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The World in 2025

Contributions from an expert group



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EUROPEAN COMMISSION

The world in 2025

Contributions from an expert group

Edited by Elie Faroult

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TABLE OF CONTENTS

Jean-Michel BAER - Foreword	7
Gijs BEETS – The world in 2025: Demographic issues	9
Lionel FONTAGNE – The world in 2025: Macroeconomics, Growth, Trade	27
Luc SOETE – Malthus’ Revenge	35
João CARAÇA – 2025, a World too different from today?	57
Geoff MULGAN – Europe 2025: Discovering the future through action as well as analysis	69
Thierry GAUDIN – The world in 2025: A challenge to reason	77
Professor Uno SVEDIN – Towards the gardening of the planet in the period of the anthropocene: <i>The World as socio- bio-space (SBS) - future options and challenges</i>	163
Jacques THEYS – Le Monde en 2025 : Les quatre transitions	185
Samir AMIN – Au-delà de la mondialisation libérale : Un monde meilleur ou pire ?	207
Samir AMIN – Is the European project viable?	231
Nicole GNESOTTO – Le monde en 2025 - Indicateurs Défense et sécurité : vers davantage d’insécurité	239
Irina KUKLINA – The World in 2025: focus on Russia	245
Rongping MU – Innovative Development and Innovation Capacity-building in China	249
Loukas TSOUKALIS – Thoughts on Governance and Power in the World System	271
Josephine GREEN – Democratizing the future	275
Yvan DECREUX, Christophe GOUEL & Hugo VALIN – The World in 2025: Economic projections with the MIRAGE model	311

INDICATIVE SCENARIOS	347
KEY MESSAGES FROM THE EXPERT GROUP	375
LIST OF THE MEMBERS OF THE EXPERT GROUP	385

FOREWORD

Foresight is a matter of building on sound qualitative and quantitative data on the past in order to elaborate creative and imaginative scenarios on possible future trends and events. We don't pretend that the imagined scenarios will necessarily occur exactly as predicted but hope, rather, that they will help to open a broad discussion on the basis of "what would happen if...". In this way, we hope that different stakeholders can exchange, communicate and even agree on their understanding of complex situations and, as a result, difficult decisions which would have to be taken.

DG Research's Directorate for Science, Economy and Society, in collaboration with the Bureau of European Policy Advisers (BEPA), launched a Foresight expert group on "The World in 2025" which met on five occasions in 2008 and 2009.

The objectives of this group were first to assess and measure global trends over recent decades, distinguishing the different major economies and regions, including the European Union, and the main economic, geopolitical, environmental and societal relationships and inter-connections, to serve as a basis for forward projections. Secondly, the group was asked to generate and analyse alternative (even disruptive) scenarios of world trends up to 2025, based on specified assumptions about economic, political, social, environmental and technological developments, in order to assess their consequences for the EU and to examine which policy responses could be appropriate.

"The World in 2025" group was composed of experts with a profound understanding of global challenges and developments, as well as a solid knowledge of foresight in specific countries or regions. The list of experts can be found at the end of this publication. Each expert produced an individual contribution to the discussions and, collectively, they generated a set of indicative scenarios for the world in 2025.

The experts covered a wide range of issues, including demography, migration, urbanisation, cohesion, macro-economics and trade, employment, services, environment and climate change, energy, access to resources, education, research, technology, innovation, economic governance, defence, security and intercultural dialogue.

The key messages summarised at the end of this document concern the main challenges to be faced in the next fifteen years, the main drivers that could impact on the future, the main strengths and weaknesses of Europe by 2025 and finally the wildcards that may radically change the different situations that are foreseen.

The stimulating contributions and discussions of this expert group have paved the way for a broad debate at European and world level. This prospective analysis helps us to understand, anticipate, and better shape future policy and strategy developments in the European Union.



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The world in 2025: Demographic issues

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World population size

World population size currently stands at 6.5 billion, will continue to grow but is expected to stabilise at about 10 billion in the next century (UN 2006 Medium variant¹). Medium variants in earlier projections almost always indicated ongoing increases to higher levels into the far future (due to above replacement fertility), but more recent expectations make stabilisation appear at the horizon, as a result of the expected fall in fertility towards the replacement level. Around 1950 a woman had on average 5.1 children, currently the average stands at half that number (2.5) expressing an enormous achievement. The UN expects a further fall towards the replacement level (2.1) by about 2040. However much uncertainty continues around these figures: a higher rate by mid-century is more likely than a lower. A recent report shows evidence on stagnation in the fall of fertility in Africa, the major region where fertility is still relatively high. If that were the case then world population size would increase further and could eventually stabilise at a higher level (Bongaarts 2008).

Around 1900 the world had 1.6 billion inhabitants, by 1950 2.5 billion. Between 1950 and 2000 world population size more than doubled. The population growth rate is now diminishing.

Fertility is the main driver of population sizes. If nothing had happened in the world fertility level since 1950 (while the mortality level had improved as it did) then world population size would have been over 10 billion today, and would exponentially continue to increase towards 18 billion by 2025 (towards 35 billion by 2050; and to (astounding!) over 250 billion by 2150). No change in both the fertility and mortality levels from 1950 onwards would lead to 10 billion inhabitants by 2025 and 15 billion by 2050 (with also a continuing exponential growth rate afterwards).

The countries that we currently call the *more developed world* are inhabited by about 20% of the world population. Around 2025 this will have diminished to around 15%. It means that population increase will be mainly a matter of the *less developed world*. Europe's² share will diminish from currently 12% to around 9% by 2025. In 1950 Europe had 22%. Europe is the 'big loser', Africa the 'big winner'.

If EU-27 is seen as one country then it currently has, with 496 million inhabitants, the third position in the row of most populated countries, after China (1331 million in 2007), India (1136) and before the USA (304). Other countries included in the current top-10 include Indonesia (228), Brazil (191), Pakistan (185), Bangladesh (147), Russian Federation (142), and Nigeria (137). Each of these countries is much larger than the single most populated EU Member State, which is Germany (83). By 2025 the world top-10 has not changed very much

¹ See: <http://esa.un.org/unpp/index.asp?panel=1>

² Europe according to the UN definitions, i.e. including the complete Russian Federation.

but by 2050 India is at first position (1593), China second (1392) and the EU-27 still third and the only one with a population size 'over the top' (515) which is expected to be reached around 2040 (520). USA (395), Pakistan (305), Indonesia (285), Nigeria (258), Brazil (254), Bangladesh (243) and Congo-Zaire (177) complete the 2050 top-10. No single European country is located in the top-10 then. Specifically the enormous population increase in Nigeria, Bangladesh and Pakistan is noteworthy, to a lesser extent also the increase in India and Brazil. The USA is expected to have a higher population increase than Indonesia.

The population of China will level off by 2040, mainly due to the one-child policy that was introduced in 1978. If no change had occurred in the Chinese fertility rates from 1978 onwards then China would currently have had some 500 million more inhabitants, i.e. about 1.8 billion.

Maybe more important than the sheer numbers of population will be their behaviour. If from tomorrow onwards all world citizens would behave like the American population with by far the largest per capita energy and food/water consumption patterns in the world these commodities would become scarce immediately and most likely create a severe world crisis with exploding costs of living. The poorest nations would be the main victims. Extending cheap energy, food and clean water supply therefore is a number one priority.

Number of children

As indicated the world fertility decline (from an average of 5.1 children per woman around 1950 towards 2.5 currently) mirrors what enormous achievement has taken place. Of course the introduction of modern contraceptives like the hormonal pill made it possible, but why do western people nowadays want to have small families? There probably is no single explanatory variable. However, education likely belongs to the set of most important reasons. Education, together with welfare and development turns out to be a very good contraceptive recipe: unwanted childbearing diminishes, children are born later in life, spacing becomes easier, and the lower final number of children gives more opportunities towards having an economic career.

More so than men's education, women's education is a driver for the number of children. The lower educated used to have much larger families than the higher educated. Per educational level recent evidence shows that this is still the case, even in western societies, but variation has decreased considerable, also because families have become rather small in general. However, if one looks to the number of children per *mother* the variation in number of children is almost absent: currently the higher educated are more often childless, but on the other end if they have children they have slightly larger families.

In the more developed world the number of children dropped from about 2.8 around 1950 towards 1.6 currently, i.e. below the so called replacement level; in the less developed world the decrease went from 6.2 to 2.9 in the same period. However the least developed world (mainly sub-Saharan Africa) saw the number of children only decrease from 6.6 to 5.0. Of all continents the European fertility rate is currently the lowest, and in the 'old' EU (EU-15) it is higher than in the new Member States. The 'low fertility virus' is spreading quickly to increasingly more countries, also outside Europe. According to the *second demographic transition (SDT)* theory (Lesthaeghe & Van de Kaa 1986) it is associated with societal developments that stress the importance of ideational changes in bringing about certain (macro) demographic behaviours such as single living, pre- and post-marital cohabitation, delayed fertility, high prevalence of non-marital fertility and high rates of union disruption.

This developmental view is subject to debate, in particular with regard to the possible persistence within Europe of the differences between the patterns of family and fertility behaviour in north-western Europe – the cradle of ‘new’ family patterns – and southern European societies on the one side and central and eastern European countries on the other side: will family and fertility behaviour converge to a common ‘standard’ as set by societies that are considered to be most advanced, i.e. Scandinavian countries, or will variation persist?

On the other side, on the micro level the diffusion of the SDT concept has focussed attention on the importance of subjective evaluations (especially, of values) in shaping differential family and fertility behaviours within societies. This is of course connected to the macro-level developmental idea of SDT (a higher share of the population sharing ‘new’ values in certain countries may imply a higher share of the population exhibiting ‘new’ behaviours), although it has a more general applicability. Long-term persistence of old behavioural patterns or resistance to new behaviours can be connected to the reproduction of certain values. In addition, the connection between values and behaviour may be not direct and may vary across contexts.³

Connected with the spread of modern contraceptives and the increased educational levels is the fact that young western adults can experiment more extensively with union formation before settling down and start a family. As a result patterns of union formation (and dissolution) have changed substantially: unmarried cohabitation has increased, marriage takes place later and divorce occurs more often. Childbearing has become a result of deliberate reflections (i.e. unwanted pregnancies are getting scarce) and occurs much later in people’s lives; more specifically adults first spent a good time without having the responsibility for a family and only after having build up basic security on several fronts (partner, labour market and income, house) they may feel ready for having a baby. Where in western societies the first child used to come when the mother was 21-24 years old, this has shifted to 25-28 years, in some countries even 29 years (Italy, Spain, Netherlands). Where women are 30 or over when trying to have a first child, for example because they first wanted to fulfil other aspirations (educational degree, economic career, being independent for a while) or had not found a partner yet, involuntary childlessness increases due to fecundity problems. Like natural pregnancies also getting pregnant via an IVF procedure depends on chances. About half of the IVF patients will ultimately not have the child they so badly wish.

Most people do want to have children. Unwanted childbearing has almost disappeared. After finishing education and entering the labour market men and women first want to enjoy their independence in the free time they have, make some fun, find a steady partner, etc. They are looking for a ‘certain amount of happiness’. Only after several preconditions are ‘secured’ (having found a steady partner, a steady income, a nice accommodation, and an agreement on child care) people feel ready for having children, and to invest energy, time and money in raising the child. Pregnancies will be postponed as long as not all preconditions are secured. So, creating a ‘safe and secure garden’ for young adults is essential for making them decide to become parents. If the ‘garden’ is too nice one may easily have a number of children above the replacement level, i.e. non-sustainable. But, men and women are often observed to have different ideas on the importance of such preconditions and the timing of children.

Women are more precise in their child wishes, and often make their partners follow their ‘plans’. Having an economic career often depends on the woman’s family situation. In western societies an economic career may be the number one ambition for very highly educated women, giving room to voluntary childlessness if the compatibility between the work and family careers is perceived as (too) far from easy.

³ This text on SDT is taken from <http://www.eaps.nl/activities/wgcurr/2ndtransition.html>

It is paradoxical to observe that the hormonal pill, developed to help people optimally decide on the number and timing of children, also led to more difficulties for youngsters to find the partner to share parenthood with. As unwanted pregnancies are easy to prevent, the search for a partner has for many developed into a troublesome and sometimes long-lasting route. After having experimented with some sequential cohabitational unions people easily separate but do not easily start a new relationship again, as they have become increasingly more critical.

Immigrants normally take with them the fertility patterns they were familiar with in their country of origin. However those who have immigrated with their parents at very young ages, or were born in the immigrant country (second generation) have already adapted substantially to the local behavioural pattern. In the third generation normally hardly any variation in the fertility pattern is observed anymore. Note that also in most of the non-western countries of origin where immigrants to Europe stem from, the fertility rates have dropped considerably over the past decades.

Fertility quantum and tempo

Fertility is demographically a very complicated process. From year to year births are registered together with several characteristics of child and parents. However decisions to have a baby are related to the individual's wish to have children and the possibilities to start a pregnancy. As women are increasingly better educated and (also as a result of that) more labour market oriented, practising contraceptives effectively and enjoying young adult life, the age at first birth has increased significantly over the past few decades in the western world. Postponement of having children is one of the major determinants of the low fertility levels that are currently registered. However the current levels tell only part of the story about the number of children born per woman in her life time, as postponement may be made up later on.

The best way to understand fertility behaviour is via *birth cohort* (birth year) analysis, not via *period* (calendar year) analysis (see Figure 1, based on Sobotka 2004). If women postpone childbearing (Phase 1), i.e. they have their first child later in their life than women born in previous cohorts, one will observe a rise in the age at first birth and, as a consequence, a drop in the number of children born per calendar year (period Total Fertility Rate – TFR). This ‘tempo effect’ may sometimes lead to ‘dramatically low’ TFR levels (like currently 1.1-1.3 in several Central and Eastern European countries). When the first group of postponers starts to catch up having children but those from subsequent birth cohorts are postponing Phase 2 follows, characterised by a more or less stable low period TFR. When the increase in the age at first birth starts to diminish (Phase 3) or stalls completely (Phase 4) people are catching up having children that were postponed before, and the period TFR increases substantially again. However period TFRs will not reach the initial higher (cohort) levels, since a later start normally leads to a lower ultimate number of children (quantum decline). Making a forecast with keeping lowest low TFRs constant in a period of a rising age at first birth may lead to a very inaccurate picture of the future.

USA fertility rates

Compared to Europe the USA total fertility rate is often mentioned as surprisingly high. If one looks to EU-27 that is true: the recent USA rates remained at about or only just ‘millimetres’ below the replacement level of 2.1, while EU-27 period rates are (with just below 1.6) much further down. However a closer look shows that a lot of variation hides behind the overall USA level (see Figure 2).

More than half of the states (31) have rates below 2.0 (averaged over the period 1990-2005); the lowest is Vermont with 1.67. Rates are above 2.19 in Alaska, Arizona, California, Hawaii, Idaho, Nevada, New Mexico, Texas with Utah being the highest (2.54), i.e. states in the south and the west, and in some of these Spanish is the main language; rates below 1.90 are observed in Connecticut, District of Columbia, Kentucky, Maine, Massachusetts, New Hampshire, New York, North Dakota, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia, i.e. states which are to a large extent located in the north-east, originally the 'most European' area. Maybe there is not that much of difference between the USA and EU fertility patterns. Also the USA is characterised by significant postponement behaviour and childlessness among the higher educated women. However what really differs, and remains a painful concern as both determinant and consequence are poverty related, is the much higher USA teenage pregnancy rate which usually goes together with a higher TFR. Characteristic also is that up until very recently the TFR for blacks used to be (much) higher than for whites in the USA (see Figure 2). Like within Europe it is very unlikely that the within-US variation will disappear soon; even more so, and that would not be for the first time in the world, demographic heterogeneity in fertility may contribute to conflicts if some sub-populations are perceived as 'growing too fast'. Conflicts usually have a lowering effect on TFRs. The US north-south divide is also from a demographic perspective one of concern.

Effect of policies to influence fertility

The decline of fertility to very low levels in countries of Southern Europe in the 1980s and in Central and Eastern Europe in the 1990s has raised concerns, as the continuation of such patterns leads to population decline, and intensifies the challenges posed by population ageing. Most governments from these countries regard their fertility levels as too low and are looking for measures that could counterbalance the trends.

History indicates that it is possible to influence the fertility level by making specific policy measures. In some authoritarian run countries evidence shows that effects may be severe (the 1978 Chinese one-child-policy to prevent a too large population; the 1966 Romanian abortion ban to stimulate a larger population, which failed already after one year as the population found other ways to prevent getting too large families – however it created a one-year excessive baby boom).

In democracies policy measures are rarely made with specific pronatalist population goals, but more often with an aim to facilitate people to fulfil their wishes with respect to work and family. Most evidence on the possible fertility level effect of policy measures suggests⁴ that such effects are normally small, no more than 0.1 child per woman (Gauthier 2007). However, several measures taken together in a coherent way may make a difference, although the costs of such interventions will most likely be enormous.

Surveys indicate that childless people expect positive effects on their future number of children from a larger availability of facilities (like child care, flexible working hours, leave). However people with already one or more children expect positive effects only from more extended financial support (like child allowance) as they do not believe anymore that facilities will be extended adequately and in time to meet their preferences.

⁴ It is extremely difficult to assess the fertility effect of separate policy measures, certainly when these are not quantifiable. One cannot experiment with manipulating populations under various conditions in a laboratory. Moreover cultural settings between countries may be so diverse that a specific measure might be effective in one country but not necessarily also in another.

But there is a complication. Childless people have ideas about their future family size. Initially, they have a specific, slightly utopian idea about that family size (normally above the replacement level). However, as soon as the first child is born they lower their family size wishes to a level often below the replacement level. Ultimately they are even unable to finish at that level, due to circumstances that may come on their road, like for example union break up, declining fecundity, labour market priorities. It would be very difficult then to convince people to have an extra child. Children are born as a result of couple's family size wishes, not for a nation's sake! Below replacement level fertility will very likely continue for at least a while in Europe.

It seems to be easier to influence, via specifically directed policy measures, the timing of people's children than their number of children. If policy measures appeal to people they may be stimulated to have a child rather soon, but not necessarily have more children in their life time. If all of a sudden children are only born earlier, one will observe a baby boom, together with stagnation in the increase of the mother's age at first birth, followed rather rapidly by a baby bust (see Sweden 1990-1995). So, do not interpret baby booms as a great pronatal success until being assured that a (likely) baby bust did not follow.

A recent Dutch study (Centraal Planbureau 2006, referred to in NRC Handelsblad 2 August 2008) confirms that it will be counterproductive to try to raise the number of children in order to facilitate the expected rising costs of population ageing: adding extra children via specific pronatal or child supporting (family) policies will be so expensive that total expenditure will on the short run increase enormously. Extra financial support to couples to help them have more children than they most likely would have had otherwise is an extravagant investment as the newly born will only add to treasury after entering the labour market as a young adult, i.e. as population ageing is close to its top. So, population ageing is an autonomous and inevitable process that gradually fades away in the course of this century but leaving behind a population with a much older age structure: a challenge for societies to anticipate.

Life expectancy

World wide life expectancy has risen from 46 years around 1950 to currently 66 years. In the more developed world it went from 66 to 76, in the less developed world from 41 to 63 years. In Europe the rise was slightly less than in the more developed world, from 66 to 73, mainly due to stagnation in Central and Eastern Europe shortly after the fall of the Berlin Wall. The rise in life expectancy has been spectacular in many western countries in the first half of the previous century, as a result of the enormous efforts our ancestors made in improving sanitation and hygiene, as well as, but to a lesser extent, of the improvements in medical diagnoses and treatments. The outcome was a successful fight against infectious diseases; today most western citizens die at high age of endogenous diseases.

All efforts are still directed towards making life span even longer. However, scarce, increasingly available but still conflicting data on the 'healthy life expectancy' seem to suggest that men and women have about an equal absolute number of healthy years. As women live longer, they have a larger share of unhealthy years. Do men catch fatal diseases at lower ages than women or do they die from such diseases more speedy than women? Healthy life expectancy is rising but not so quickly as total life expectancy. Possibly new unhealthy life styles (obesity) contribute to this trend. It leads to the paradox that the most recent investments in health care systems and treatments add to the prolongation of 'unhealthiness', an expensive exercise.

Epidemics normally only have a small effect. The HIV epidemic for example has only a minor effect on total populations, their age structures etc., even though already some 2 million people have died from this epidemic and 33 million individuals are currently infected world wide. Since HIV is more prominent in sub-Saharan Africa, the effects there are somewhat larger, but no country is expected to suffer from any substantial population decline only due to the HIV epidemic. HIV has passed its top but the numbers of new infections will remain high for the time being, specifically in Africa, but within Europe also in central and eastern Europe (UNAIDS 2008). It means that still many efforts are needed to help those who suffer from the virus. It also means that we may expect that by 2050 the epidemic has almost disappeared (from Europe; not yet world wide).

The future of life expectancy is under debate. Some scientists believe that the rise in life expectancy will continue as it did over the past decades, others believe that it is much more difficult to keep up that pace since improvements now have to be made mainly at higher ages while at the same time people at lower ages increasingly show unhealthy life styles. Moreover scarcity in food and drinking water may form a threat as well as climate change if that would lead to disasters including mass migration. And we should be on the alert, every day and every place, for a possible start of a pandemic, which may spread quickly (via air traffic contacts) and kill millions if we are too inattentive.

Migration and migrant populations

International migration plays a much more important role in demographic trends than before. International comparable statistics are scarce, also because the definition of what is a migrant varies. Migrants are mainly driven by economic reasons or political instability (refugees / asylum seeking), in the future likely more often also by natural disasters of which some may be the result of climate change. Migrants orient towards countries where they have historical or cultural bonds with (including language bonds), or where already larger groups from the same country of origin have settled and have send positive information. Over the past decades the European economic prosperity has attracted many immigrants from a variety of countries. Some of these migrants groups also made large contributions to that prosperity. Migrants may stay only for a short period (for study or work reasons), or were young at arrival and stayed much longer than initially planned. They may, at a certain moment, have brought their family to Europe as well (chain migration: first economic reasons, subsequently family reunion and family formation reasons). Some of the migrants, whether for economic or family reasons, arrived illegally.

UN estimates suggest that about one third of all international migrants in the world live in Europe (i.e. persons born in another country). These 64 million persons make up 9% of the total European population. North America (44 million) and Oceania (5 million) have lower absolute numbers but higher shares of their population being born in another country than where they live, respectively 13 and 25%. Usually the number of migrants diminishes with increasing migration distance.

The various 'non-western' minority groups have substantially enlarged within Europe due to ongoing immigration, and due to higher fertility. However the longer ago immigration took place the more first en second generation immigrants have adapted to local circumstances (in their family and fertility behaviour, but also from a human capital perspective). In general one can say that third generation immigrants can hardly be distinguished on the base of their specific behaviour.

When first generation immigrant streams are lowering and the second and third generations are gaining importance (looked upon as the total minority population including offspring) one can observe various elements of integration behaviour, among which family and fertility behaviour.

Often politicians and others suppose that population ageing can be stopped via replacement migration, i.e. that international migration may be a help to take away some of the severe (financial) sides of population ageing. In theory that is true, but practice is different. If the number of children born per woman lies below the replacement level of 2.1 children per woman, let us say at 1.7, then the required number of extra migrants needed to stop population ageing completely, would be 0.4 ‘migrants per woman’ (and more notably these migrants would need to be 0 years old). Such practice would normally involve giant numbers of immigrants. At specific localities this may be feasible but not on large scales, as less population ageing in region A due to immigration from region B will lead to more population ageing in region B just because all world regions are ageing. However some regions (Africa) are still in an early ageing stage and could potentially send quite a few migrants as long as these regions suffer from wide spread unemployment and poverty.

Population ageing

The age profile of populations mirrors the demographic history of the past 100 years (Figure 3). The number of survivors normally follows very precisely the fluctuations in fertility that took place in that period. Only excessive fluctuations in mortality and migration may be reflected as well. In many western countries even the baby boom after the First World War is still visible, even though the majority of persons born around 1919 have deceased by now. But much more impressive and ‘rather exceptional’ has been the baby boom born after the Second World War. In many countries this boom ended only around the late 1960s or during the 1970s. As these birth cohorts can also expect to profit from substantial increases in life expectancy just this boom, ending rather abruptly, forms the major reason for population ageing in Europe in the coming decades. It will last up until the last baby boomer has died. If fertility continues to be below replacement and migration will not make up natural decline, population sizes will decrease. Even in such declining populations the ageing process may come to a halt. The models for Europe show that population ageing will reach a top around mid century (with in EU-27 a share of the 65+ population at around 30%) and that some rejuvenation will occur. However the 65+-share will only drop a few percentage points and most likely become more or less stable then. Anyhow it will be much higher than the current level.

The current process of population ageing that started already more than 100 years ago, is “unprecedented, pervasive, profound, and enduring” (UN 2007). World wide the percentage of persons of 60 years or over⁵ was 8 in 1950, 11 in 2007 and it is expected to rise to 22 by 2050. Almost no country escapes from this trend. Europe is frontrunner but also the first to see some relief by mid-century. Variation within Europe is large (see Figure 4), specifically Eastern Europe was hit by the world wars (low fertility, high mortality/migration), which is still visible (also because of its recurrent effects in the next generations).

As ageing basically results from falling numbers of children, the process normally shows that first the youngest age groups get smaller, but with time proceeding the following age groups are ‘affected’.

⁵ The EU normally gives percentages of the population 65+, the UN of 60+.

Gradually the labour market population will start ageing as well, first due to lower entrance streams, many years later due to larger exit streams which leading to a boom in retirement (which is expected at short notice when birth cohort 1946 turns 65 years), later on followed by a boom in the number of very old people. Consequence of this process is of course that the dependency ratios are changing fundamentally as well, in the sense that the number of dependent people per independent person will rise substantially. Currently the ‘window of opportunities’ or ‘demographic bonus’⁶ is in many countries relatively large: the number of 0-19 years together with the number of 65+ years compared to the number of 20-64 years (the potential labour market population) is around the lowest point, i.e. those who are economically active have only to care for a relatively small number of dependants (who were mainly youngsters in the past, but now increasingly older). This will change rapidly to the worse.

Ageing will challenge intergenerational solidarity due to changes in family patterns (more unmarried cohabitation, later marriage, more divorce, more repartnering, smaller family sizes, later childbearing). This will trigger social protection systems in finding social cohesion to support people to interact as much as possible within and between generations, both in countries with cultural traditions of stronger or weaker family ties. Measures in support of child and elderly care as well as measures that make work-family balances more compatible can strengthen intergenerational solidarity.

Small and large populations

The smaller the population size the larger the effect of for example (temporary) disturbances or of migration may be. Making forecasts for small populations is therefore much more hazardous. To show some examples of such effects: Figure 5 gives the population age structure for four university cities in the Netherlands. University students (among them several from abroad) arrive in such cities around the time they turn 18-20 years, and most leave again after finishing their studies. From the graphs we can learn that the total Amsterdam population is so large that hardly any ‘student peculiarity’ can be distinguished even though Amsterdam has two large universities. In the other municipalities these graphs reveal some characteristics of the university: Utrecht turns out to attract much more women than men to study there; Groningen has almost equal numbers of men and women of which many obviously leave the city again before they turn 30 years (which seems to be much less the case in Utrecht), while Delft (Technical University) obviously attracts more men. Expectations that such excessive age groups will grow older in these populations are likely to be false.

One can display several other sub-populations, for example by ethnicity (Figure 6) or for some exceptional cases (Figure 7). Figure 6 gives populations by country of origin (including the second generation off-spring) for the Netherlands. As many of these immigrants arrived only in the past decades, mainly at a relatively young age, population ageing among these groups is currently not yet very advanced: the percentage older persons is still fairly low, also because people may return to their country of origin when retiring. Moroccans have relatively large numbers of children, currently older Turks and Moroccans staying in the Netherlands are often males. In the near future this may be quite different.

⁶ Referring to the period with a relative high share of the working-age population.

Population seen as a super tanker

The larger a population the less sensitive it is for disturbances. Fluctuations in fertility, mortality and/or migration should be enormous before becoming visible. Therefore it is almost for sure that world population size will further increase and not stabilise before the end of the century. The European population will decline rather soon, and population ageing is advanced and inevitable.

Populations can be compared with super tankers that just continue their path straight on unless manoeuvring far in advance before entering the harbour. This manoeuvring is very delicate and should occur far in advance since the autonomous power of the super tanker is enormous. It is very difficult to get a tanker deviate from its planned route. Starting to manoeuvre too early or too late ultimately has far reaching effects like missing the harbour or disturbing others. Adding new (fertility; immigration) or losing 'passengers' (mortality, emigration) may not make much difference. Currently the EU-27 population counts almost 500 million persons. Per year almost 5 million children are born (about 10 per 1,000), 4½ million die (9 per 1,000) while net migration (immigration minus emigration) comes to 1.5 million (3 per 1,000). So, net migration is currently larger than natural increase. However the number of immigrants is (most likely) smaller than the number of babies. These figures also indicate that around 98% of the population does not make any such transition per year. They only get older, and some of them may change their household composition or location but that does not change the sheer numbers of persons present. All this makes that real demographic changes take place very gradually, and that effects of a 'major impact' may be very small. Even mortality effects of wars, natural disasters, or epidemics on large populations are usually small. HIV/aids will most likely not cause serious population declines, also not in the most infected countries in sub-Saharan Africa; it only leads to a slightly lower population increase.

Final remarks

'Demology' (the full explanation and so understanding of demographic changes) does not (yet) exist. Demographers (describing population changes) come closer with small bits, but population structure and change roots in a broad range of societal developments (union formation, fertility, mortality, migration streams, households, ageing issues, minority groups, health, welfare, etc), while population structure also influences society. The full understanding of how and under which conditions population affects society and vice versa remains unclear to a large extent. Demographers try to develop more theories in order to explain variation but often only detailed 'period' descriptions are available which in research are not easily translatable into life course behaviour.

When developing projections demographers are often confronted with 'their arrogance': how the hell can you say something serious about 50 years from now? Well, demographers do not pretend to know the future, but since a large share of the population that will live by 2050 is already born now, and since those who are still to come will be born according to certain (life course) patterns that only change gradually, demographers build demographic variants (scenarios) about the most likely future given realities of yesterday and today together with broadly discussed and supported expectations on demographic behaviour in the near future. Such expectations normally lack a more thorough underpinning of for example educational and labour market expectations as well as international economic outlooks. However population projections were less but have become much more accurate (also due to more advanced modelling techniques), much more so than for example weather forecasts or economic outlooks.

The demographic projections always start from the supposition that major catastrophes are not to be foreseen. Specifically in projecting populations of small areas with fluctuating migration streams projections may turn out (very) inadequate quickly.

In the 1970s-1990s evidence showed that fertility in western countries correlated negatively with female labour force participation, currently it is positively correlated. Is that related to a transitional period and if so for which of the two (or for both) has that come to a final end now, or more precise: what is the chicken and what is the egg? Almost for sure many issues are at stake here: changes in educational levels, labour market aspirations and contracts, union formation, family sizes, timing of fertility, etc. Maybe more precise models should be developed as the 'populations at risk' are different: not all women participating on the labour market will have a child in a certain calendar year.

It is inevitable that the world population size further increases. It will not stabilise before the end of the century at a level of around 10 billion. Very differently from that Europe is on the edge of reaching its maximum and will decline subsequently. That is a rather normal and gradually ongoing demographic process when fertility is low. Migration may be able to somewhat dampen the associated effect of population ageing, but will not be able to wipe out ageing completely as the whole world is ageing and other countries would age more rapidly if large shares of their (working) population would move to Europe (or elsewhere). So population ageing is there to stay, but will in Europe come to a close when the quantitative effects of the post-war baby boom are becoming extinct, i.e. after 2050. Even with sub-replacement level fertility the declining European population will start to become slightly 'greener' (younger) by then (although remain much older than currently), while the other continents will still be faced with increasing population ageing issues as they are lagging some decades behind. Moreover population ageing has different origins there: in China for example due to the one-child policy, in Africa due to falling fertility without any relation to a Second World War.

Population ageing and decline are the two major issues that will determine the future European demographic landscape. People may think that the European population will become extinct soon but that is very unlikely: with the current demographic indicators even at the end of this millennium Europe will be populated.

Population ageing and decline should not be seen as *problems* but as *challenges*. We know fairly well what maybe expected year by year: a gradually rising share of the older population. Even though this share may still double within the coming decades, the rise is spread over several years to come. In many countries the percentage also doubled in the past 50 years. Has that created serious problems? I think 'not': it came over us and each year we adapted a bit. Given the demographic knowledge we currently have we can plan the consequences, the 'political process' of national budgeting and restructuring society, much better. Countries that are not yet that advanced in population ageing and decline may learn lessons from those that are more advanced.

Population ageing and decline will certainly bring Europe to develop societal adaptations, most likely with within European variation. It will also give Europe a position to set political agenda's world wide. The world needs to make progress towards 'sustainability'. It will be an enormous challenge to get population sizes elsewhere more sustainable, and, more important, their life style. If life styles would be similar to what is normal now in the USA or in Europe then there is a major food and energy challenge. We do not know what is the maximum nor the optimal world population size, let alone the optimal world wide life style.

Both the optimal population size and life style depend on food and energy supply, on peaceful international co-operation, as well as on where people prefer to live (megacities?). According to the FAO it is likely that 20 billion people can be fed but not if the necessary and available food supplies to do so damp off in harbour sheds.

References

- Bongaarts, J. (2008), *Fertility transitions in developing countries: progress or stagnation?* Working paper # 7. Population Council. New York, 15 pp.
- Centraal Planbureau (2006), *Ageing and the sustainability of Dutch public finances*. The Hague, 133 pp.
- Gauthier, A. (2007), The impact of family policies on fertility in industrialized countries: a review of the literature. *Population Research and Policy Review*, 26, pp. 323-346.
- Lesthaeghe, R. & D.J. van de Kaa (1986), "Twee demografische transitities?" (Two demographic transitions?). In: Lesthaeghe, R. & D.J. van de Kaa (eds), *Bevolking - Groei en Krimp*. Mens en Maatschappij. Deventer: Van Loghum Slaterus, pp. 9-24. See for a later, updated version: Van de Kaa, D.J. (1993), The second demographic transition revisited: theories and expectations. In: Beets, G. *et al* (eds.), *Population and family in the Low Countries 1993: late fertility and other current issues*. NIDI CBGS Publications # 30. The Hague: NIDI/CBGS, pp. 81-126.
- Sobotka, T. (2004), *Postponement of childbearing and low fertility in Europe*. Doctoral thesis, University of Groningen. Amsterdam: Dutch University Press, 298 pp.
- UN (2007), *World population ageing 2007*. Department of Economic and Social Affairs: Population Division. ST/ESA/SER.A/260. New York: United Nations, 517 pp.
- UNAIDS (2008), 2008 Report on the global AIDS epidemic. Joint United Nations Programme on HIV/AIDS. UNAIDS/08.27E/JC1511E. New York: United Nations (see: http://data.unaids.org/pub/GlobalReport/2008/JC1511_GR08_ExecutiveSummary_en.pdf)

2008 EUROSTAT population projections

The recently released 2008 EUROSTAT population projections show new insights, although only slightly different than previously. However, the main trends of ultimately population decline and significant population ageing are reaffirmed.

The new Member States are expected to face a period with slightly more serious population ageing than earlier expected, due to a higher life expectancy and a remaining low period TFR (EU-27: from 1.54 in 2008 to 1.67 by 2060; EU-15 (the old): from 1.59 to 1.70; EU-12 (the new): from 1.31 to 1.51). Up till 2060 life expectancies keep rising, 8 years for men, 7 years for women, slightly more in EU-12 than in EU-15. So both for fertility and mortality the within-EU variation is expected to shrink. Migration will diminish, specifically in Member States with currently the highest migration rates. Consequence is that population size will continue to slowly increase in EU-27 up till a maximum around 2035 (from currently 496 million to 520 million in 2035). But that population increase only occurs in EU-15, as EU-12 will see its population decline (from currently 103 million to 85 million by 2060). Another consequence is that population ageing continues, but its speed will diminish after 2040 and around 2060 several Member States have already passed the ageing top: they will observe some rejuvenation. By 2050-2060 EU-12 is expected to be significantly older than EU-15: in EU-12 the median age will be just over 50 years as against 45 in EU-15. Currently the median age stands at 40 years (EU-27).

See: Eurostat (2008), Ageing characterises the demographic perspectives of the European societies. *Statistics in focus*, 72/2008.

Figure 1. Relationship between fertility quantum and fertility timing (based on Sobotka 2004)

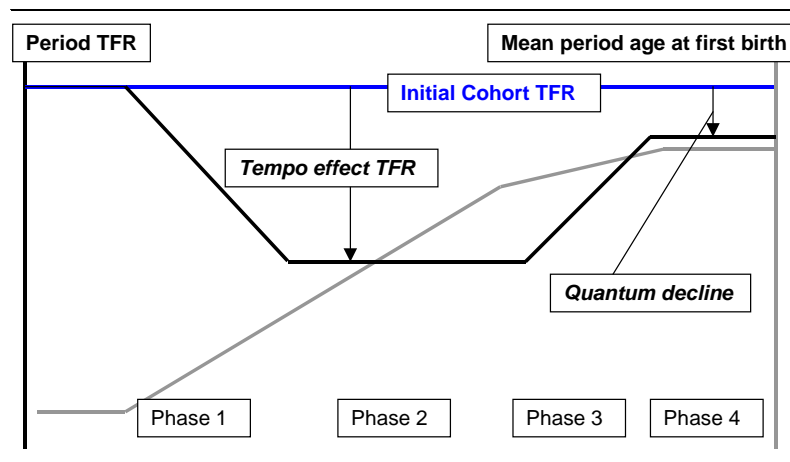


Figure 2. TFRs in the USA, 1980-2005, total, black and whites, lowest and highest States

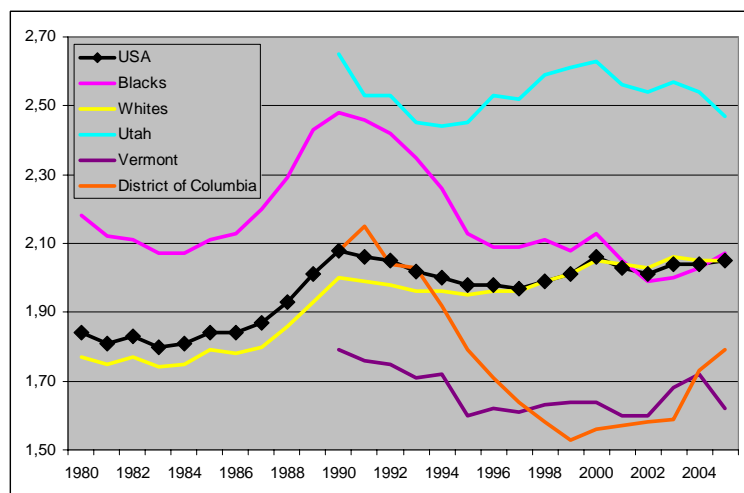


Figure 3. Population by age in 2006 and number of children born 1911-2005 in the Netherlands

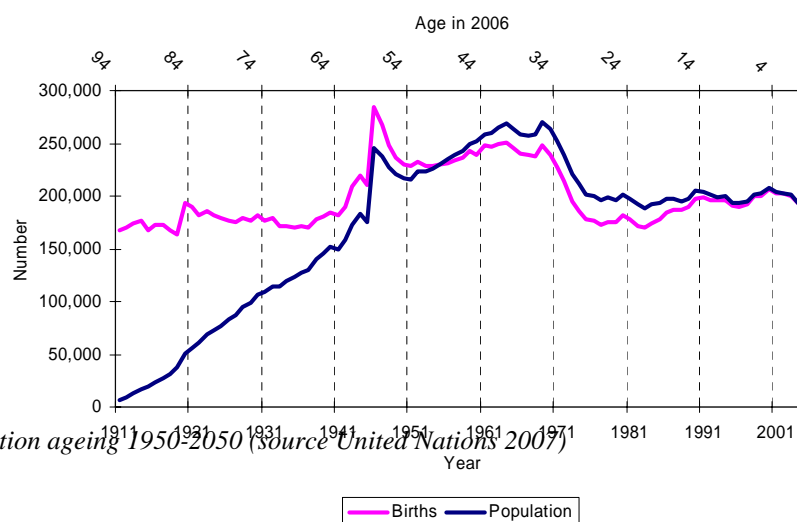
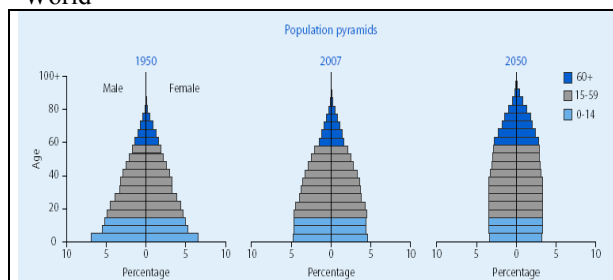
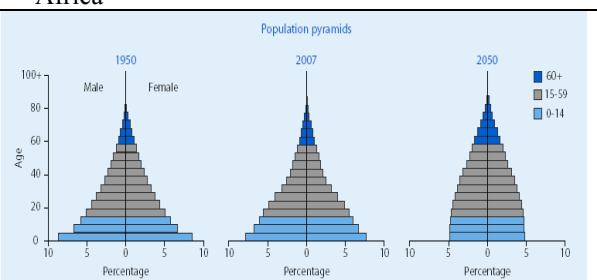


Figure 4. Population ageing 1950-2050 (source United Nations 2007)

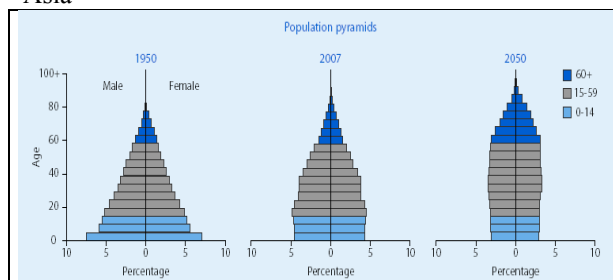
World



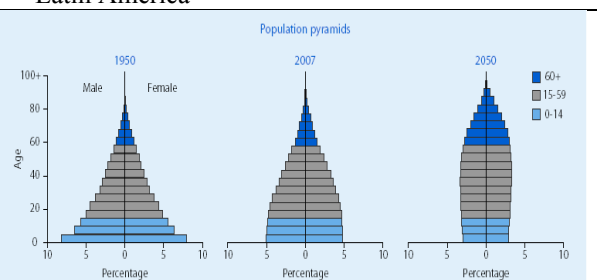
Africa



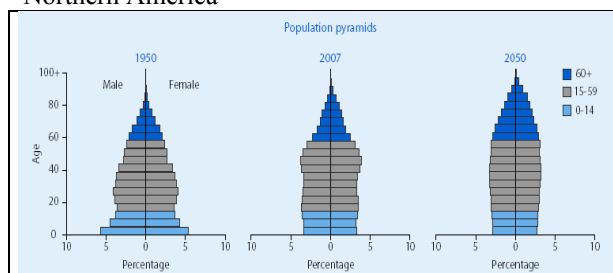
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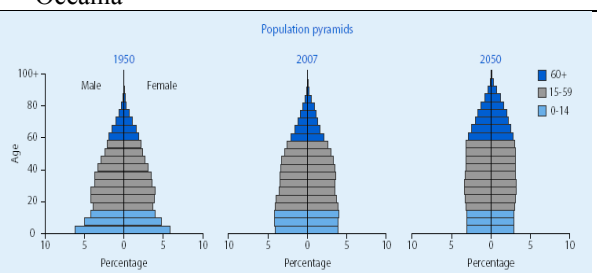
Latin America



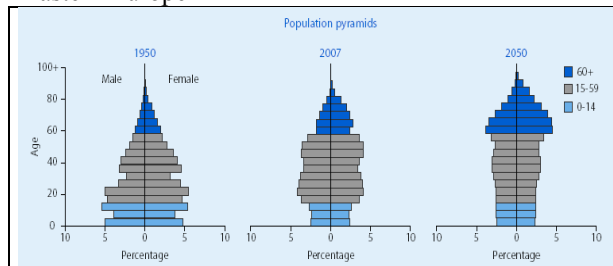
Northern America



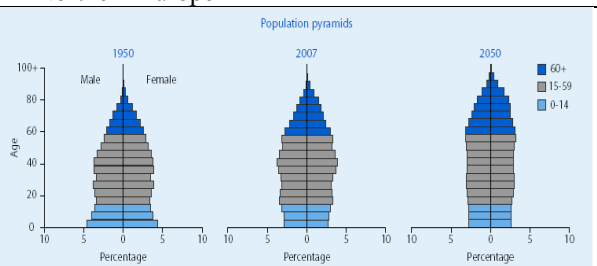
Oceania



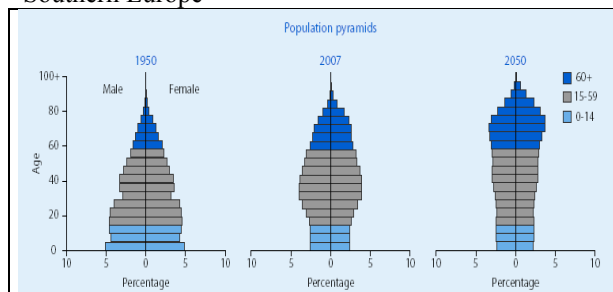
Eastern Europe



Northern Europe



Southern Europe



Western Europe

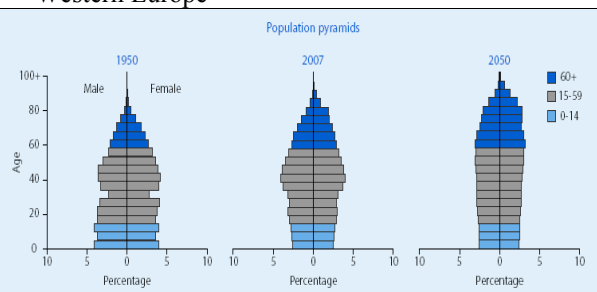
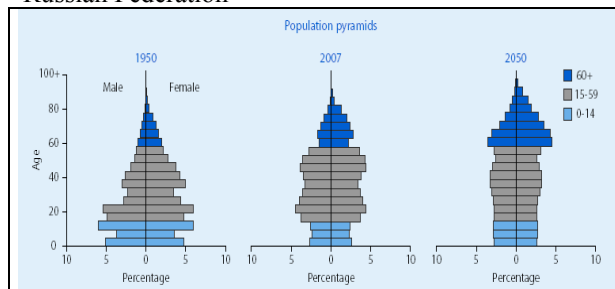
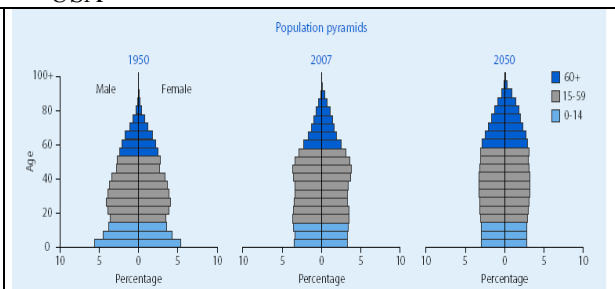


Figure 4. Population ageing 1950-2050 (continued) (source United Nations, 2007)

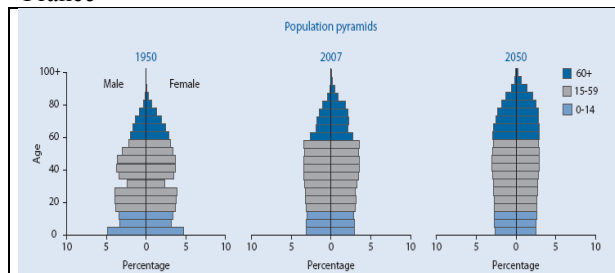
Russian Federation



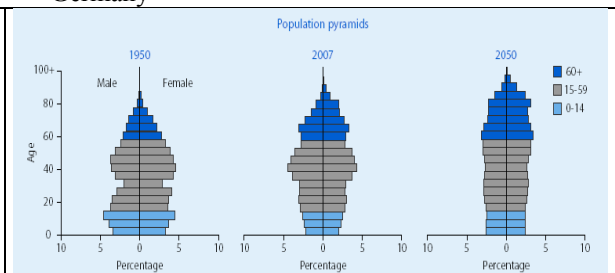
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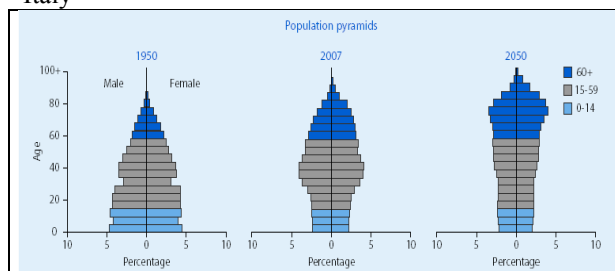
France



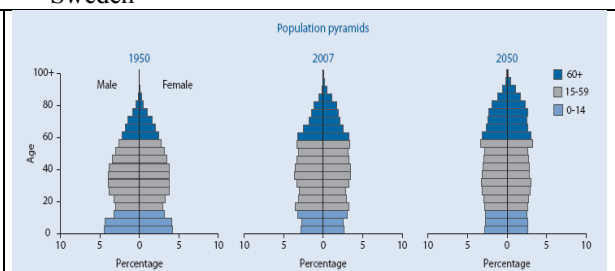
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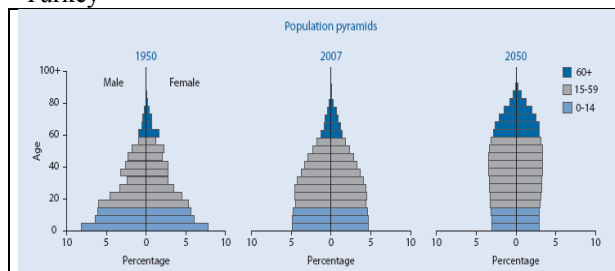
Italy



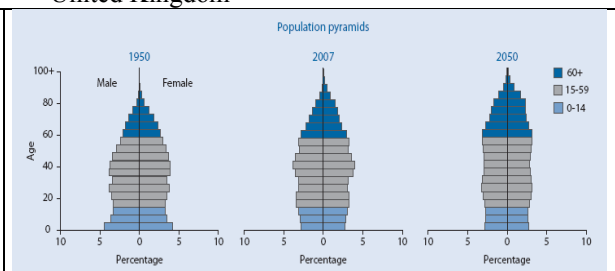
Sweden



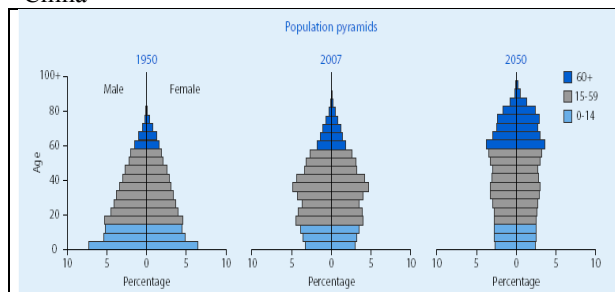
Turkey



United Kingdom



China



Japan

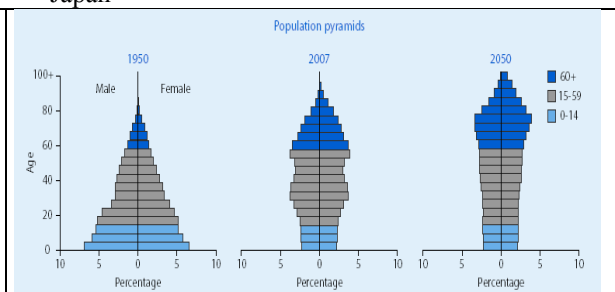
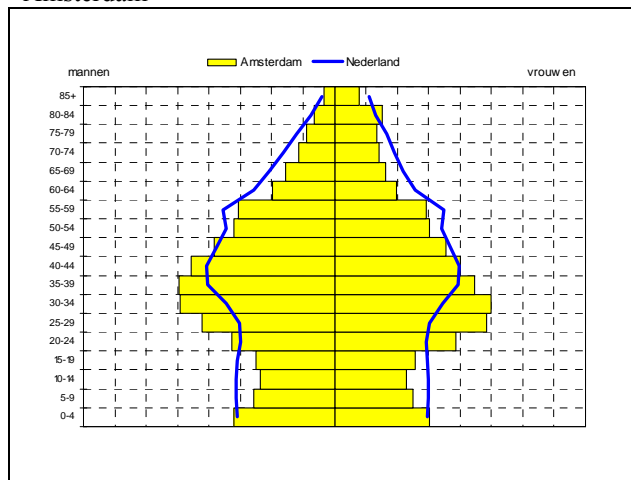


Figure 5. Population age structure, 4 University cities (yellow bars) compared to the Netherlands (blue line), 2006 (source Statistics Netherlands)

Amsterdam



Groningen

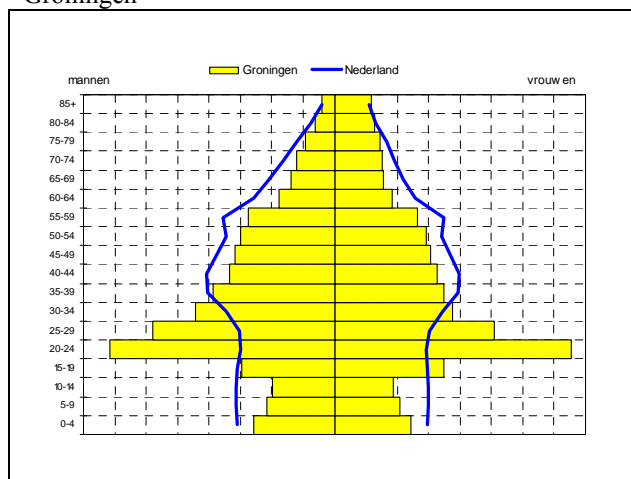
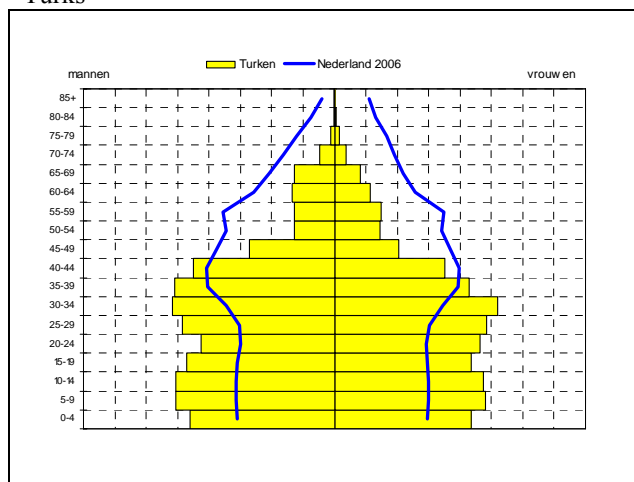


Figure 6. Population age structure, 4 'ethnic groups' living within the Netherlands (yellow bars) compared to the Netherlands (blue line), 2006 (source Statistics Netherlands)

Turks



Netherlands Antilleans

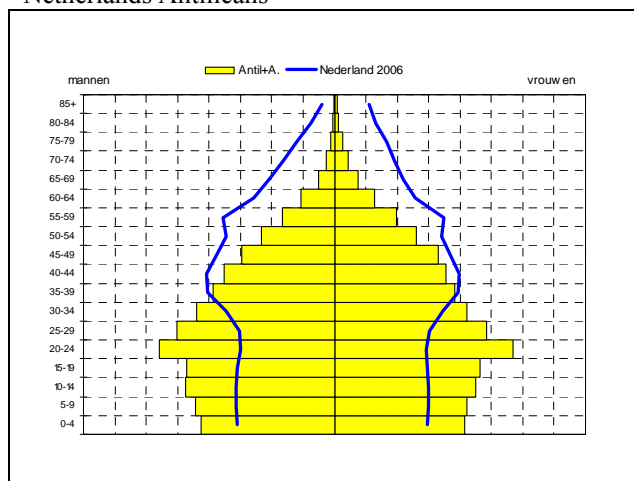
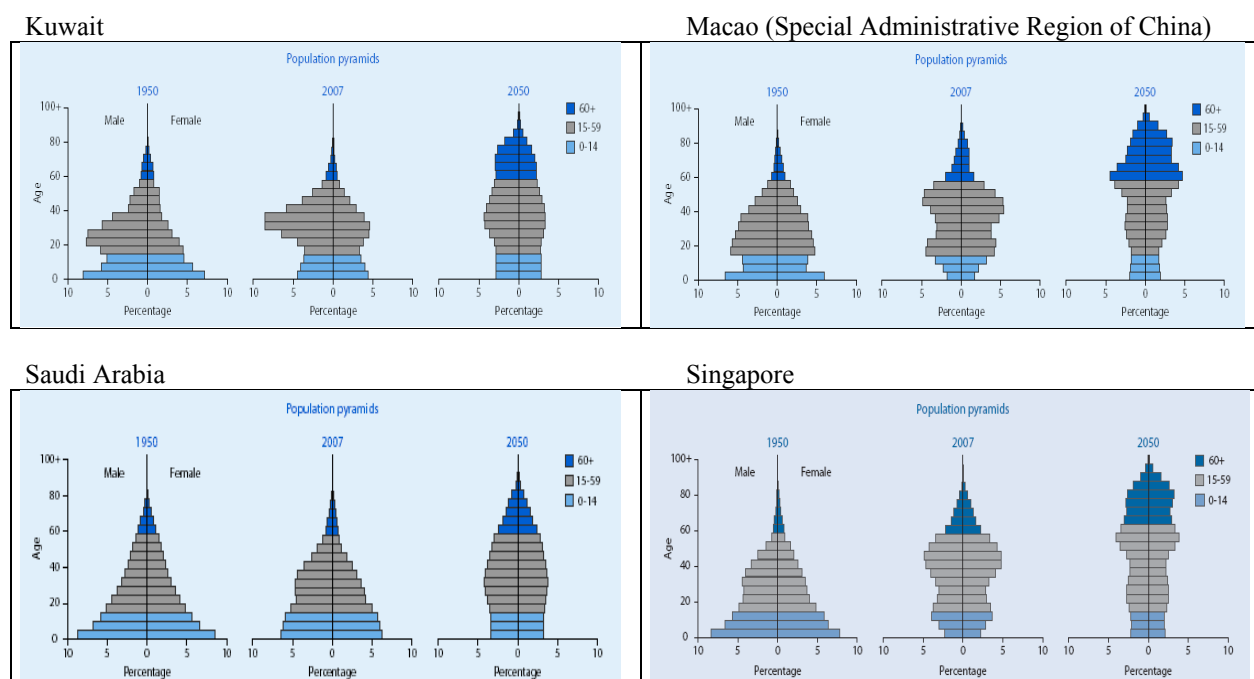


Figure 7. Population ageing, some 'exceptional' examples, 1950-2050 (source United Nations, 2007)



THE WORLD IN 2025: MACROECONOMICS, GROWTH, TRADE

Lionel Fontagne

September 28, 2008

Abstract

We address issues related to economic sizes, market shares, specialisation, and their internal consequences for the European economy. We conclude that the volume of trade should double over the period 2008-2025, despite a temporary brake during the 2009 recession. This growth will be partially driven by the rapid development of Asia opening wide markets for statutory to-range products. However, there is great uncertainty on which country will ship which category of product at the considered horizon. Indeed at least half of trade flows that will be observed in 2025 are not observable currently. To put it differently the sectoral or even product-specialisation of countries can hardly be forecasted. This is even more the case that specialisation is taking place across varieties within products, a phenomenon that is quite resilient. All in all, if we cannot guess which country will export which product to which market, we can trust the conjecture that the EU will be even more specialised in the top range varieties of the (currently unknown) products. Such outcome has to be prepared, by providing the European economy with the right framework for the qualification, innovation, creativity and flexibility that will be needed.

1 Introduction

The 17 years horizon contemplated in the current exercise is not very remote and authorises to rely on economic reasoning to draw conclusions. Demography, relative economic sizes of countries, changes in the volume of world trade and in the position of competitors can be derived from our experience of underlying determinants without too large risks. Contemplating a 2050 or 2100 horizon would have requested a different approach. The only uncertainty is about the magnitude and duration of the expected 2009 recession. It is indeed difficult to forecast what will be the consequences for the real sector of the collapse of the financial sector, just because not only the magnitude but also the nature of this crisis has no precedent.

We ask in the following what will be size of world trade, what will drive its increase when the world economy recovers from the current financial turmoil, what will be the main patterns of international specialisation and ultimately what will be the consequences for Europe.

2 Economic Size and Trade

At the pace observed until 2006, world market for goods was doubling every 8 to 9 years. Thus world trade could be as large as 4 times its current volume in 2025, would this pace sustainable.

Such pace will however hardly continue during decades and has not been observed steadily in the past. In 2007, this growth has been limited to 5.5 % in volume, corresponding to a doubling in 13 years. The current crisis will lead to a recession in 2009, damped by the increasing disconnection of emerging economies from the OECD cycle. Previous episodes of recession led to amplified but temporary changes in world trade: in 1982, trade growth was -3

percent; in 1958: -3 percent; in 2001 -1 percent. The worst episode has been 1975 with a -7.3 percent decrease in world trade.

But recovery was rapid too, with a 11 percent increase in 1959 and 1976, and 8 percent in 1984.

If protectionist tensions do not top on the recession, we can reasonably expect such recovery by the end of 2010 or during 2011 at worst. It would leave some 15 years before the 2025 horizon considered here. This leads us to bet on a doubling of world trade between today and 2025. The rapid development of world trade, and the underlying rapid turnover of competitors on markets, will be accompanied by a shift of the engine of world growth towards Asia.

2.1 World Trade Will Double

Underlying determinants of the current boost in trade volumes (e.g. fragmentation of production process and offshore outsourcing) will weaken in the future due to technical limits, inflated transport costs, and further world instability. Indeed, physical limits such as scarcity of hinterlands behind ports in Europe, or the saturation of (road, air, rail) transport infrastructures will put a limit to the rapid progression of flows. The increasing cost of energy, with a 3-digit price of the barrel, will inevitably play a role for certain heavy products. Anyway, the resilience of world trade growth should be remarkable in absence of major extra-economic shocks such as generalised terrorism.

By sake of comparison, if we exclude the recent short period of buoyant world trade and GDP, the volume of world trade had been multiplied by 2.6 over the 17 years before the 2001 breakdown.

Meanwhile the size of the world economy (at current market exchange rates had increased by 50 percent).

Another comparison is provided by the year 1991, 17 years backward from today. In 1991, the Uruguay Round was not yet achieved, and one would have hardly expected the good news provided to the world economy by the combination of the success of emerging economies and Asia, and by the large productivity gains associated with the wide dissemination of information technologies in our economies. However, a conservative foresight of a 6 percent growth of world trade (a doubling between 1991 and 2003) would not have been misleading. Neither the exceptional circumstances of the world economy, nor the geopolitical turnpike of the 9/11 would have put such foresight at risk.

All in all the bottom line is that world trade should double at the 2025 horizon, if no major accident is encountered outside the economic sphere (e.g. massive terrorist attacks implying tighter security procedures at the borders).

2.2 World Growth to be fuelled by Asia

Such global figures hide a shift of the world economy towards Asia. But how to properly assess what will be the exact contribution of Asia and other emerging regions to the dynamism of the world economy?

Foresight based on PPP is not only very fragile, as demonstrated by the recent revision of the ICP series by the World Bank, they are misleading: what matters is the current exchange rate when it comes to competition on the world market.

Within the next decade, the economic size of China will at least double, whatever the conditions of the international economy: China has acquired an autonomous reservoir of growth that makes such prospect rather certain. At worse, such doubling could be postponed for a couple of years. But in any case, at the horizon we are contemplating, such outcome means adding another Germany to the world economy (if we take exports as a benchmark).

This is a large shock indeed, but much more limited than what the folk view of a China leading the world economy would suggest. China is not alone of course, and India plus other emerging Asian economies will probably record exceptional performances.

But the own Asian dynamics could be an opportunity rather than a threat for the rest of the world, and in particular for Europe. For the rest of the world, the emerging Asia will offer a wide market for primary products, agricultural products, etc, thus putting an end to the secular decrease in relative prices of raw products in which numerous developing economies are advantaged. Regarding the consequences for Europe, one must keep in mind that economic development in Asia (but the same would be true for Brazil) is characterised by large and growing inequalities among individuals. Accordingly, the development of these economies will be characterised by the presence of a fast growing demand of statutory and high quality goods, as income per capita reaches occidental standards for a thin margin of the population. Given the patterns of European specialisation that will be presented below, this might be an opportunity for European producers. In the current economic downturn, benefits associated with the presence of a large region of the world economy exhibiting resilient growth within the current crisis come on the top of the previous arguments.

Another issue, is how such fast growing economies will affect the conditions of world competition.

This is the question addressed in the next section.

3 What the New NTT is Telling Us

We have suggested some possible orders of magnitude for world trade growth at the 2025 horizon.

But what are we talking about when it comes to the growth of international trade? Trade models in the line of Dixit-Stiglitz-Krugman rely on the assumption of differentiated varieties and representative (single-product) firms. The representative firm is exporting its product to each destination market; trade volumes are determined by foreign market size, remoteness and trade barriers. When transaction costs are reduced, or when foreign market grows, the volume shipped increases. The workhorse of empirical studies in international trade, namely the gravity equation, has relied on such assumptions until recent developments by Melitz (2003) and Chaney (2008).

Accordingly, using the definitions popularised by the new New International Economics, this is the intensive margin of trade that is increasing in such framework. But one may ask whether the extensive margin of trade (the number of exporting firms, the number of destination markets by firm, or even the number of products exported by firm in a multiple-product setting) is contributing to the observed changes. This is key to our understanding, since our applied models addressing the consequences of international trade liberalisation basically rely on the intensive margin.

3.1 Individual Exporter Evidence on the Extensive and Intensive Margins of Exports

Getting rid of the representative firms assumption and assuming a distribution of firms differing in their productivity, some firms will be productive enough to overcome the fixed costs and export, while other firms will limit their sales to their domestic market.

The stylised fact that a limited number of firms account for the bulk of exports, and that exporters are larger and more productive has been repeatedly stressed in the recent literature (Bernard and Jensen (1995); Eaton et al. (2004); Mayer and Ottaviano (2007). Similarly,

Berthou and Fontagne (2008) using individual firm data for France over the 1998 to 2003 period point to the extreme concentration of French exports. Only few French firms export. The 10 percent French 'champions' (more precisely, 'Champions' located in France) concentrate 94 percent of the total value of French exports in 1998 and even 95 percent in 2003. And as regards the number of French exporters, a reduction is observed: one percent and a half of the total number of exporters have disappeared over the period 1998 to 2003.

In order to identify the extensive and intensive margin of exports, Berthou and Fontagne (2008) propose an original method combining all the dimensions that can be observed at the individual firm level. French firms report their shipments by NC8 code (some 10,000 different products), by destination market. Hence the extensive margin can be defined as the product of the number of firms, the average number of products exported by firm, and the average number of destination markets for each exported variety. The intensive margin is defined as the average value of exports for each variety exported to a given destination.

Over the period considered, French exports have been driven both by the intensive and extensive margins, with less firms exporting more product categories to more destinations, together with a larger value of exports by shipment. But when the various destination regions are disentangled, a different picture emerges.

Competition within the EU (in particular within the monetary union) leads to a reduction in the number of exporters and to an increase in the number of products and destination markets by exporter. Less firms export more varieties to more markets. This suggests a tough competition among exporters, while the winners enlarge the scope of their activities within Europe. In contrast, exports to the rest of the world (namely what one should actually consider as exports) exhibit a very different pattern: slightly more firms export less products to a rather constant number of destination markets, but with fast increasing values per shipment. In total the intensive margin only contributes to French shipments outside the EU, while inside the EU both the extensive and intensive margins account for the increase of exports.

These results suggest how (the tiny proportion of exporting) firms adapt to world competition, when it comes to export beyond the borders of the internal European market: they increasingly select in their portfolio of products the best varieties to be shipped, and they increase very fast the value of their shipments. Specialisation occurs within the portfolio of products of the firm, and the dynamics of the new and remote markets boost the values shipped of the selected products. We will provide later on with a further decomposition of this observation by introducing the notion of qualitative margin.

3.2 Country Evidence on the Extensive and Intensive Margins of Exports

A related issue is the observed turnover of exporting countries, exported products and destination markets in world trade. To what changes in the composition of flows did the recent rapid increase in world trade lead and what consequences can one derive from this observation as regards world trade foresight?

A simple method to address this issue is to rely on an exhaustive and very detailed data base of trade flows at the world level, over time. Cheptea et al. (2008) rely on BACI, derived from COMTRADE, to assess the respective contributions of the two margins of trade (extensive and intensive) to the observed growth of world trade growth, between 1995 and 2005. Products are identified using the HS6 classification (some 5,000 products), and each exporting country and destination market can be identified. An elementary flow will be defined as a four-dimensional 'non-zero' observation in the database: a country exporting a product to a destination market in a given year. The intensive margin can be defined as the change in the value of existing trade flows in 1995. The extensive margin is the net value

associated with the appearance and destruction of trade flows between the two dates. This distinction is of paramount importance when one addresses the redistribution of world trade among incumbent exporters and new players such as emerging economies. Accordingly, one must keep in mind this distinction when it comes to a tentative foresight of world trade at the 2025 horizon.

In value terms, the USD 3,361 bn over the period 1995-2005 corresponding to the intensive margin accounts for 82 percent of the change in the value of world trade. Considering these values, a contribution of the extensive margin limited to 18 percent would suggest that future trade environment is a quite predictable.

However, out of the 4.1 million elementary trade flows observed in 1995, only 2.8 were still present in 2005: during this period, 31 percent of the elementary trade flows initially observed have disappeared. This can be the outcome of exporting countries exiting the market, of importing countries stopping their purchases on the world market, or of products no longer consumed (e.g. black and white TV sets, or mechanical typewriters). Meanwhile, 3.9 million new elementary trade flows appeared during the period. These entries accounted for 95 percent of initial trade flows. All in all, the number of entries between 1985 and 1995 is roughly equal to the number of actual flows in 1995. But the number of trade flows has not doubled, since these entries have led to exits. The bottom line of this analysis is that only 42 percent of elementary trade flows recorded in 2005 were present in 1995.

Another way to look at these figures is to compute the number of potential trade flows. A simple calculation would compare the 4 million trade flows observed in 1995 with a potential of some 200 countries trading on a bilateral level in some 5,000 products. Accordingly, only 2 percent of the theoretically possible trade flows would have been observed. However, simply taking the number of products times the number of exporters times the number of importers is misleading: Norway hardly exports bananas. Thus, we must compute this potential number by restricting it to situations where a product is at least exported by a country to one partner. Thus, for each year and product if a country declares its trade with at least one partner, trade flows with all undeclared destinations are considered as true zeros and correspond to potential flows. Under this assumption, we get 75 million potential trade flows in 1995 and 96 million in 2005. The change in the number of countries is not the explanation of such difference: what matters is the diversification of exports of their exports (in terms of products) boosting the number of untapped trade flows. Accordingly, only 5.5 percent of the potential trade flows were observed in 1995 and 7.0 percent in 2005. This points to the extraordinary level of uncertainty when it comes to forecasting which country will export which product to which market a decade ahead.

All in all, even if the extensive margin of trade accounts for only one sixth of the change in the value of world exports, one must keep in mind that at least half of the trade flows that will be observed in 2025 currently correspond to zeros in the matrix of world trade.

4 Shift of Market Shares and Specialisation across Varieties

The idea of specialisation is the first one that economists developed when they turned their interest to international trade. Since the late sixties, however, empirical evidence has led to growing concerns.

Firstly, trade liberalisation episodes among similar countries (e.g. the European Common Market) have been associated with Intra-Industry Trade rather than with Inter-Industry Trade. Secondly, trade liberalisation among different countries (e.g. the inclusion of China among competitors on the world market) has led to an unexpected outcome: while the multi-cone approach of the classical theory of international trade concludes that different countries belonging to different cones of diversification (having very dissimilar relative factor

endowments) should specialise in different products, the share of products jointly exported by countries at very dissimilar levels of development has on the contrary been rapidly increasing (Schott (2004)).

In both cases, these stylised facts have a simple explanation which is highly relevant for our purpose. Concerning Intra-Industry Trade, Greenaway et al. (1994), or Fontagne and Freudenberg (1997) proved that trade overlap in vertically differentiated products was dominant. It means that countries do actually (two-way) trade varieties differentiated by their market positioning and/or by their production function, within product categories.

On the front of specialisation, Finger (1975) highlighted in a seminal paper a larger variability of factor intensities within industries than across industries. Hellvin and Torstensson (1991) found evidence of Sweden's specialisation on quality vis-a-vis countries at different levels of per capita income. Lastly, the influential paper by Schott (2004) pointed to US imports exhibiting a large variance in unit value within product categories at the most detailed level of the product classification.

Two-conclusions can be derived from this repeated evidence: differences in international prices for a given category of product are resilient; countries are specialising within products across varieties according to their development level.

4.1 Resilient Deviations from the LOP

A series of repeated stylised facts stressed in the trade literature points to the conclusion that the LOP does not apply without strong qualifications in world trade.

Firstly large differences in prices can be observed among exporters for the same category of products. More surprisingly, these differences are increasing in the level of detail of the classification and thus cannot be interpreted a statistical artefact. For instance, Schott (2004) finds differences up to 1 to 30 for certain shirts exported by the Philippines and Japan to the US.

Secondly, Fontagne et al. (2008) stress that the same exporter will ship the same products to different destination markets at different prices.

Lastly, these differences in (FOB) prices are resilient. The same authors point to differences in relative prices among exporters of the same (category of) product to the same market hardly shrinking over time, including vis-à-vis China. Japanese prices 1.4 times higher than for Brazil for the same products shipped to the same market. These Japanese prices are 1.9 times higher than for India, and 2.9 times higher than for China.

Three arguments suggest that such differences in the price of similar goods should shrink over time: catching up of successful exporters, Balassa-Samuelson effect on the real exchange rate of the exporter, repeated purchases by the consumer acquiring knowledge of the unjustified differences in prices for similar goods. The problem is that this convergence in price is not, or only very weakly, observed.

4.2 Specialisation Across Varieties

At the most detailed level of classification, the prices of US, Japanese or European imports is a function of the GDP per capita of the exporter, a proxy for the development level of exporters.

The development level of the exporting country does not determine which products it is actually exporting, but in which range of the market it is exporting. Accordingly, countries specialise within products across varieties (and not within sectors across products). This general rule is even more true for Europe, since we observe a very specific pattern of EU trade.

The EU is mostly specialised in the upper segment of the market: this pattern is more pronounced than for Japan, and much pronounced than for the US. Moreover, EU world market shares are highly resilient in the upper segment of the market, a pattern that is contrasting with US or Japanese ones. The categories of products that are mostly contributing to this performance are consumption goods. On the contrary, and this is a residual of sectoral specialisation, this is not observed for hi-tech goods

5 Conclusion

Our previous developments have broad-brushed what should be the patterns of world trade within the next 17 years. Firstly, the volume of trade will at least double over the period 2008-2025, a growth that will be partially driven by the rapid and increasingly autonomous development of Asia.

This is where easily forecasted evolutions end up. There is in contrast great uncertainty regarding which country will ship which product at the considered horizon. Indeed, at least half of trade flows that will be observed in 2025 are not observable currently. And these new trade flows will be a tiny part of the 93 percent zero trade flows in the world trade matrix. This is why the sectoral or even product-specialisation of countries can hardly be forecasted, and certainly largely depends of the future strategies of MNEs shaping a large share of world trade.

This is even more the case that specialisation is actually taking place across varieties within products, a phenomenon leading to quite resilient deviations from the LOP in world trade.

However, if one cannot guess which country will export which product to which market, one can make the conjecture that the EU will be specialised in the top range varieties of the currently unknown products that it will export in 2025. The opportunity for Europe is that the rapid growth in Asia combined with income inequalities (which are of course not desirable per se) will be opening wide markets for statutory to-range products.

Such outcome has to be prepared, by providing the European economy with the right framework for the qualification, innovation, creativity and flexibility that will be needed to be able to reap the benefits of such profoundly reshaped environment.

References

- Bernard, A. B. and Jensen, J. B. (1995). Exporters, jobs and wages in us manufacturing: 1976-1987. *Brookings Papers on Economic Activity: Microeconomics*: 67-112.
- Berthou, A. and Fontagne, L. (2008). The euro and the intensive and extensive margins of trade: Evidence from french firm level data. *CEPII working paper* 2008-06, May.
- Chaney, T. (2008). Distorted gravity: The intensive and extensive margins of international trade. *American Economic Review*, 98(4).
- Cheptea, A., Fontagne, L., and Zignago, S. (2008). European export performance. *CEPII working paper*, forthcoming.
- Eaton, J., Kortum, S., and Kramarz, F. (2004). Dissecting trade: Firms, industries and export destinations. *American Economic Review, Papers and Proceedings*, 94: 150-154.
- Finger, J. M. (1975). Trade overlap and intra-industry trade. *Economic Inquiry*, 13(4): 581-89.
- Fontagne, L. and Freudenberg, M. (1997). Intra-industry trade: Methodological issues reconsidered. *CEPII Working Papers*, 97-01.
- Fontagne, L., Gaulier, G., and Zignago, S. (2008). Specialization across varieties and northsouth competition. *Economic Policy*, 23 (53): 51-91.

- Greenaway, D., Hine, R., and Milner, C. (1994). Country-specific factors and the pattern of horizontal and vertical intra-industry trade in the uk. *Review of World Economics* (Weltwirtschaftliches Archiv), 130(1): 77-100.
- Hellvin, L. and Torstensson, J. (1991). Quality differentiation and factor proportions in international trade: An empirical test of the swedish case. *Review of World Economics* (Weltwirtschaftliches Archiv), 127(1): 183-194.
- Mayer, T. and Ottaviano, G. (2007). The happy few: the internationalization of european firms. *Bruegel Blueprint Series* vol. 3, Brussels.
- Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, 71(6):1695–1725.
- Schott, P. K. (2004). Across-product versus within-product specialization in international trade. *Quarterly Journal of Economics*, 119(2): 647-678.

Malthus' Revenge⁷



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Introduction

Quite suddenly, a hypothesis which seemed to be disregarded and rejected for the last 30 years, now appears to get some benefit of the doubt. It is not the original version of Thomas Malthus' hypothesis, that food shortage and hunger would remain "*nature's last most dreadful resource*", but a more sophisticated, revised global version. Once the word "*population*" in the famous Malthus quote that: "*the power of population is so superior to the power of the earth to produce subsistence for man, that premature death must in some shape or other visit the human race*" is replaced by consumption, both present, real consumption and future, global consumption aspirations, the old Malthus' quote takes on a new, more intriguing 21st Century meaning.

In this paper, we elaborate on such a possible new interpretation and what its policy implications might be. Written as part of a more technology/economic inspired contribution to a European foresight exercise about what the world might look like in 2025, it seemed natural to start such a brainstorming exercise with the most well-known historical economic attempt at forecasting: the one by Thomas Malthus two hundred years ago, adapted though to modern times.

In a first section, and somewhat as a parenthesis, we briefly comment on the financial crisis as it has unfolded over the last four months of 2008 and impacted gradually the real economy. The financial crisis with its dramatic collapse in demand has undoubtedly softened in the short term some of the Malthusian challenges discussed in this paper. However, it is unlikely to provide any long term breathing space. On the contrary, any scenario of rapid recovery is likely to be quickly confronted with the various Malthusian limits to global growth as described below. In this sense the financial crisis of 2008 might, in an indirect way, be illustrative of the intrinsic sustainable growth bottlenecks global society has increasingly become confronted with.

In the second section of the paper we review the different policy responses to past Malthusian challenges: how food production succeeded particularly over the second half of the 20th Century to keep pace with rapid population growth. There are still many lessons to be learned from this recent past: lessons which appear not to have been picked up in the recent debate about rising food prices. Similarly, whereas world population growth no longer appears to raise major Malthusian concerns today, the huge differences in population growth rates across regions in the world – with the most rapid population growth occurring in regions, such as the Middle East and Northern Africa, least well endowed with arable land, access to fresh water and most subject to further environmental deterioration as a possible consequence of climate change – raise major global migration pressures very much Malthusian in nature and origin.

In a third section, we replace the word "*population*" in the above cited Malthus' quote with "*consumption*" and illustrate what this might imply for global world growth and Europe's place in the world in 2025. Such replacement appears justified following the global diffusion of new digital information and communication technologies over the last thirty years with the uptake of those technologies across the world at a historically unprecedented speed. We suggest that future population growth appears today a more relevant measure of future market opportunities, indicative of unfulfilled consumption aspirations, than current GDP which appears in many ways more of an economic measure of industrial strength of the past.

In a fourth and final section, we then draw some initial policy conclusions. The nature of the Malthusian challenges raised today appears both global and local in nature. On the one hand it raises questions with respect to the need for open, international research collaboration. Imposing national, or regional, boundaries with respect to research participation and funding, certainly appears (with respect to some of the most urgent Malthusian research problems) to be the expression of an outdated and wasteful research nationalism. On the other hand, the growing need for local knowledge re-use, adaptation and embedment in many emerging and developing countries involving efforts at local innovation, is in many ways similar to, and reminiscent of the development of the many innovation policy tools in European countries and regions. The first policy challenge, we refer to as “*recherche sans frontières*”; the second one as “*innovation for local development*”.

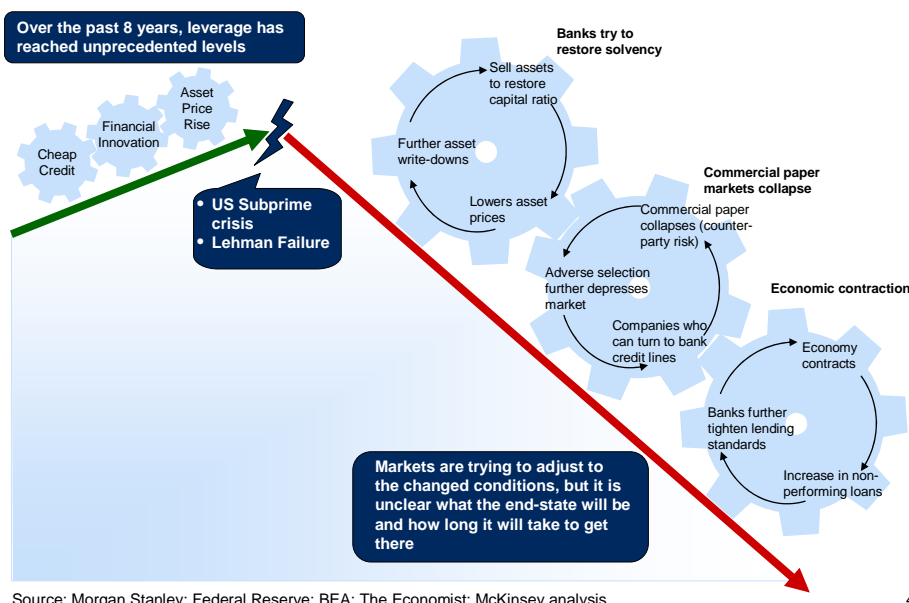
1. Reflections on a unique financial crisis very different from previous downturns

The financial crisis, as it unfolded in 2008, is rapidly starting to affect the real economy across the globe. The collapse in demand appears to spread across many sectors from durable consumer goods such as motor cars to machinery and investment goods. In many sectors, investment decisions have been scrapped or delayed. Unemployment, and not just of temporarily employed labour, is rising rapidly in most countries across the world.

The McKinsey Global Institute describes the unique features of the current crisis along the following four lines. First and most dramatically since September 2008, a more or less systemic failure of credit markets with a large number of such markets coming to a stand still at the same time. Second, high leverage levels in combination with asset write downs have resulted in a further credit contraction that slows GDP as less cash for investments is made easily available. Third, the globally interconnected world of the 21st Century with more countries than ever belonging to the WTO implies that for the first time all large economies and markets across the globe are hit, limiting the possibility of recovery through strong demand or capital injection in one region benefiting other regions. And fourth, the mutually reinforcing effect of the financial crisis and the resulting global economic recession impacts the economy in a variety of different financial and real, local and global ways making outcomes much harder to predict and potentially very negative. The figure below from the MGI illustrates well the mutually reinforcing negative effects of the financial crisis. As the figure highlights, interdependencies in financial assets and the real economy which had been beneficial to the economy over the last decade, became in an unfavourable economic environment detrimental to the economy. Economists have pointed to the dangers of such volatility impacts. Thus as Gallegati *et al.* (2008) noted long before the financial crisis: “private incentives are such that too many linkages are formed with respect to what is socially desirable. The risk of contagion increases the volatility of the outcome and thus reduces the ability of the financial networks to provide risk-sharing.”⁹ As a result next to the dramatic collapse in final consumer demand, which affected many durable consumer goods sector such as motor cars, there has been a collapse in risk-taking investment with a shift in financial markets’ readiness to provide risk capital. At the same time, the investment opportunities on offer to venture capital and private equity rapidly dried up.

⁹ Gallegati, Mauro; Greenwald Bruce; Richiardi, Matteo and Joseph Stiglitz (2008), “An Asymmetric Effect of Diffusion Processes: Risk Sharing and Contagion”, *Global Economy Journal*, 8(3)

THE CURRENT CRISIS IS DRIVEN BY MUTUALLY REINFORCING EFFECTS SO MAY LAST LONGER THAN EXPECTED



Source: Morgan Stanley; Federal Reserve; BEA; The Economist; McKinsey analysis

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One of the reasons why the issue of knowledge investments has played a limited role in the current debate on the financial crisis is the policy need for immediate, short term outcomes of the proposed interventions. Most of the financial interventions appear first and foremost of the “fire fighting” sort, e.g. providing liquidity in the financial system and in a second phase addressing the fire spreading across the initially assumed immune national parts of each country’s financial system, such as the granting of state guarantees for inter-bank loans or the state guarantees of the minimum amount of saving deposits. The next phase in the spreading of the financial crisis is the impact this massive destruction of capital is likely to have on consumer and investment/saving habits of citizens. There are several scenarios. The first one starts from the assumption that citizens will, to the extent possible, try to restore their assets and savings by increasing as rapidly as possible their savings. This can be readily observed in many of the traditionally high-saving European countries, such as Belgium, Germany, the Scandinavian countries or The Netherlands, but even countries such as the US and the UK which had traditionally much lower savings ratio’s. As a result, the high income inequality within developed and emerging countries which had been an engine for the strong consumer-led growth path in the US, Europe and many emerging economies (Russia, Brazil, Latin America, Eastern Europe) no longer induces such strong demand-led global growth impact, filtering through to the rest of the global economy through remittances, and other demand multiplier effects. On the contrary, the high income inequality is now likely to become a major source for high savings, being invested now in secure government bonds. As a result the financial crisis is spreading much more rapidly than expected to the real economy with major global implications.

A different, and to some extent opposite scenario would start from the assumption that precisely because the financial crisis has affected primarily those more well-off having invested funds in high risk products, it is unlikely to have major macro-economic negative growth impacts. Rather it will hasten the decline of individual rich persons or families, allowing for the entry of newcomers including also emerging economies on the global financial scene. It is interesting from this perspective that China today is keener than ever to position its national currency as a new reserve currency.

So the distributional impact on the real economy of the present financial crisis remains subject to debate. In the meantime, the academic policy debate appears to have shifted to the need for stronger global regulation in the financial sector with proposals for a Bretton Woods 2, for drastic reductions in the financial perks and golden severance payments given to financial CEOs while leaving most of the financial losses with share holders, both private small individual shareholders as well as institutional shareholders. Saving accounts holders are protected at least as long as they invest their savings nationally, while governments have become themselves speculative shareholders using their own state prerogatives to bet on a rise in stock market value. As a European politician put it: *“capitalism for the poor in the US as the origin of the crisis, socialism for the rich in Europe as the solution to the crisis”*.

What can one say about the impact of the financial crisis on knowledge investments? Continuous high knowledge investments particularly in the highly developed countries have been the major factor behind long term welfare growth. That is also the reason why countries, such as the EU ones, have been keen on setting long term targets for increasing such knowledge investments. So leaving aside the nature of such knowledge investment and their geographical scope as discussed below in section 4, the question touches on an essential feature of long term growth and development.

At the micro-economic level, the negative impact of the recession on profitability forces firms in the short term to focus on the most productive segments of their output. Furthermore, the opportunity costs of achieving productivity growth are likely to be lower in recessions, providing incentives to undertake research activities in downturns (Aghion and Saint-Paul, 1998; Canton and Uhlig 1999). Finally, R&D-personnel will be subject to “labour hoarding”; the most qualified scientists and engineers are kept at the expense of the lower skilled personnel. The internal training of highly skilled R&D personnel requires in some high tech sectors more than ten years, sacking such personnel has generally remained a measure of last resort. This feature also explains why firms during expanding growth phases have often restructured their R&D activities, thereby increasingly calling upon external R&D expertise. As the economic crisis is likely to spread in 2009 in Europe, it can actually be expected that the R&D/GDP ratio of European countries might actually rise.

With respect to innovation, the opposite, cyclical view appears more likely. Innovation or the implementation of new ideas is likely to be postponed in a recession till the boom period (Shleiffer, 1986 and Francois and Lloyd-Ellis, 2003). The old, so-called innovation acceleration hypothesis of Gerhard Mensch (1975) whereby radical innovation would be favoured in recessions/depressions out of despair has been empirically rejected (Clark, Freeman and Soete, 1981). Alongside such cyclical trends there are, however, also more structural factors which might impact directly European research and innovation.

The nature of those structural factors can, at the present moment, only be derived from anecdotal evidence, analytical speculation and historical example. One may start with the uniqueness of the crisis originating ultimately from within the financial sector¹⁰ and affecting the real economy under the form of a dramatic change in “risk aversiveness”. As a result private financial institutions which normally play the role of central agents in any counter-cyclical recovery policy have become “dead bodies”. At the same time there is now a widespread lack of trust in future risks with private investors primarily as a result of the huge write-offs over the last year. All this leads to growing distrust in society. As a result the new

¹⁰ In this we do not follow the fascinating, but in our view as yet unsubstantiated view of Perez (2009) linking directly the internet bubble of the early 21st century to the present financial crisis.

dominant philosophy of “*Cash is king*” has a direct negative impact on knowledge investments. Within stock listed companies, where the CFO will put pressure on the CEO to distribute as much of the limited profits as dividends – in a recession a crucial differentiating factor signaling solvability and management reputation. In a growing number of non high-tech firms this is likely to prevail over long term R&D investment commitment. Within SMEs as credit is becoming difficult to get, the focus will rather shift to organisational and easy to implement process innovations reducing costs and inventories. New product innovations and renewal investments will be postponed. Finally high-tech starters will postpone the introduction of new product innovations. As a result seed money providers will have difficulties in finding sufficient worthwhile investment proposals. The venture capital market collapses.

In short, the financial crisis has been accompanied by a shift in favour of risk averseness with as most direct impact on the real economy, a move away from investments in risky activities such as R&D and innovation. At the global level though, the crisis is likely to lead to an increased “offshoring” and “outsourcing” of private R&D: a more rapid relocation of certain parts of R&D (in particular development) to cheaper locations in emerging countries with a strong scientific base such as China and India. Furthermore, there is likely to be also increased “national outsourcing” of private R&D from large firms to small firms with increased specialisation and the incumbents’ large private R&D labs playing increasingly a new local role as “open”, more systemic innovation infrastructure. “Open” also to public participation from universities and public research institutes. This development might be particularly beneficial to the developments described in section 4 below. In this sense, it might be argued that the financial crisis provides a new opportunity to reassess the contribution knowledge investments both private and public, will have to make to long term sustainable growth and development so as to overcome the various Malthusian challenges described in the next sections.

2. On past Malthusian challenges

Thomas Malthus has of course been most dramatically contradicted by the rapid growth in population over the last Century, and in particular after the Second World War, with world food production keeping well ahead of the world's most rapid growth ever in population.

a) On food production

It is undoubtedly one of the major global achievements of the period of cold-war rapid economic growth: "les trentes glorieuses" in the words of the French economic historian Jean Fourastié¹¹, roughly speaking the post-war period between 1950 and 1973, when food production succeeded in keeping up with an exponential growth rate in world population. In saying this, I obviously do not want to underplay the numerous famines as they affected a number of developing countries in the 70's and 80's, but rather belabour the point that such famines were less associated with nature's impossibility to keep up agricultural production than with political and human mismanagement. As Amartya Sen's 1982 classic book on "*Poverty and Famines*" (Clarendon Press) has convincingly argued, there has never been "a famine in any country that has been a democracy with a relatively free press".

However, given the historically unprecedented growth in agricultural production over the post-war period, it is surprising that so little attention is being paid in the current food debate to the characteristics of agricultural production during the early post-war period and in particular to the rich economic literature (Hayami and Ruttan, Griliches) on the nature of technical improvements in agriculture; the particular role of different, so-called agricultural knowledge "extension schemes"; the significant role of publicly funded research in enhancing food productivity; the limited role of intellectual property protection with respect to seeds, fertilizers as well as irrigation and other farming techniques; the dominance of local production over international trade with as a consequence a more limited product variety available to local consumers more closely linked to seasonal production, etc.

All those issues appear at first sight also of particular relevance to the current situation of rapidly rising food prices. We know, as a matter of fact, surprisingly little about the underlying structural causes behind the present rise in food prices. Leaving out possible speculative and other short term effects on food prices, the following questions appear of particular relevance to the current policy debate. To what extent are current food shortages the result of failures to introduce at the global world level, large scale farm production techniques as e.g. typified by Europe's Common Agricultural Policy introduced in the 70's and 80's, or rather the opposite: the result of failures to introduce small scale, locally adapted rural agricultural production techniques? Or of more immediate concern: to what extent are present world food shortages the result of recent reforms in European agricultural policy with the structural removal out of agriculture production of large areas of agricultural land? Might such policies at a moment of rapidly rising food demand not have exacerbated the problem of reduced food supply? And at the level of research: to what extent has research on agricultural production shifted from a national priority with the involvement of large public research laboratories to an area with low public and increasing private sector research interest? What have been the implications of such a policy shift on the access to, and the diffusion of, soil

¹¹ Fourastié, J., 1979. Les Trente Glorieuses, ou la révolution invisible de 1946 à 1975. Fayard, Paris.

and agricultural knowledge; farming and irrigation techniques¹² and; more broadly, environmentally sustainable, agricultural development?

A first relevant policy conclusion might therefore consist of the need to reprioritize agricultural research as an area, not of “*grand*” but of “*glocal challenge*”: global in nature but local in implementation with particular attention being paid to world regions’ environmental, including fresh water availability, comparative advantage. Such reprioritization will also need to pay particular attention to the growing convergence between food and nutrition research and what it implies in terms of the trade-off between increased intellectual property protection and the resulting international trading of licenses and global access to such knowledge.

b) On population dynamics

With respect to population dynamics, by contrast, world population growth has gradually adjusted downwards over the last thirty years. Any tendency towards a continuous exponential population growth rate has been proven to be false. The present world population of 6.6 billion, increasing at a daily rate of some 200,000 is expected to peak in absolute terms at some 9.5 billion between now and 2025. The exponential growth after 1950 when world population was just 2.5 billion did ultimately evolve in a non-linear, typical s-shape curve.

Certainly with respect to world population demographics, Thomas Malthus appears to have been disproven totally. Actually, and contrary to Malthusian expectations, it is the impact of improved health and sanitation conditions on life expectancy which has, as a second order effect, brought down most significantly population growth. The main reason being of course that those health and sanitation improvements were accompanied by contraception technologies, shifting dramatically the balance between desired procreation and accidental one. In this sense, it can be expected that improvements in world-wide health and sanitation conditions will further reduce child mortality in the least developed countries, reducing in the longer term the way parents want to insure their own future by having large numbers of children. It is in other words, and from a Malthusian perspective somewhat paradoxical, the combination of health improvements and the ensuing reduced mortality rate which is behind the long term decline in population growth and ultimately the more or less expected future stable world population size of around 9,5 billion.

While population growth does not play any longer a direct role in the Malthusian predicament, it remains though an important overall context condition. In Table 1, based on data originally collected by Maddison (2003), the historical share of countries both in population and GDP over the last 200 hundred years is presented for China, India, Brazil and South Africa.

What remains from a historical perspective, particularly striking is how the two largest countries in the world: China and India, saw their population world share and their share of world GDP fall significantly over the period 1820 till 1973. In 1973, the *imbalance* between

¹² One may think here of various digitally controlled drip irrigation techniques when converting desert into farmland producing low water intensive crops. As a recent article in the IHT pointed out, most rapid population growth occurs in regions such as Northern Africa and the Middle East with the least available land with fresh water availability. Whereas in the oil-rich countries in those regions, money can solve the water shortage problem, the solution is obviously not sustainable: “You can bring in money and water and you can make the desert green until either the water runs out or the money”(Martin, Andrew, “Population rises, resources dwindle and there is no easy solution”, International Herald Tribune, July 22nd, 2008).

the world's concentration of GDP and the world's concentration of population was historically probably the most extreme one ever.

Table 1: China India, Brazil, South Africa and Mexico in the World Economy

Share in world population and world GDP: 1820-2001

Percentage share of world population

Year	China	India	Brazil	South Africa	Mexico	Total
1820	36.6	19.9	0.4	0.1	0.6	57.6
1870	28.1	17.0	0.8	0.2	0.7	46.8
1913	24.4	14.2	1.3	0.3	0.8	41.0
1950	21.7	14.8	2.1	0.5	1.1	40.2
1973	22.5	14.8	2.6	0.6	1.5	42.0
2001	20.7	16.5	2.9	0.7	1.7	42.5
2006	20.2	16.9	2.9	0.7	1.7	42.3

Percentage share of world income

Year	China	India	Brazil	South Africa	Mexico	Total
1820	32.9	16.0	0.4	0.1	0.7	50.1
1870	17.1	12.1	0.6	0.2	0.6	30.6
1913	8.8	7.5	0.7	0.4	0.9	18.3
1950	4.5	4.2	1.7	0.6	1.3	12.3
1973	4.6	3.1	2.5	0.6	1.7	12.5
2001	12.3	5.4	2.7	0.5	1.9	22.8
2006	16.8	6.1	2.4	0.5	1.8	27.4

Source: Deepak Nayyar (2008) based on data from Maddison (2003); Maddison(forthcoming)

Again in the current debate little attention has been paid to the rich, and sometimes controversial literature on such global unequal development paths between the developed OECD countries and the developing world with many debates amongst trade theorists and development economists about, amongst others: unequal exchange, import substitution and the need for infant industry development strategies, the impact of de-colonisation and the many early development attempts in developing countries at self-reliance, etc. Viewed in retrospect all these contributions were first and foremost inspired by concerns about rising global inequality and what appeared at that time to be an intrinsic lack of autonomous growth and development opportunities for many developing countries, just having achieved political independence but by and large still being economically tied to their previous colonial powers¹³.

I would also argue that it is this extreme geographical inequality in world GDP in the 60's and early 70's which has formed the basis for the sheer unilateral focus of social scientists and policy makers on strengthening *domestic* competitiveness as the essential feature for a country's future economic growth. As Ulrich Beck and Elisabeth Beck-Gernsheim, discussing the recent phenomenon of globalization, put it a couple of years ago: "The consequences of this for society (and sociology) have been spelt out most clearly in the

¹³ It might be noted that while India and China have been expanding their industry at a very fast rate and are undergoing industrial revolutions, the absolute numbers employed in manufacturing as well as the share of manufacturing in total employment has been falling. Many scholars would argue that the two countries should have had their industrial revolutions more than a hundred years ago but that they were thwarted in this endeavour by colonialism including unequal treaties.

English-speaking countries, but above all Britain, where it has been forcefully argued that conventional social and political science remains caught up in a national-territorial concept of society. Critics of ‘methodological nationalism’ have attacked its explicit or implicit premise that the national state is the ‘container’ of social processes and that the national framework is still the one best suited to measure and analyse major social, economic and political changes.” (Beck and Beck-Gernsheim, 2002) This national-territorial obsession of social scientists was particularly reflected in policy makers desire in both developed *and* developing countries alike, to be technologically independent, to create national technology support policies aimed at strengthening the country’s technological competitiveness. As a matter of fact, in the 70’s the notion of technological independence was quite popular in the development literature¹⁴.

In many developing countries, poorly endowed with arable land and/or natural resources, peripheral islands or land-locked countries/regions, the old Malthusian concerns about rapid local population growth and limited local opportunities for low cost agricultural production still exist. As a matter of fact lack of development appears still closely associated with population dynamics¹⁵ with most rapid population growth occurring in regions, such as the Middle East and Northern Africa, least well endowed with arable land and access to fresh water. Furthermore, those regions appear often the most fragile and most subject to further environmental deterioration following climate change. The historical Malthusian solution, large foreign emigration is still today the clearest manifestation of the local validity in many regions in the world of Malthus’ predicament.

¹⁴ See in particular Soete (1981)

¹⁵ As Sen (1998) pointed out the ability of countries to reduce their mortality can be seen as a test of their economic performance.

3. The new Malthusian 21st Century challenge: “global” consumer aspirations

The advent of the Information and Communication Technology (ICT) revolution in the 80's and 90's radically challenged the national-territorial bias in social sciences research and policy making¹⁶. As argued elsewhere, the cluster of ICT represents a historically unique process of technological, organisational and above all social transformation at the global level, both in terms of speed and in terms of world-wide impact.

The two clusters of technology Information Technology (IT) and Communication Technology (CT) have each played a crucial role here. At the IT level, there has been the continuous technological improvement (Moore's Law) in semiconductors. This 30 year long continuous technological improvement, combined with the tendency to miniaturise IT, has enabled the physical integration of electronic functions in existing (and new) equipment and led to an ever-increasing diffusion of IT applications throughout practically all sectors of the economy. In short what has been called a 'general purpose' technology (Bresnahan & Trajtenberg, 1995), the diffusion of which has been accompanied by a great many organisational mismatches and tensions (Freeman & Perez, 1988; David, 1991). Ultimately, the possibilities for such ever-increasing miniaturisation (“More than Moore”) opened the avenue to nanotechnology, i.e., the production of electronic material at sub-micron level that can interact with tiny matter and cells, including live cells. These mainly technologically driven developments towards miniaturisation illustrate that the technological trajectory within the IT sector is far from completed with application areas, described today as nano-electronics continuing to expand further to other, new areas.

The technological improvements in the CT cluster have been, if anything, as impressive. Both the continuous developments in the field of optical fibres allowing for the transmission of digital signals without noticeable loss of energy and mobile communication have radically altered the notions of distance. The concept of 'death of distance' (Cairncross, 1997) describes well the radical changes those technologies have brought about at the world level. Mobile communication, with its unique features both in terms of diffusion speed and geographical coverage of number of users (currently half the world population) represents in many ways an ultimate form of global reachability. It implies also along the end of the physical distance factor, the end of segmented information and the end of geographical boundaries in world citizens and/or world consumer's aspirations to find a good job and to enjoy material welfare.

As with other radical social transformations there is no way to reverse those changes: the spirit of global aspirations is, as it were, out of the box. National boundaries in opportunities for jobs, for studying, for communication, for travelling, for social exchanges are increasingly rejected by employees, students, internet users, tourists alike. In terms of life long aspirations, the world has truly become global.

Coming back to our previous discussion on population dynamics, this means effectively that size of population is likely to become a more directly relevant indicator of future potential growth and future market opportunities, than GDP which appears more a reflection of the industrial wealth of the past¹⁷.

¹⁶ See a.o. Clark, Freeman and Soete, 1981, Freeman, Clark, and Soete, 1982, Freeman and Soete, 1987

¹⁷ Like numbers of tractors in agriculture or steel were with respect to the measure of industrial wealth in former centrally planned economies.

For countries like the EU ones, it means that their future global economic role will decline substantially in the years to come: first, because of the decline in Europe's own share in world population given the current demographic structure of EU population; second, because Europe's is likely to witness over the years to come a substantially lower GDP growth compared to that of most of the large emerging economies. To put it bluntly: in 2025, of the 15 most populated countries in the world: all countries with more than 100 million inhabitants, not a single one will be a European country. ***In 2025, the EU will be primarily composed of relatively small countries.*** Only in areas where the EU-27 acts as a singly country, such as in the case of the WTO, will the EU play an important international role.

There is little doubt, as argued in the previous section that most of the Malthusian doubts arising today are first and foremost related to the combination of increasingly global consumption aspirations confronted with a global and local mismanagement of food supply and growing ecological pressures on “*the power of the earth*” to expand at low costs its supply of food. The “*power of the earth*” to produce food has been estimated by agronomers to be capable of providing sufficient food to no less than 20, even 40 billion people. However, such global food production would require an optimal, ideal earth “gardening” strategy optimizing available land across countries and regions, and harvesting the ideal soil combinations of food, while at the same time eliminating some of the most energy-intensive food production activities, such as meat. The current fragmented global agricultural system is far removed from this ideal optimized world (Svedin, 2008). As a matter of fact, it is clear that once all emissions and other environmental costs of the Western world's energy-intensive food consumption pattern are accounted for, the present world agricultural system would be unable to provide for such a food consumption pattern for the global world population of 6.6 billion, let alone a future world population of 9 to 10 billion. At the same time, the demand pressure, given the global convergence in “consumption aspiration” patterns towards such energy-intensive food consumption patterns is rising rapidly with growing income in the emerging countries. Furthermore, the pressures on available arable land will increase following the emerging profitable opportunities for farming biofuels.

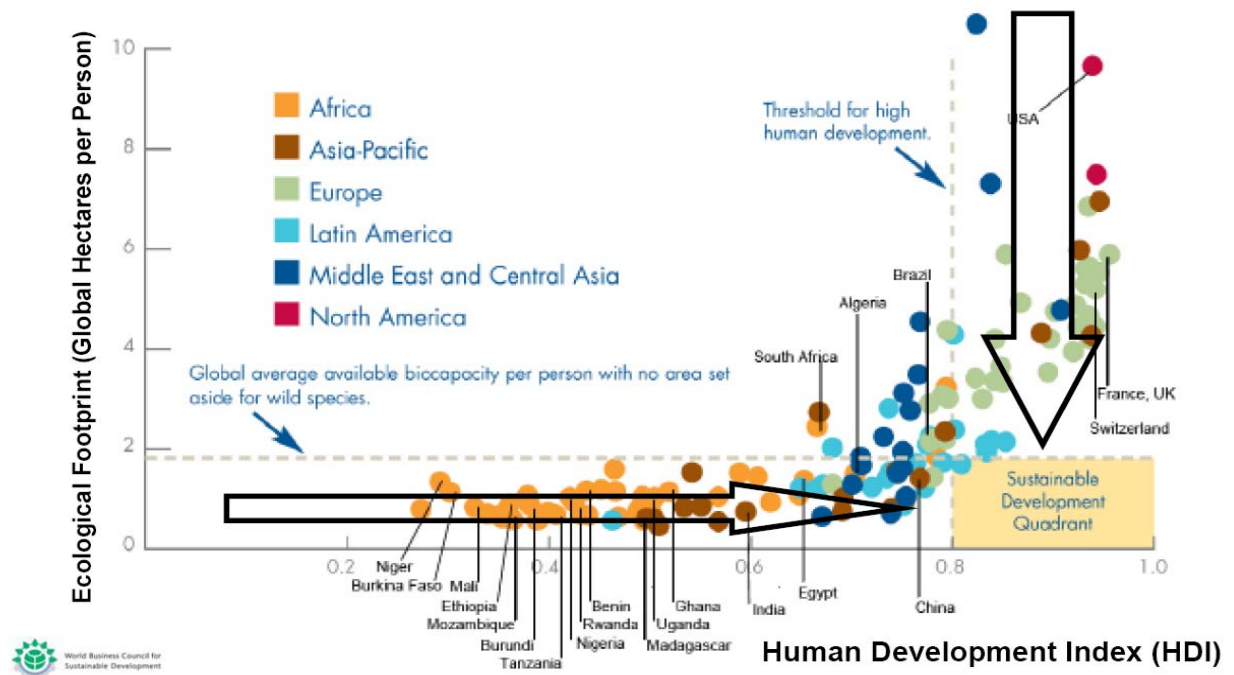
In short, in pure Malthusian tradition the current rise in prices of agricultural commodities, and more broadly natural resources, is likely to have a strong structural component, raising not just major global, macro-economic issues about rising inflationary pressures in both developed and developing countries, but also increasing distributional issues with significant shifts in the terms of trade in favour of countries well endowed with natural resources and, within countries with an increasing number of low income groups in society becoming confronted with difficulties in getting access to basic subsistence commodities.

4. The new “global” research and innovation Malthusian policy challenges

As highlighted in section 2, it were first and foremost improvements in technology that enabled the supply of food to keep up with population growth in the 50's and 60's of last Century and counter most of our Malthusian fears.

Within the present global context the challenge is, as argued above, much more complex. There is not just a “global” need for the development of major, sometimes radical improvements in energy-saving technologies, sustainable food and energy production, carbon-neutral transport systems, sustainable water management, to name but a few, there is also a need for the quick implementation of such new technological improvements within the fast growing environments of many emerging countries, as illustrated in Figure 2.

Figure 2: How will future national societies look like with human development within planet's ecological limits?



This combined, new Malthusian “*glocal challenge*” of ensuring that “*the power of the earth*” remains in line with global consumption aspirations fundamentally questions the organisation of research and innovation activities in the rich, developed countries, and in particular the European ones after the period of decolonization, within the contours of their own national boundaries, or as in the case of the EU, within the contours of the EU.

a) Recherche sans frontières¹⁸

There is little doubt that the process of economic integration in Europe has also had a major effect on intra-European research cooperation and networking. As is well-known the gradual enlargement of the EU in the late 1970s led to a broader set of policies aimed at strengthening intra-European cooperation in areas such as pre-competitive research. In a similar way to trade theories about economic integration, it could be argued that this European research integration process had both positive and negative effects. Positive effects included the ‘creation’ of new research through the additional joint EU research projects initiated, and the new insights into specifically European problems such research provided. Among the negative effects is what could be called research ‘diversion’, i.e. the redirection of research activities, nationally funded but with an international focus, towards European research issues. Elsewhere, I have suggested (Soete, 1997) that these diversion effects of knowledge – with researchers preferring to network with European colleagues primarily for the sake of European financial support – have led to the European *cocooning* of knowledge inside the region’s physical borders, as typified in the notion of a ‘European research area’.

At the same time, and of direct relevance to most research communities in the world, the international accessibility of ‘codified knowledge’ increased dramatically through the use of ICT along the lines of our discussion in section 2.

¹⁸ This section is partly based on Soete, 2007.

While support for intra-European research collaboration – certainly with respect to the joint use of large research facilities in areas such as ‘big science’ – was very welcome, much of the most interesting collaboration extended well beyond European borders, and became truly global in scale. In applied research such as engineering, including energy-saving technologies and medical sciences and technologies, as well as the social sciences and humanities, however, knowledge diversion might well have been a major factor in the growth of intra-European exchange having taken place at the expense of extra-European exchange. In the more basic research areas where open international access had always existed, such ‘diversion’ had ultimately little impact.

It is what could be called yet another ‘European paradox’. As Europe invested in intra-European research, in collaboration and the exchange of scientific knowledge among European scientists, or even in the technological strengthening of the competitive potential of European firms, the advantages of such geographically ‘bounded’ collaboration became marginal, given the dramatically increased opportunities for exchanging information and cooperation. It could be argued that the Lisbon 2000 summit represented the last major EU attempt to formulate a set of combined European and national policy priorities with respect to domestic knowledge creation and its diffusion, and social and macro-economic policies aimed at fostering European growth dynamics: the peak, but implicitly also the coming to an end, of 50 years of policy priority given to European internal integration.

Our Malthusian discussion in the previous sections, suggests that most of those national (and European) research and technology support programmes were designed at a time when strengthening the international competitiveness of particular high-tech sectors and firms located in Europe was considered essential for Europe’s long term welfare. Today though it might be argued that in many areas crucial to Europe’s future welfare, such as energy saving technologies, research on sustainable development and climate change, health and the spreading of diseases, food safety, security, social sciences and humanities, etc. it is less the development within Europe’s national borders of technological expertise than the global access to such knowledge, the development of joint global standards and the rapid world-wide diffusion of such new technologies to other, non-EU countries which is at stake. In all these areas, the territorial limitation of the funding of research and innovation to domestically located public and private research agents appears contrary to the need for global solutions to safeguard in the long term European welfare.

In short, the Malthusian challenges discussed above call for a much more radical and at the same time more straightforward level playing field approach in developing international research partnerships. Apart from the systematic opening up of European research programmes to partners outside of the EU and in particular from the South, as has now become gradually part of the European framework programmes, there is a need for a more active approach to international North-South research partnerships in those Malthusian areas of global concern described above. As an example of what I mean by such a more active approach, let me list some concrete proposals¹⁹:

First, there is a growing need to explore systematically the opportunities for a full integration of what could be called Southern “research for development” aspects in the curricula and the research activities of university departments and research institutes in the North. In many medical faculties, food and nutrition departments, geological departments the need for such a

¹⁹ For more detail see Soete, L. “International Research Partnerships on the move”, Paper presented at the Dutch Conference Knowledge on the Move, ISS, The Hague, January 2008.

more systematic integration has already become recognized sometimes under pressure of international, private firms' interests, as well as more globally oriented, private philanthropic organisations. Much more will be needed to be done here. Higher education training and research is continually in search of challenging application environments. Bringing in systematically the Southern development environment as one of the most challenging areas for applied research offers new opportunities for international North-South research partnerships. Furthermore, in many development environments standardized data are now becoming available, opening up new opportunities for micro-based evidence and case study research. In short, there is a natural expansion of the geographical coverage of applied research beyond the Northern developed world.

Second, one should systematically consider the possibilities for the formal twinning between higher education establishments and/or research institutes in the North and the South. Such a twinning process could offer opportunities for re-invigorating North-South research partnerships. Applied to the whole of Europe with its 4000 or so universities and higher education establishments, a coordinated twinning initiative could provide a major impetus for fast research capacity building in the South. The global dominance of "Northern" international research collaboration has been based on the concentration of private and public research funds in the developed countries. The remaining North-South publicly funded research partnerships became generally shaped within the framework of national developed countries' so-called "development cooperation" activities. Often ambitious standards, reflecting specific national development cooperation concerns, were being set for such North-South research partnerships. As a result, those criteria often eliminated large parts of the developed country's research community. North-South research collaboration became as a result a separate, often marginalized research field that focused on areas at the centre of Northern donor agencies' concerns often dominated by short-term, immediate concerns.

In short, a new, more radical vision of "*recherche sans frontières*" should lead to a renewal of international North-South research partnerships in areas that are key to some of the global Malthusian challenges. In this research is following the process of globalization and the international spread of private research activities with the emergence of new research hotspots – no longer solely in the Northern world but increasingly also in emerging and developing countries.

b) Innovation for local development

The mirror picture of the global Malthusian challenge of international research collaboration consists of the local challenge of the rapid take-up and integration of new technologies within emerging development environments. What we will call here "innovation for local development". Underlying this notion is a vision of development that acknowledges much more the 'endogenous' nature of innovation rather than the external nature of technological change. In the old industrial S&T model, the focus within a context of local development was quite naturally on technology transfer and *imitation*: imitation to some extent as the opposite of innovation. In the new model, innovation is anything but imitation. Every innovation appears now unique with respect to its application. Re-use and re-combinations of sometimes routine, sometimes novel pieces of knowledge are likely to be of particular importance, but their successful application might ultimately well involve more engineering expertise and design capabilities than research.

The need for a shift in research on innovation in private businesses has been popularized by Prahalad in his book: *The Fortune at the Bottom of the Pyramid* (2004). One of the best-known examples of a Bottom of the Pyramid (BoP) innovation is the multiple-fuel stove innovation developed for the rural poor, in which cow dung and biomass (sticks and grass) can be used as cooking fuels. Traditionally these fuels are used in an extremely inefficient way and are dangerous to use due to the smoke inhaled from indoor fires. With the so-called “combination stove” that costs less than \$20, the user can now switch relatively easily from biomass to natural gas, according to his/her needs. There has been a flood of similar examples of BoP innovations being introduced in developing countries by multinational corporations from developed countries, sometimes in poor rural villages, sometimes in urban slums²⁰.

A number of conclusions can be drawn from such examples: first of all, the likely and most successful location of such innovative process activities, will have to be close to *BoP users* contexts. Given the crucial role of users in the innovation process, this will imply that BoP laboratories will have to be embedded in users’ environments and not be part of traditional high-tech R&D centres and enclaves whether in the developed or developing country. In this sense the notion of “**grassroots innovation**” developed by Anil Gupta can be considered as the endogenous, intrinsic version of Prahalad’s external, top down version of BoP innovation. This brings to the forefront that for successful BoP innovation, there will be a need for a local business model that fully embodies local behavioural responses to innovation. Hence, the increasingly recognized need in BoP innovation for strategic alliances between large MNCs and local NGOs.

Second, the innovation process itself is likely to be reversed, starting with the design phase which will be confronted most directly with any attempt at finding functional solutions to some of the particular BoP users’ framework conditions. This will involve not just the need to bring the product on the market at a substantially lower price than existing goods, as Prahalad emphasized, but also a clear adaptation to the sometimes poor local infrastructure facilities with respect to energy delivery systems, water access, transport infrastructure, digital access, etc. *Autonomy* is the key word here. It is no surprise that the most rapidly spreading technology in developing countries has been mobile communication with currently more than 3 billion users worldwide. Autonomy from high quality energy, water, broadband network availability is undoubtedly one of the most pervasive drivers for BoP innovation. Another one might well be “cradle to cradle” sustainable innovation. The lack of high quality logistic infrastructure facilities in rural development settings might well imply that once goods are sold, the repair and/or central recollection of obsolete goods or their parts will be expensive. By contrast local re-use along the principles of cradle-to-cradle might well be a new form of sustainable grassroots innovation. It is in this sense that one might talk about “*appropriate innovation*” and that there seems to be some analytical similarity with the old notion of “appropriate technology”²¹.

Third, the feedback from BoP users and from design developers upstream towards more applied research assistance, even fundamental research in some of the core research labs of European firms might become one of the most interesting examples of reverse South-North transfer of technology, re-invigorating and motivating the research community in the

²⁰ For some of those examples in the sanitation area, see Ramani (2008). For an overview of the BoP literature see Weehuizen (2008).

²¹ The notion of appropriate technology was of course much more formalized in terms of a rational set of economically determined “choices of technique” (Sen, 1968), depending very much on capital-labour substitution possibilities. The term “appropriate innovation” by contrast is much more open.

developed world increasingly “in search of relevance.”²² Not surprisingly, the main focus at the moment within the developed world is on BoP innovations in the health area, a sector where applied medical research is increasingly dominated by access to new technologically sophisticated equipment and much less by some of the more down to earth research questions about, and the list is non-exhaustive: anti-biotic resistance, infectious diseases or resistant tuberculosis. Not surprisingly, health is the sector most in need for what could be called a bottom of the pyramid research re-prioritization.

²² See Soete (2008), *Knowledge on the Move*, The Hague

References

Aghion, P. and P. Howitt (2006), "Appropriate Growth Policy: A Unifying Framework", *Journal of the European Economic Association*, 4 (2-3): pp. 269-314.

Aghion, P. and G. Saint-Paul (1998), "Uncovering Some Causal Relationships Between Productivity Growth and the Structure of Economic Fluctuations: A Tentative Survey", *Labour*, 12 (2): pp. 279-303

Beck, U. and E. Beck-Gernsheim (2002), *Individualization: Institutionalized Individualism and its Social and Political Consequences*. London: Sage.

Bresnahan, Timothy F. and M. Trajtenberg (1995), "General purpose technologies 'Engines of growth'?", *Journal of Econometrics*, 65(1): pp. 83-108

Canton, E. and H. Uhlig (1999), "Growth and the cycle: Creative destruction versus entrenchment", *Journal of Economics*, 69(3): pp. 239-266

Cairncross, (1997), *The Death of Distance: How the Communications Revolution Will Change Our Lives*, Cambridge: Harvard Business School Press

Clarke, J., C. Freeman, and L. Soete (1981), Long Waves, Inventions, and Innovations, *Futures*, 13: pp. 308-322.

David, P. A. (1991), "The Hero and the Herd in Technological History: Reflections on Thomas Edison and the Battle of the Systems". In: Higonnet, P., D.S. Landes, and H. Rosovsky (eds.), *Favorites of fortune: Technology, growth, and economic development since the Industrial Revolution*, Cambridge: Harvard University Press. Pp: 72-119.

David, P. and D. Foray (2002), "An introduction to economy of the knowledge society", *International Social Science Journal*, 54 (171): pp. 9-23.

Fourastié, J. (1979). *Les Trente Glorieuses, ou la révolution invisible de 1946 à 1975*. Paris: Fayard

Francois, P. And H. Lloyd-Ellis (2003). "Co-movement, capital and contracts: 'normal' cycles through creative destruction," Discussion Paper 62, Tilburg University, Center for Economic Research.

Freeman, C., J. Clark and L. Soete (1982), *Unemployment and Technical Innovation: A Study of Long Waves and Economic Development*. London: Frances Pinter

Freeman, C. and C. Perez (1988), "Structural crises of adjustment, business cycles and investment behaviour", In: Giovanni Dosi, Christopher Freeman, Richard Nelson, Gerald Silverberg, and Luc Soete (eds.), *Technical Change and Economic Theory*. London: Pinter, pp. 38-66

Freeman, C. and L. Soete (eds.) (1987), *Technical change and full employment*, New York: Basil Blackwell,

Gallegati, Mauro; Greenwald Bruce; Richiardi, Matteo and Joseph Stiglitz (2008), "An Asymmetric Effect of Diffusion Processes: Risk Sharing and Contagion", *Global Economy Journal*, 8(3)

Ghosh, R. and L. Soete (2006), "Information and Intellectual property: the global challenges", *Industrial and Corporate Change*, vol. 15, nr. 6, pp. 919-935.

Griliches, Z. (1957) "Hybrid corn: An exploration in the economics of technological change". *Econometrica*, 25(4):501-22.

Krugman, P. (2008), "Gordon Does Good", *The New York Times*, October 12, 2008.
Available at: <http://www.nytimes.com/2008/10/13/opinion/13krugman.html>.

Lall, S. (1992), "Technological Capabilities and Industrialization", *World Development*, 20 (2): pp. 165-86.

Maddison, A. (2003), The World Economy: Historical Statistics. Paris: OECD

Malerba, F. (Ed.) (2004), *Sectoral Systems of Innovation*, Cambridge University Press, Cambridge MA.

Martin, A. (2008), "Population rises, resources dwindle and there is no easy solution", *International Herald Tribune*, July 22nd

Mensch, G. (1975), *Stalemate in Technology*, Cambridge: Ballinger Publishing
Nayyar, D. (2008), *Trade and Globalization: Collected Essays*. Oxford: Oxford University Press

Pavitt, K. (1984), "Patterns of technical change: towards a taxonomy and a theory", *Research Policy*, 13 (6): pp. 343-73.

Perez, C. (2009) "Carlota Perez on the Downside of Globalization" *Business Week*, January 21.
Available at:
http://www.businessweek.com/globalbiz/blog/globespottin/archives/2008/01/carlota_perez_o.html

Perez, C. and L. Soete (1988), Catching up in technology: entry barriers and windows of opportunity, in G. Dosi, C. Freeman, R. Nelson, G. Silverberg and L. Soete (eds.), *Technical Change and Economic Theory*, Pinter, London.

Prahalad, C.K. (2004), *The Fortune at the Bottom of the Pyramid. Eradicating Poverty Through Profits*. Wharton School Publishing.

Ramani, S. (2008), Breaking the Guardian knot in sanitation - Development of new technology & business models to create a market for toilets for India's poorest, UNU-MERIT Research Memorandum 2008-12.

Hayami, Y. and V. Ruttan. "Agricultural Productivity Differences among Countries," *American Economic Review*, 60(1970): pp. 895-911.

Sen, A. (1982), *Poverty and Famines : An Essay on Entitlements and Deprivation*, Oxford: Clarendon Press

Sen, A. (1998), "Mortality as an Indicator of Economic Success and Failure", *Economic Journal*, 108(446): pp. 1-25

Shleiffer, A. (1986), "Implementation Cycles", *Journal of Political Econom*, 94(6): pp. 1163-1190

Soete, L. (1981), Technology Dependency: A Critical View, in: D. Seers, *Dependency Theory: A Critical Reassessment*, Frances Pinter, London, UK, pp. 191-206

Soete, L. (1997), The building of cross-border institutions in Europe: towards a European system of innovation?, In: C. Edquist (ed.), *Systems of Innovation. Technologies, Institutions and Organizations*, Pinter Publishers, London and Washington, pp. 395-419

Soete, L. (2007), Recherche sans frontières, Paper presented at the Ascona Conference, June 2007.

Soete, L. (2008), "International Research Partnerships on the Move", Paper presented at the Dutch Conference Knowledge on the Move, ISS, The Hague, January 2008.

Von Hippel, E. (2004), *Democratizing Innovation*, Cambridge: MIT Press

Weehuizen, R. (2008), *Innovation for the bottom of the pyramid*, March, UNU-MERIT, mimeo.

World Bank (2009), *Interventions in Financial Institutions in the US and UK*. Available at: <http://crisistalk.worldbank.org/2009/03/interventions-of-financial-institutions-in-the-us-and-uk.html>.

2025, A WORLD TOO DIFFERENT FROM TODAY?

Disruptions in the horizon?

The establishment of a new world order is never smooth or fully determined. It results from the balance of forces, the level of predation of the resources and on the more or less cohesive groups of nations that engage in the several conflicts that unfold.

For half a century since Yalta the world order was shaped by the nuclear capacity of the two (then) emerging superpowers – the US and the USSR – and we mistook the collapse of this cold war order for a kind of globalization. Certainly, transportation and communication increased immensely due to the deployment of a techno-economic paradigm based on information processing capabilities. But this would have happened, anyway, without the implosion of the Soviet Union.

Thus we are now in the transition to a new world order, where nuclear warfare capacity will be the determinant factor. However, we now have more than two major players: maybe seven, and until 2025 the nuclear club may well turn into a dozen or so members.

The world will probably be more secure with twelve nuclear powers than with the sole two of the past century; but who knows? Disruptive factors (always unforeseen) may drive the world differently from what we expect when we attempt to anticipate the future.

I list, to start this paper, a series of possible disruptive factors which will affect considerably what is written in the subsequent pages. This has to be taken as an “insurance” against revealed “wisdom”.

DISRUPTIVE FACTORS

1. A major war (in the turbulent years 2010-2020)
2. The first collapse of a third-world big city (be it a capital or a major urban center)
3. The collapse of the EU architecture (in view of continuing difficulties in the search for a new political arrangement of the European nations)
4. The fading-out of the university system in Europe (bringing forth the issue of the education of the elites)
5. The new techno-economic paradigm being first implemented in any of the big countries of Asia.

Main factors of human evolution

Should the beginnings of the 21st century seem very different from those of the 20th? Yes and no, for sure. We are not perfect copies of our ancestors; population has grown considerably around the planet --- four times all over; and our conceptions of nature and of ourselves have evolved considerably. And yet, in spite of all these changes, as it happened a hundred years ago, when numerous discoveries of new natural phenomena and of mysterious X-rays, added to cognitive ruptures in philosophy, literature, painting, medicine, engineering and the end of the old regime, we see a similar renewal of superstition and belief in the occult.

Today, we witness complexity, climate change, water and energy concerns, a new understanding of cells and proteins, we are attempting at the disclosure of the most inner secrets of the brain and of consciousness, we experience globalization; but we suffer from social exclusion and new diseases, with new forms of communication spreading over the globe. Increased specialization and advanced training have turned the most rational human being in his (or her) area of expertise into a weak and unprotected individual, prone to emotions and vulnerable to obscurantist thoughts, eager to run after any illusion which claims to bring a seed of hope. After a full century of extraordinary scientific and technological progress, this seems very disconcerting. How can this be so, and what are the implications for 2025?

Two main factors are driving human evolution: (i) people; and (ii) their talents, or cognitive abilities, taken in the French sense of “savoirs”. Given the time horizon of the present exercise, demography is not the main source of incertitude. What about knowledge production and diffusion, in particular, technology?

We know from the seminal work of Christopher Freeman and collaborators that industrialization set a pace of definite structural continuities and transitions, which were labeled “techno-economic paradigm” changes. From early mechanization based on hydraulic power, successive transformations followed, which were characterized by the power of steam, by electrification, and by motorization based on cheap oil. Since the 1980’s we seem to be living in an era of “computerization” of the entire economy; non-specialists call it “globalization” and see it coupled to the emergence of the “information society”. Until the 2020’s we will continue to perform and operate in this global framework of economic activities. What are the drifts, problems or discontinuities looming in the near future?

To understand what the main issues for 2025 are, we must recall that in the course of the 20th century the mechanisms of technological creation were drastically altered, and enhanced. Science nowadays is the source of powerful technologies.

Science and technology

The emergence of industries of high technological intensity in the second half of the 20th century, such as nuclear power, aerospace, semiconductors and computers, and more recently the pharmaceutical and biotechnological ones, reveals the critical importance of science applications in the societies of the industrialized world.

Business and societal practices now strongly depend on new ideas which have an origin intimately related to the scientific effort, i.e., that do not derive from natural language nor common knowledge. This procedural change was not straightforward; it implied a thorough transformation and a deep institutional reorganization in the societies that assumed it.

The world, today, would not be possible without its products: airplanes, missiles, satellites, space vehicles, computers, lasers, antennas, electronic networks, genetically modified products... In turn, the products of these sectors diffused to enable the deployment of a full package of new and highly comprehensive services.

The instrumental conception of the scientific endeavour --- the generation of wealth and economic development through science-based technology, gave way in the last decade of the 20th century to a more nuanced (or complex) notion of the “embeddedness” of scientific activities in the social context in which they are conducted. Therefore, the very nature of research policies changed, in order to accommodate more diffusion-oriented goals, stressing the mechanisms of knowledge circulation and transmission, of technology management and exploitation, of science awareness and public engagement in science.

This change has also been motivated by the questioning of the character of public intervention in the economy, namely the role of central government in the conduction of operations too close to the market. Public policy and actions have been directed to the regulation of competition, the building-up of infrastructure (including the development of human resources), the stimulation of networking activities (and hence the concept of mobility), the financing of research programmes in basic “pervasive” technologies and the provision of S&T services, norms and standards.

The new enabling conditions and constraints that society imposed on modern science practice evolved in conjunction with an escalation of global uncertainties and political instabilities in a context of demographic pressures, urban sprawl, climate change and perturbing inequalities.

But why should the creation of a new knowledge-based society, involving strenuous cycles of change and adjustment, be a triumphal promenade towards the future? Rather, we should have been prepared to watch the emergence of conflictual issues, leading to severe and irreversible choices. Contingency rules the world around us: only science, the best available science, can enable humankind to see through the mists of complexity, by engaging in proper collaborations with other relevant non-scientific fields of knowledge, like philosophy, the social sciences, arts and humanities, ethics and behavioral disciplines. Science alone cannot solve the problems of sustainability.

Knowledge: tree or network? The archipelago metaphor

The system of classification of knowledge we inherited from late positivism, a pyramid with science at the top, aimed not only at the consecration of science as the model of all other fields of knowledge but also at establishing a corresponding hierarchy, is no longer adequate. The novelty comes from the emergence a new immaterial, information-intensive order, in the realm of the material paradigm of progress and socio-economic development.

Information and knowledge are not regulated by the regimes of cumulative possession or ownership developed for tangible transactions. Communicative “sharing” is a concept that must be introduced to allow for aspects such as assimilation and audience. What this means is that knowledge can no longer be thought of as a fluid, as in a mechanical framework, but has to be understood by enhancing its communicative, language-based features.

No classification of knowledge can be envisaged without a reference to the societal context in which it is generated. The present notion of “explosion” of information and of “fragmentation” of knowledge is probably the result of the powerful weakening and fragmenting effects that the forces of economic globalisation provoke in the social order of our nations.

But this is not a singularity of our epoch. Fragmentation of prevailing social order has occurred in the past. For instance, Enlightenment brought the idea of the Encyclopaedia. As the old regime was being shaken, knowledge was envisaged as a tree, with its various fields developing as successive ramifications from the common stem: philosophy. Three main branches of the knowledge tree were assumed: the science of God, the science of Nature, and the science of Man. Then, in the late 19th century, the success of industry and the triumph of mechanics, rail-roads and iron, brought along a new rationale, the positivist's pyramid, with mathematics and the other (hard) sciences in a descending order from the top, presiding over philosophy, the humanities and religion.

The pyramid was the organization of knowledge which was conveyed and taught to us and which reigned undisputed until the 1960's. However, from the standpoint of contemporary society it is impossible to maintain rigid distinctions between different fields of knowledge. The proliferation of disciplines was greatly intensified since the middle of the 20th century along with their internal complexity. And interdisciplinary fields became established.

The hierarchy of the pyramid hides important segments of contemporary knowledge, sometimes with very innovative features, simply because they are unclassifiable in the light of current criteria. Think of marketing, or design, or even software...

The issue is simple: criteria do not have any meaning outside strategies. Therefore, we must reappraise rather than dismiss the disciplinary references, articulating them in a communicative manner, creating a network. In this sense, the metaphor of the archipelago of knowledge is useful and heuristically operative, because it allows us to think about the criteria/strategies of the main areas of relevance today.

The archipelago suggests a reticular situation, a network, with no “natural” hierarchy. Further, it allows the creation of new disciplines.

Science and knowledge

The traditional approach to science and knowledge has involved the use of two perspectives ---an epistemological one, interested in the status of theories and laws and their relation to reality, and a sociological one, dealing mainly with the framework of scientific activity in a given society or environment.

These perspectives, which could also be described as internal and external, have been found to be most fruitful in the well know works of Popper and Kuhn, respectively. It is doubtful, however, whether they are sufficient today. Profound changes have marked the transformations occurring in economic activities, i.e. the increase in intellectual investment compared to physical investment, the growing role of complexity in the systemic framework (which until recently was particularly dominated by materiality), the emergence of sharing as the dominant form of communicating and circulating knowledge.

We now have to understand knowledge from three different aspects: (i) the production of theories; (ii) the creation of communities, and (iii) the development of specialized languages; in other words, we see knowledge as a cognitive, communal and rhetorical device.

Thus, we can no longer forget the presence of tacit knowledge in the network. And, due to the different levels of sophistication in language development, the archipelago metaphor suggests that “codified” knowledge be split into two parts: “explicit knowledge” (or “specialized information”) and “disciplinary knowledge”.

The “tacit” relationship with the world corresponds to common knowledge, which is apprehended or diffused by “exposure”. The “explicit” relationship between man and his world corresponds to “specialized information”, with “teaching” as its main mechanism of diffusion. Finally, “disciplinary knowledge” corresponds to high-level languages, which diffuse through “research” and its protocols.

The practice of research varies according to the “island” of the archipelago in question, i.e., with the specific cognitive, communal and rhetorical strategies: the criteria of science, based on the amplitude of empirical proof, correspond to the method of “experimentation”. But philosophy uses other methods, namely analysis; ethics relies on “revelation”; and aesthetics uses systematic procedures of construction/deconstruction. Sharing assumes different aspects in each grand domain of knowledge.

In this network metaphor the central island of the archipelago corresponds to tacit knowledge (encompassing both technical, political, religious and artistic components). Through a process of explicitation the network progressively extends and complexifies. Other “islands” appear: those of technology, of law, of morality, and of fine arts. And then further away, through a more intensive explicitation or thematization process, corresponding to the emergence of high precision languages, new “islands” of disciplines are seen: science, social sciences, philosophy, aesthetics, ethics...

Knowledge and learning

True knowledge is therefore what is inside the “boundary” of the archipelago; and ignorance is the “sea at large” that surrounds it. This sea can be conquered by constructing new islands, or by launching bridges to other islands or even to newly built offshore platforms (marketing, design, ecology... emerge by such processes).

The archipelago is nowadays the locus of an intense circulation of knowledge, in all directions, revealing a true network character.

Of course, pseudo-knowledge creeps at every turn of the landscape, every time we want to swim (individually), or navigate (institutionally), in uncharted waters. Pseudo-knowledge can be thought of as a group of sharks, or pirate submarines, that hunt both along the shores and inside the canals of the archipelago, feeding on the discomfort of the human souls. They disrupt the existing connections and make sure that their assertions cannot be verified.

We also observe a wide proliferation and renovation of pseudo-knowledge in the media. The strategy followed by the practitioners of pseudo-knowledge is that of “certainty” versus methodological “doubt”, that of escaping confrontation between subject and object, that of finding refuge in unknown powers. It is based on the detection of flaws in the public system concerning scientific culture, in conjunction with the dysfunctions that exist in teaching the practice of active citizenship. The space of occultation in the so-called knowledge-based societies thrives on ignorance, feeds on intolerance.

Knowledge and learning are the central resources and mechanisms of the new institutions, communities and organisations. So, the implications of the intensified circulation of knowledge will have to be recognized and fostered: disciplinary knowledge can only evolve in the context of a strong communicative framework which enables the attitude of sharing meanings and values to realise its full potential.

The globalised world is made of enlarged networks which create, diffuse, finance, manage and support innovation, based on a group of formidable social, organizational and technological changes which were brought by the new process of producing technology from a science base. But these changes are societal, they are responses to the transformations experienced, involving all aspects of today’s reality, concerning all networks of intense and enlarged communication that support our activity.

But we must be aware, though, that the view of the world of globalisation based on “knowledge”, does not coincide with the view of the world of modernity, based on “science”. The vision brought about by the new paradigm of knowledge and information favours “governance” rather than “government”; promotes what is “global”, rather than “universal” values. This apparently innocent change is, however, full of implications (see Annex – in French – «Trois petits mots»).

Knowledge-based (not science-based) societies

The movement towards a knowledge-based society, involving new long distance interactive mechanisms implies a whole, i.e., a continuum of education, science and innovation which cannot be separated and must be treated in close articulation. Science is no longer at the end, or at the beginning, of societal processes. But the level of pervasiveness of science is also a measure of the achievement of a knowledge-based society.

However, science will have to learn to co-exist, co-operate and co-evolve with other relevant non-scientific fields of knowledge. This is not necessarily simple for the more established scientific communities. But there is no way back.

And even if until the 2020's we do not foresee the emergence of a new techno-economic paradigm, long-term trends will bind the operations and performance of "globalisation". In general, personnel costs will tend to rise, as will the pressures on enterprises to internalize their costs of production; indexes of taxation by governments will also increase. With respect to innovation in the European area we may fear the effects of ageing in the dynamics of innovation policy, as well as the effects of energy concerns; further, the impact of competitive goods and services from big economies based on low salaries will almost certainly prevent the design of policies directed solely towards national contexts.

The emergence of a multipolar world will probably mean the end of the present pulse of globalisation and the return to imperial demarcation of territories based on the availability of known resources. The levels of conflict in disputed areas and their damages in general will certainly continue to plague the world into the 2020's.

The new leaders after 2025 will have to differentiate themselves from the multitude --- this will require the invention of new resources, through the application of new (science-based) technology.

We have been watching the emergence of new clusters of S&T areas which can possibly lay the pillars of a new techno-economic paradigm for the future – i.e. in the 2030's – based on the "molecularisation" of the economy. This will be supported by a cohesive core of nanosciences and nanotechnologies, biosciences and biomaterials, new communication and information processing technologies.

No big nation, or concert of nations, can afford to thwart the march of science. But new questions arise: (i) which directions to choose (because it is impossible to be excellent everywhere across the board); (ii) which impetus to allocate in each case (as research structure and resources are highly interdependent); how much monitoring to exert (the level of autonomy) to assure expected returns? Will the nations of Europe be able to ride and lead the new wave?

Living with universities

Universities were a European invention. They are an essential element of scientific training, besides housing a large fraction of basic research performed in national S&T systems. In the European strategy, universities are deemed to represent central nodes in knowledge production. We know that the older universities missed the scientific revolution, and only caught-up with science much later. Will the same fate be bestowed upon European universities now, when the surge of information technologies is revolutionizing our behaviour? Can Bologna cope with the diversity of ministerial regulations that divide and quench education/science/innovation interactions in Europe? Scientific productivity is being used as a prime determinant of researcher's careers and of the level of science financing. But can we identify with ease the entities who (globally) control science today?

The US followed a singular strategy: a series of "cold-war" universities (the first and best example being Stanford) were selected by the federal government to ensure a proper environment for the new (then, in the late 1940's) science-based technology production processes. The US were very successful in that not only these universities evolved into a new model of university – the "research university" – but also in that they found their place at the top of the higher-education system and developed as prime interlocutors of powerful hi-tech industries.

The US research universities however are both a by-product and a component of a specific highly developed capitalist economy – they are independent, have their own sources of funding (through endowments) and, above all, are not managed by any central ministry or authority of the sort.

The way to follow in Europe until the 2020's (with its constellation of nations) must be based on the creation of European institutions, such as ERC, EIT, a future Innovation Agency, a platform to articulate existing multinational scientific institutions: CERN, EMBO, ESA, ESO... into an European policy for research and knowledge sharing.

The "ethos" of the European universities of the future will also have to change. The US awoke in 1983 from the impacts of massification of secondary and tertiary education. "A Nation at Risk" was the lemma for a set of actions developed to overcome the malfunctions of the system, not all of them successful. But in Europe, with its concert of nations, no movement of the sort emerged – and we were also suffering from the same illness. The terms coined in the early 1980's – "learning society", "long-life learning"... are still with us: not the action.

The modern university developed during the 19th century has as epistemic objective the transformation of nature. The triumph of science in the 20th century can also be seen as a victory of the modern university. However, a century ago, nature could be looked upon as external to mankind, with their passions, their conflicts, their nastiness and generosity.

But if nature is what we make of it, there is no longer room for being outside. So we are beginning to turn round in circles.

Europe should devise, as the core of its now “regionalized” system of higher education, a set of highly attractive new global universities, autonomous from national regulations, aiming at a new epistemic objective, fully in line with the issues of sustainability we are going to be engaged in during the 21st century.

Such objective could be centred in “living together”, the crucial problem of keeping communication channels open in a turbulent world, and of dealing adequately with the global commons that will support life in our planet.

Living with technoscience

The social impact of science is today associated with the usefulness (or with the problematic effects) of the products which are based in scientific principles.

The potential for wealth creation in advanced societies is strongly rooted in science-driven technological change and artifacts. The social image globally projected by science is therefore no longer that of the scientist who doubts, who questions the frontiers of knowledge, but rather that of the specialist who implements measures to obtain the most efficient responses, or that of the engineer who develops practical solutions to the problems of quality of life.

So the evolving relationship of science with politics cannot be seen in isolation from its context --- public opinion and the quality of public debate. Science is nowadays very important for the sustainability of economic and social mechanisms. It can no longer claim to be neutral. It is a player in the political game.

The current relationship between science and power, in the political, economic and military spheres, does not favour the understanding of the emancipatory role of science and knowledge. On the contrary, it conceals it.

Given all this, will the generations of Europeans leading us into 2025 be able to further democracy and critical thinking? What are the alternatives? How can we act decisively now? What should and should not be compromised?

ANNEX

TROIS PETITS MOTS

En analysant la situation actuelle, on peut vérifier que l'on rencontre aujourd'hui de manière systématique trois mots clés, dans tous les documents, tous les discours, toutes les émissions, tous les domaines.

Ce ne sont pas des mots nouveaux, mais ils prennent tous un sens nouveau qui les rend dignes de considération. Ce sont la «mondialisation», la «connaissance», la «gouvernance» (en anglais, governance). Ces trois mots, tellement inoffensifs quand ils sont placés entre guillemets, deviennent de véritables instruments de transformation si on les oppose aux trois mots auxquels ils se sont substitués, respectivement, «universel», «science», «gouvernement». De fait, ce qu'il nous intéresse de comprendre est bien l'essence des conflits que nous apportent les oppositions mondialisé/universel, connaissance/science, gouvernance/gouvernement.

C'est pour cette raison que la période actuelle est une époque de transition. D'un monde où, durant plus de deux siècles, ont régné les concepts d'universel, de science et de gouvernement (de l'État-nation), on est passé, presque sans s'en rendre compte, entre de grandes célébrations et louanges, à la mondialisation, à l'économie de la connaissance et de sa gouvernance.

Mais il n'y a jamais de transformations innocentes. La mondialisation s'oppose à l'universel, la connaissance à la science et la gouvernance au gouvernement (à travers des gouvernements nationaux), pour le meilleur ou pour le pire. Voyons cela de plus près. D'abord avec la mondialisation.

Durant deux siècles nous avons joui du règne de l'universel. Nous possédions des droits immuables, éternels, sacrés, par le simple fait d'être nés. Tous «les hommes (et femmes) naissent et demeurent libres et égaux en droits» proclame une des plus grandes conquêtes de l'histoire de l'humanité, la Déclaration universelle des droits de l'homme et du citoyen datée de 1789. Ces droits, libertés et garanties sont antérieurs et supérieurs à l'État; ils sont acquis, permanents et inviolables. Y compris pour protéger les citoyens des abus de l'État, celui-ci a vu ses pouvoirs limités et divisés en exécutif, législatif et judiciaire. La souveraineté est alors entre les mains du peuple.

Tout n'a pas été facile dans le règne de l'universel: le progrès du bien-être social a été le résultat d'une longue lutte, où la sphère du privé constitue jusqu'à présent un ultime réduit de liberté.

Subrepticement, la mondialisation est venue introduire plusieurs éléments. Dans l'empire de la mondialisation il n'y a pas de droits acquis, il y a des contrats, ou bien des droits négociés. La place de l'individu (du consommateur ou du producteur) doit être conquise, de force, sur le marché, son accomplissement doit être rentabilisé, son utilité démontrée.

Il y a donc nécessité d'une négociation continuelle, de rentabilisation, de compétition. Les personnes sont superflues, elles ne présentent de l'intérêt que dans leur fonction - consommer ou produire - et deviennent ainsi de véritables ressources: des ressources humaines!

On a même inventé une jolie expression pour nommer la nécessité du recyclage des ressources humaines (sans laquelle ces ressources n'ont pas de valeur pour le marché): l'éducation tout au long de la vie. Qui n'est pas rentable n'existe pas, ne compte pas pour le monde mondialisé. Il peut être éliminé puisqu'il n'a aucune utilité économique. Il devient un poids pour la société mondialisée et efficace qui, à la limite, le méprise.

Passons maintenant à la connaissance. Durant trois siècles, la science a été considérée comme un moyen essentiel de gérer une vision plus correcte du monde. La science moderne est parvenue, y compris à l'apogée de sa croyance dans le progrès et le positivisme, à se voir considérée comme le critère de vérité pour la connaissance. Autrement dit, la véritable connaissance était ou devrait être scientifique.

Le succès de la science fut tel qu'il a donné lieu au développement de puissantes et efficaces technologies, qui ont été à l'origine de la croissance économique des pays développés durant les cinquante dernières années. La science est à la base de la création des secteurs industriels de haute intensité technologique qui furent les instruments de la mondialisation des finances, des assurances, de l'immobilier (*real estate*), des transports, des médias.

Mais le succès de la mondialisation des nouveaux services a tout dépassé et dépassé tout le monde - et requiert tout un ensemble de savoirs (juridiques, organisationnels, de marketing, de *software*, de design, de formation) qui ne sont pas proprement scientifiques ou technologiques. Ainsi, la décennie 1990 fut envahie, dans les documents stratégiques (*policy oriented*), par le mot connaissance (*knowledge*), mot doté d'un nouveau sens spécifique qui a détrôné et s'est substitué au mot science qui régnait jusqu'alors.

On s'est mis à parler d'économie de la connaissance, ou d'économies fondées sur la connaissance, de la société de la connaissance (ou de l'information), de gestion de la connaissance, et même de la nécessité de politiques de la connaissance! Ainsi, ce nouveau mot de connaissance et son empire sont venus détrôner la science, désormais pure vassale de l'empire mondialisé, tout juste bonne à gérer des enfants rentables et technologiques. Et l'expression S&T s'est transformée en T&S, la technoscience.

Enfin la gouvernance. Durant les trois mêmes siècles, l'Etat-nation (et l'équilibre entre États souverains) a constitué la pierre angulaire de l'ordre établi en Westphalie, qui a stabilisé l'Europe, et fut ensuite exporté par celle-ci aux différents coins du monde. Les gouvernements étaient ses représentants légitimes et les responsables moraux pour la sécurité et le bien-être intérieurs et pour la conduite des affaires étrangères.

Mais la réalisation croissante des affaires sur des marchés extérieurs - la création de marchés mondialisés - tout comme la propagande destinée à libéraliser les marchés nationaux, les déréguler et privatiser les entreprises publiques rentables, piliers du *Washington Consensus*, ont entraîné le retrait progressif des gouvernements nationaux de la sphère de l'économie. Cela n'a fait que privilégier, dans la sphère du politique, les

actions relevant de la gouvernance, et l'influence politique en chaque pays de nouveaux acteurs (économiques ou politiques) externes ou internes.

On posera donc que la gouvernance est l'image (politique) de la mondialisation (économique), et que son instrument de domination (culturelle) est la connaissance.

Geoff Mulgan

EUROPE 2025:

DISCOVERING THE FUTURE THROUGH ACTION AS WELL AS ANALYSIS

Looking back from 2025 what will Europe collectively most wish it had done better in 2008? Where do we most need to change in order to survive and thrive as a continent? And where can we collectively do most to change our future for the better? In what follows I will argue:

- First, that Europe's greatest priority is not to predict the course of the oil price or demographic change but to make itself more resilient and adaptive to change. This requires better performing meta-institutions to understand change and act in response to it – in particular governments, media and universities, as well as business. Too many governments are only weakly focused on future readiness rather than past commitments; universities have been particularly poor in redefining their roles within circuits of knowledge; and Europe's media do too little to mobilise and enhance Europe's collective intelligence. I suggest various actions that the Commission could promote to address these issues.
- Second, that Europe needs to become much more energetic in promoting innovation in all fields, and specifically that investment in technology R&D needs to be complemented by much more vigorous investment in social innovation in order to discover the future through action rather than believing that it can be discovered solely through analysis. This will require a much more prominent role for civil society, social entrepreneurs and citizens themselves. Again, I make some specific suggestions.
- Third, that futures work can help to identify the key fields for innovation and resilience, both through defining central scenarios (and the priorities around ageing, climate change, diversity &c) as well as key potential variations. For Europe as a whole resilience will depend on pluralism – with different places and institutions optimised for different possible futures.
- Fourth, that the current crisis requires an acceleration of actions to improve resilience – including mobilising civil society to reduce the damaging impacts of recession, and adapting any fiscal stimulus to reinforce future-readiness rather than simply propping up existing economic models and practices.

Knowledge, power and the future

No institutions – or individuals – can know the future or achieve the future they wish for. Instead, in responding to future trends, governments and other institutions are constrained by both knowledge and power. They need a rigorous view of just **how much they know** about the dynamics of change and the effectiveness of responses; and a rigorous view of how **much power** they, or any other institutions, have to influence drivers of change and trends.

Where Europe's institutions have both power and knowledge the future can be confidently shaped. But there are few fields where this is the case. Some aspects of demographic change appear to fit into this category; yet life expectancy forecasts have been constantly revised, as have forecasts on in-migration. Climate change is relatively knowable and many of the tools to respond lie within the power of governments, even if they are politically challenging. Yet here too the margins of error are very wide.

Where we have knowledge but little power quite different strategies are necessary, acting and thinking more like insurgents, and seeking points of leverage. A high proportion of technological change will be of this kind, with Europe as a user of technologies developed elsewhere. Where we have power but little knowledge strategies have to be more exploratory, adapting quickly in the light of experience.

The current downturn is of this nature. Although many expected a severe crash in response to the huge imbalances in the global and US economy, none predicted its specific sources or the patterns it followed. Governments are responding with rapid action and rapid learning – and although they will undoubtedly make many mistakes, the key is to understand these quickly.

These considerations point to the importance of complementing traditional futures models (scenarios, forecasts, foresight) with future oriented actions, which discover the future through experiment. This is reasonably well-understood in entrepreneurial high technology industries where public R&D supports high risk research ventures, enabling venture capital and other finance to back new enterprises. But it is much less familiar in the social fields which will be essential to Europe's future: adapting to ageing; transforming health systems for a situation where long-term chronic diseases dominate demand and costs; adapting to low carbon economies and lifestyles; adapting to hyper-diversity in cities.

In these fields Europe needs to finance multiple experiments with fast learning, and commitments to grow successful models. Some of the support for more systematic innovation needs to come from governments at all levels; some from foundations; some from businesses which stand to gain from the emergence of new markets; and some from new types of social investment.

Experimentation of this kind needs to consciously draw on the work of analytic futures exercises; but it can also feed back distinct insights, reflecting the fact that in many fields practice is ahead of theory. This must be a priority for budget-setting and is where the modest resources available to European institutions can potentially achieve most.

The major forces for change up to 2025: connexity and knowledge

What, then, are the major drivers of change with which institutions have to respond with the available knowledge and power? Where will innovation of this kind be most needed?

The most basic forces that look set to shape the next two decades are ones that Europe has played a decisive role in unleashing. The first is the continuing growth in the density of connections which I call ‘connexity’ and which is measurable in the form of flows of money, products, information and also of people. Europe made the world global through empire, trade and communications, but no longer controls globalisation and connexity. Instead it is itself being profoundly shaped by new networks and flows: air travel, the waves of inward migration (which have left London, for example, with 42% of its workforce foreign born), flows of investment increasingly from India (e.g. Tata) and China (e.g. in automotive industries). The degrees of integration vary by field – strong in the economic field and communications, much weaker in politics and culture. But they are the decisive fact of the 21st century.

This connexity is increasingly reflective: self-aware of its power (and limits) and contributing to the accelerated accumulation of knowledge in many forms, including scientific and technological knowledge, and organisational knowledge as well as tacit and cultural knowledge. Europe has many strong institutions devoted to knowledge but has largely failed over the last two decades to make the most of its assets. It has lost ground in high technology; failed to create the key knowledge platforms (operating systems, search engines, exchange systems, social networking platforms) of the 21st century; lost ground in cultural knowledge (i.e. influential ideas about living); and lost ground in the convergence of ‘info, bio, nano, cogno’. It’s striking that all the near monopolies of the current era are American – Intel, Microsoft, e-bay, Google, Youtube &c.

The interaction of connectedness and new knowledge explains much that is changing in the modern world, from migration flows for high skilled workers to shifting occupational structures. It also delineates some of the dilemmas: e.g. rapidly rising life expectancy combined with much slower rises in disability-adjusted life expectancy; or the dilemmas of new knowledge (whether to know, or act on, a genetic predisposition to particular diseases; whether to know and act on a predisposition to criminality; how to regulate transnational communication of personal information of this kind). It points, too, to some of the areas of backlash from the major losers who either lack valued knowledge or connections or both.

The specific dynamics in particular sectors (e.g. the dynamics of democratisation and de-democratisation, of growth and slowing, of social cohesion and fragmentation) are highly contextual. But the broad trends are common, and broadly predictable, albeit with uncertainties:

- the likelihood overall, even now, of broadly linear economic growth (albeit with cycles, and some periods of severe slowdown) driven by new knowledge, growth-favourable institutional arrangements and widening global markets;
- the likelihood that the big technological stories will involve the diffusion of already maturing technologies (biotech and genetics, digital, nano), alongside the beginnings of a major impact from less mature ones (e.g. around cogno)
- broadly predictable demographic change (though with constant adjustments of death rates, birth rates and migration levels);

- some reasonably predictable occupational changes towards knowledge intensive and service roles (including care), and the growing importance of sectors based on relationships – care, health, learning – with very different models of production, scaling and innovation to the dominant 20th century industries
- values changes - autonomy, gender shifts, post-materialism &c – so long as peace and prosperity persist
- shifts in geopolitics and economic position as Europe's share of the world economy declines relative to China and India
- the continued imbalance of weak multilateral institutions and strong economic and ecological integration
- the continued interaction of civic cultural integration (an emerging world public opinion, and an increasingly confident global civil society) alongside hardening of national identities in particular nations
- declining political party affiliation as the mirror of rising civic activism in the old democracies, and continuing innovation to find new ways to connect politics to the public (from e-petitions and deliberative processes to transparent budgeting)
- rising IQ according to the Flynn effect (though it may possibly be levelling off) suggesting a growing capacity for mutual comprehension and grasp of abstract concepts
- the rising centrality of chronic diseases to health systems, requiring radically different models of care, with a much greater role for self-care, informal as well as formal support structures, and ubiquitous access to information and advice

At least over a 5-10 year horizon these are not likely to be far wrong though over more than 20 years the scope for error is very great. These provide broad central scenarios – which pose some familiar challenges to Europe about the adaptability of institutions, demographic strategy and political trust as well as the need for innovation in all sectors described above.

There are then some significant possible trend variations. Some of these are high level and strategic. For example in geopolitics will we see heightened tensions with aggressive nationalism from the major powers, and in time major wars? Will there be many more serious environmental disasters – catastrophic flooding or drought - imposing heavy costs on particular places and undermining key industries? Could the wilder claims about terrorism become more plausible – and if so, are Europe's cities, critical infrastructures ready? How will the complex politics of equality play out: will inequalities within countries continue to widen and will politics change its shape if there are widening divisions between the top and middle rather than bottom?

One of the bigger uncertainties is whether there will be a significant shift in the character of globalisation with more deliberate creation of buffers in some fields to reduce the damaging effects of excessive connectedness. This has been a common theme in systems thinking – the need for buffers and protections to stop perturbations spreading too fast.

Specifically this is likely to be relevant to: financial services regulation, ownership and business models; food and the partial return to local sourcing, rising interest in urban agriculture; energy and the greater priority for localised energy production, through Combined Heat and Power, use of waste etc.

Other variations point to other priorities for social innovation strategies:

- Climate change – even before the current crisis there were grounds for expanding a possible marked slowing of trends towards hyper mobility, promoting a new localism and showing up very uneven abilities to adapt e.g. to higher carbon costs. This suggests the need for some areas to be supported as pioneers.
- Economic – if current problems turn into a more sustained slow down, with very uneven impacts, there is likely to be a need for more conscious innovation in fields such as job creation, parallel currencies, creative ways of using underused assets (people, land, buildings &c)
- Demography – could life expectancy accelerate implying even greater pressures on health systems; or could migration levels, rise even faster, in which case Europe's ultra diverse places will need to do even more to avoid conflict and alienation.

The meta-question

More important than any of these specific drivers and scenarios is the ability of Europe to recognise and respond to changes that are beyond its control. I believe that this is an aspect of collective intelligence. Just as the ability to understand threats and opportunities, and then to shape plans and see them through, is a critical aspect of personal intelligence, so is this the critical ability for any community or society. These tasks of social cognition and action are supported by many institutions:

- governments with plans, policies and strategies of varying degrees of coherence and wisdom
- markets and firms which try to predict future demands and price patterns, sometimes helped by corporate strategy teams;
- university departments;
- specialist think tanks;
- media commentators;
- civic organisations
- writers both fiction and non-fiction;
- and many others

In retrospect historians can point to how well each of these has helped its society prepare for future change: whether they have promoted an accurate view of the dynamics of change; how much they are vulnerable to wishful thinking or myopia or the encouragement of self-destructive behaviours.

It's harder to assess in the present which institutions are proving most intelligent in the face of change. But recent history is littered with examples of collective stupidity: polities that wilfully ignored major threats (from climate change to pensions); markets that promoted profligacy and waste; media that 'dumb down' their users. And there is great anxiety that in recent years Europe may have been in denial, uneasy with much that is happening in the world, seeking a better yesterday, slow to learn from more successful parts of the world and therefore unprepared.

Here I suggest a few actions that could help some of these institutions perform their roles better.

Systematic social innovation

First, Europe needs more energetic social innovation directed to the big priority tasks of the next 20-30 years – such as ageing, climate change, social exclusion and diversity. These programmes need to tap into the creativity and entrepreneurship of the public and of NGOs as well as public servants and businesses. The role for European institutions is to create enabling conditions and funding streams but to allow the maximum flexibility and creativity. Specific new policy approaches are needed to reorient framework programmes, regional programmes, EIB activities and others to encompass social innovation, as well as applying ideas (like the city of culture) to the social field. All activities of this kind need to include requirements for measurement and fast learning. Wherever possible such programmes need to engage the public in thinking through the challenges and opportunities of the future; learning from relevant experience globally; and cultivating a reflective, risk-taking mentality. Strategies of this kind will help Europe to feel sovereignty in the face of massive changes rather than simply being a passive responder.

Adaptive governance

Second, Europe needs to do more to help its governments adapt. Governments are always at risk of stagnation in the absence of major external threats, and some governments have notably failed to address, explain and cope with the big long-term challenges, pensions and climate change, and have equally failed to build innovation into their own work (i.e. most government innovation strategies are focused on innovation in business or science, not innovation in government). Welfare systems risk becoming stuck with older demands rather than newer ones of chronic disease, ageing and youth transitions, just as industrial policies tend to reflect the power structure of the last economy not the next one. The Lisbon process and other processes of open coordination have helped to provide an objective pressure for governments to improve their performance. But more could be done to promote best practice in governance: how to use technologies; how to act strategically; how to organise horizontally as well as vertically; how to engage citizens. There are also good examples from around the world of how governing institutions can engage citizens in large scale conversations about the future (e.g. Australia 2020 earlier this year). Europe could do more to network together the many futures exercises underway in national, regional and city governments (e.g. the London Collaborative, the UK government Strategic Audits).

Dynamic universities

Third, Europe needs to address the strategic crisis of its universities. These should be the powerhouses of knowledge based societies. But Europe's universities are falling behind relative to the leaders in the US and newcomers in Asia; they are often bystanders in processes of change rather than partners; they have become strikingly inward looking and anti-entrepreneurial; they have been poor at innovation in their own work; and they have neither learned how to integrate with the economy or with civil society. A majority of the very best young researchers leave Europe to work in the USA. Universities should be playing a bigger role in shaping Europe's future but this may require: funding strategies that create new universities on entirely new bases (the sector would benefit from some closures as well as some openings); new forms of knowledge transfer that extend the best successes of technology to other fields; new models of partnership that embed academics in change processes; organisational models that are less rigidly hierarchical and give more opportunities for younger researchers to pursue their own interests.

Media

Fourth, Europe needs to consider the role played by its media. Mass media are now a critical part of how societies adapt. They give people a picture of the world, of what is changing and what needs to change. Some are superb. But as in other parts of the world research shows that most give their users systematically distorted views of the world around them. New institutions to promote truth and accuracy (using the web as a balance to broadcast and print media) have a role to play as do more concerted strategies to ensure genuine pluralism in the media, with civil society owned media as well as media owned by big business or state institutions.

Civil society

Fifth, civil society. Europe has a strong and rich civil society. But it has never had a strong voice in Europe's institutions, and it has never been a central part of Europe's vision of itself or of its future. Yet civil society has traditionally been where much of the future is first imagined and then fought for. Civil society generates many bad ideas as well as many good ones. But new mechanisms are needed to tap into its insights, to engage it in strategic decision-making, and to use its capacities to act to prepare for the future.

In conclusion

There can be no one approach to understanding the future, let alone to shaping it, and there can be no single strategy for success. The lesson of recent work on resilience is that multiple equilibrium points are possible. But discovering these points depends on constant and energetic innovation to discover the future through action as well as analysis.

Thierry Gaudin

THE WORLD IN 2025: A CHALLENGE TO REASON

The time of the finite world begins
(Paul Valéry)



Gilgamesh

Foreword: teachings from the Gilgamesh epic

Both heroes are on the one hand Gilgamesh, powerful King of Uruk (Mesopotamia) who lived in pre-biblic times around 2600 BC. He is the man of the town. On the other hand Enkidu, the man of the woods, remained in a wild state of evolution. Gilgamesh, having heard about this wild man bearing an extraordinary strength, sends a courtesan to seduce and persuade him to come and meet in the city.

He comes, they fight then become inseparable friends. They go together and defeat the guard of the forest of cedars, then they master the heavenly bull sent by the great goddess.

But Enkidu dies from disease. Gilgamesh is inconsolable. The horror of the death of his friend invades him. He wants to escape the decomposition of his own flesh. Refusing the false glories of the realm, he roams in search of **immortality**. There he finds Utanapisti the old wise man, resting on his siesta. He asks him: how were you allowed in the assembly of the Gods, how did you obtain the life without an end?

Utanapisti answers: "Demolish your house to build a boat; give up your wealth to save the life. Embark with you specimens of all the animals". Then he tells the story of the Flood and the Arch. In other words, he proposes a scenario: the one of the Man gardener, rescuer of Nature. He does not speak any more about the survival of the individual, but indeed about that of the species and the biosphere.

The epic ends, as all the initiatory cycle, by a return. Gilgamesh goes back to Uruk, now three hundred hectares, brick-built city, dedicated to Ishtar, the goddess of love.

The fight followed by the brotherhood of the urban Man and the wild Man who become as both sides of the same personality, expresses clearly the problem of that time. Two behaviours are in confrontation, men are shared between their symbioses with Nature on the one hand, their new power on the other hand, offering the temptation to challenge the natural order set up by the Gods.

Then, the message of the old wise man, Utanapisti (alias Noah) gives the key to the future. Immortality needs you to take care of Nature, to protect the threatened species and, in case of emergency, to save from the flood couples of all the animals. Because, obviously, Man dominates Nature but he cannot do without her. If he wants to survive as a species, he has to protect and cultivate it.

The present report is written at the request of European Commission DG Research and BEPA, who initiated a **foresight exercise aimed at analysing the world situation from now to 2025**. To complete this foresight, a working group was composed by the commission. Each member of the group delivered a report, the list given in the bibliography.; 2 meetings were organised on June 2 and 3 and on September 8 and 9 2008, in order to exchange about these reports and build scenarios.

The following text has been inspired by this collective work, and also by reading the abundant documentation provided from the DG Research by Elie FAROULT and many other sources too. Anyhow, it cannot be considered as expressing the views of the group members, which are not requested to endorse the interpretations presented. It should rather be considered as a personal report, acknowledging and thanking for all the different inputs provided by the members and the commission officials.

Thierry Gaudin, September 2008

1-Executive summary: Approaching the limits

The situation that human species is experiencing during the first quarter of 21st century is a disruption with the trend driving the second half of 20th century. Therefore people presently less than 60 years old have, particularly in developed country, little if no experience of comparable situations and will be tempted to imagine the future using inadequate conceptual tools issued from their own past experience.

The approach of the limits relates first to the so-called “revenge of Malthus²³”. At the end of 18th century, after having completed a long visit to different continents, Thomas Robert Malthus came back formulating his demographic law: In every civilization, the population grows up to the saturation of resources, and then inevitably stabilizes or declines.

A similar statement was made nearly 40 years ago, in the early 70’s, by the Club of Rome in his famous report “Limits to growth”. It is important to notice, regarding our 2025 horizon, even if the evolution of technology has been able to push the limits, leaving place for a surplus of growth, that most Meadow’s²⁴ models predicted a collapse of our civilization during the first quarter of 21st century. Similar conclusions, taking into account technological evolution, were made in 1990, in the “2100, récit du prochain siècle” study, operated by a team of the French ministry for research on request of the minister Hubert Curien.

Nowadays, many more signs of saturation appeared. They are detailed in the first part of the report, particularly on warming, water management, biodiversity and demography. One can estimate it would be difficult, if not impossible, to push again the limits. Technology undoubtedly makes miracles, but it would be unwise to carry forward our children’s safety on miracles. Therefore, the foresight landscape splits in two basic scenarios:

The first scenario is a tragedy, giving to the word “tragedy” the meaning it had in the antique Greek theatre: a tragedy describes an evolution in which the actors, caught in their prejudices, are unable to escape their tragic destiny. In Shakespeare performances, many die at the end, and their death bears a meaning, expressing the contradiction between their deep identity and their destiny.

In the case of the present world, the trend can be described as follows: globalization of the market economy, excessive consumption and throw away mentality, after having invaded the so called developed world, spreads over the developing countries, faced to global warming and energy scarcity. It appears to lead to a global collapse. Some experts even foresee an extinction of human species and many others species as a result of mankind behaviour. They call this sixth extinction the “anthropocene²⁵”, as due to humans (anthropos), differing from the preceding extinctions, at least the one of the dinosaurs (-65M years) and the biggest one at the end of the Permian period (-250 M years), that were probably caused by the impacts of meteorites.

The second scenario is self-control of mankind. But how can we expect 6.5 Billion humans to reduce their consumption and restore the equilibrium with natural resources? **Certainly not with a laissez-faire policy!** Therefore, a major task of foresight is now to estimate the nature and the magnitude of the constraints and incentives that might be generated by the consciousness of the limits, and also the ways these constraints and incentives may be decided and operated.

²³ See the paper of Luc Soete.

²⁴ Dennis Meadows and his team build their model of the world after the Club of Rome demand. He published in 2002 and update “Limits to Growth: The 30-Year Update”. “we must tell people how to manage an orderly reduction of their activities back down below the limits of the earth’s resources” says Meadows. His conclusions are close to the ones of the scientific community, as expressed, for instance, through IPCC (<http://ipcc.ch>).

²⁵ See Uno Svedin contribution.

The report shows that Internet and other communication technologies are rapidly changing the consciousness of the public and should generate a complete reshaping of economic and political institutions world wide.

According to the presently available data, the order of magnitude of this necessary self-control appears important. The ecological footprint analysis initiated by WWF²⁶ points that, after having consumed non renewable resources, assuming a standard of life comparable to the Europeans by year 2000, the planet would be able to carry 2.5 Billion humans, compared to the present level of world population: 6.5 Billion, 8 to 9 being expected in 2050. One must add to this rough evaluation the need to control rapidly the greenhouse effect, the droughts and floods pushing climate refugees out of their land and the rise of the level of the oceans.

It can reasonably stated that, before the end of 21st century, the reduction of the world population should have started, the consumption of natural resources per capita should have been cut approximately by half, at least in the so called developed countries, and the greenhouse gases emissions totally compensated by absorption. These would be the conditions to leave a living planet to our grand children.

Such statements have to be taken, not as a catastrophic prophecy, but as a stimulating challenge. The report shows that most sustainable technologies are already well known. Successful experiments exist. After all, during war periods, populations have been able to adapt to stronger constraints. Obviously, the challenge starts now. The period between 2010 and 2025 appears as the crucial moment, the one of the choice between tragedy and revival.

The last part of the report focuses on 4 major challenges appealing for decisions before 2025:

1-Planetary gardening: a shift from an exploitation attitude to a gardener attitude

2-Reaccounting an redesigning the economic and monetary system including natural services and self services

3-Redefining the missions of the military forces into a **global security** concept, including nature protection and rescue

4-In the perspective of a multi polar world, reinforce the international **judicial** powers. Europe is in a position to promote this reinforcement, because of its experience in the field.

2-The new tensions

2.1 The environment at stake; climate and biodiversity

Though ignored by decision makers during 20th century, climate change is now considered as one of the key disruption factor of 21st century. As a result, it is likely that the policy guidelines, formerly given by politicians and business leaders, will now be highly influenced if not determined by the scientific community.

Economy has been considered as the normal starting point of foresight during the last quarter of 20th century. Now, the physical data appear to be taken first into account. Approaching physical limits, economic growth is under constraints and its measurements, even corrected by a price index, do not provide a sound description of reality.

Foresight, therefore, must take as preliminary data the estimations of the scientists on climate change and, in a second stage, try to imagine the reaction of the social and economic forces at stake.

2.1.1 Foreseeable changes

If the increase in medium temperature predicted would reach between 3 and 6° Celsius during 21st century with current yearly fluctuations that may, as usual, exceed 10°/year, the difference may not be directly sensitive to the average human being in 2025.

²⁶ World Wildlife Fund

But the estimation of the climate evolution by the scientists should be more precise and detailed than it is nowadays, as a result of the ongoing building of global models and more precise measurements.

One of the major difficulties of these estimations is due to the fact that greenhouse effect is a “non linear” phenomenon, in other words bearing in itself a cause of its acceleration. More precisely, the permafrost melting due to an increase in temperature would re-launch methane and carbon dioxide into the atmosphere, which will increase the greenhouse effect. But, according to the present state of knowledge, the order of magnitude of this acceleration is unknown, as is also the order of magnitude of the capture of the carbon dioxide by an accelerated growth of the vegetation, which will conversely decrease the greenhouse effect. Anyhow, at least 2 classes of events may, before 2025, call for new decisions:

1-The first is the melting of ice. The models and the observations converge in predicting an increase of temperature higher in the north and south poles than in the equator regions. The melting of the ice sheet covering the North Pole is already visible. The ice reflects the solar radiations, though the sea or the ground beneath absorbs it. Therefore, ice melting is also a “non linear” phenomenon. As far as only the North Pole ice sheet is concerned, it has no important consequences for humans (if not for white bears), because its ice is already floating on the sea. But if the Greenland ice sheet, which is lying on earth, melts completely, it would increase the level of the oceans by 7 meters all over the planet. And another 7 meters would be expected if the west Antarctic Ice sheet melts or is destabilised and transformed into floating icebergs.

The 2007 report of the IPCC predicts an increase of the oceanic level around half a meter during the 21st century but the recent declaration of its president, Mr Rajendra Pachauri warned that this estimation would probably be revised and increased in the next reports.

Even with a minimum 50cm, some countries would have problems because of the increased risk of damages in case of great storms (like Katrina, New Orleans, 2005 or Nargis, Burma, 2008). But if the ocean level rises several meters, then most seashore level towns are concerned: Bombay, Calcutta, Ho-Chi-Minh Ville, Bangkok, Djakarta, Dacca, Shanghai, Canton, Tokyo, Osaka, Alexandria, Venice, Amsterdam and Rotterdam, Abidjan, Lagos, New Orleans, Miami, New York...Bangladesh, Holland, and of course coral reefs islands in the Indian and Pacific Ocean.

The World Bank, in 2007, estimates that if the level of the oceans rises 3 meters, 135 Million people would be displaced, and 300 million for 5 meters. Such a situation would generate an intense rebuilding activity, either on higher land or on “ocean cities” floating platforms, the order magnitude of which exceeds widely the post wars rebuilding activities of 20th century.

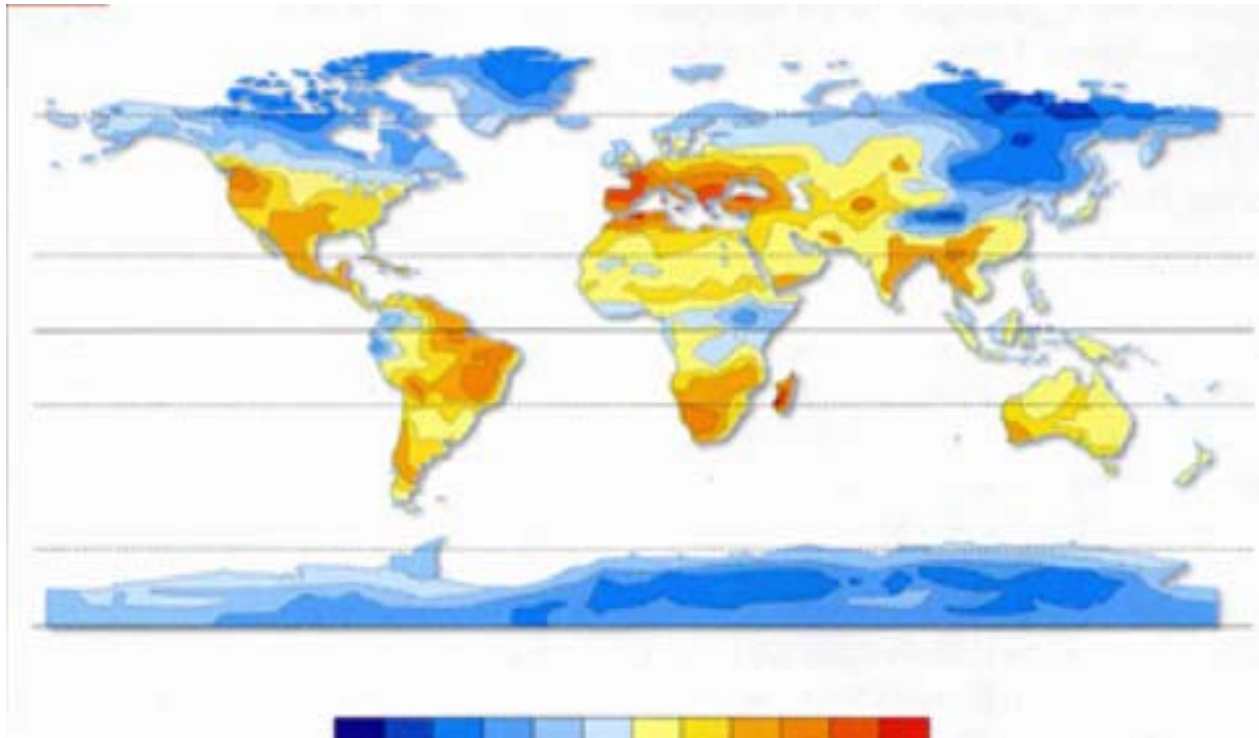
Another important aspect of the melting of ice is in the glaciers and the mountain snows. More precisely, the expectations regarding Himalaya glaciers bear the most important consequences. Himalaya is at the source of all the great rivers of the East, the ones of China, India and the Indochinese peninsula. Though nearly 99% of water in these countries does not come from the glaciers but from local rainfalls, particularly monsoons, any important perturbation in the hydrograph marsh of the great rivers, due to the weakening of the winter-summer regulatory storage of the snows and glaciers, would transform the conditions of life. And the regions concerned bear approximately half of world population. Huge public works, like the famous (and controversial) three gorges dam, may be needed to manage regulations.

2-the second class of events is the increase of droughts and floods estimated by the climate models. The present estimation is an increase of the intensity of rains (floods) and also, paradoxically, a decrease of the water available in the soils. In other terms, the rainfalls would be more irregular, diminishing the agrarian capacity of the soils.

The different regions of the world should experience quite different situations:

Regarding droughts, the vulnerable regions should be around the Mediterranean and Middle East, central America and South Africa (but not middle Africa), Australia and the south of China.

Regarding floods, the vulnerable regions should be the north of Europe, Canada, Central Africa, The north of South America and the west part of China.



Variation of the number of dry days sequences per year (IPCC A1B scenario)

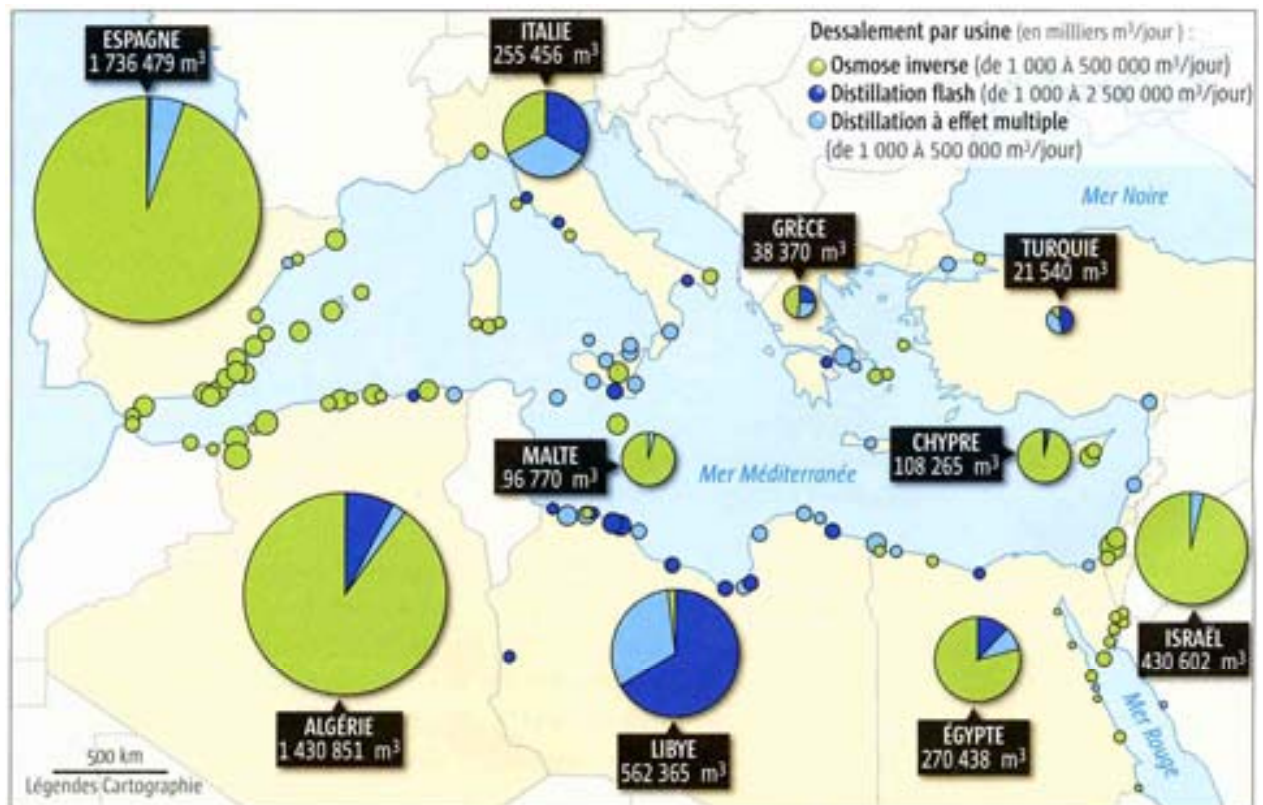
2.1.2 Water management

The UN Johannesburg summit in 2002 concluded that, by 2025, nearly half of the world population should experience water shortages²⁷. 90% of water consumption is used by agriculture.

Sewage is also at stake: 2.5 billion out of the 6.5 billion humans do not have access to sewage facilities.

The critical importance of the water supply for 21st century is also due to the fast growth of coastal human settlements. To satisfy their needs, desalination plants, first located in the Middle East (presently producing half of world desalinated water), are spreading around the Mediterranean and also in Asia, in Australia and in California. This first generation of desalination is using energy from combustion and therefore participates to carbon dioxide emissions. An order of magnitude is given by the future Spanish facilities, producing 2.7 M m3 per day responsible for 5.5 M tons of daily CO2 emissions, 0,6% of the total of Spanish emissions.

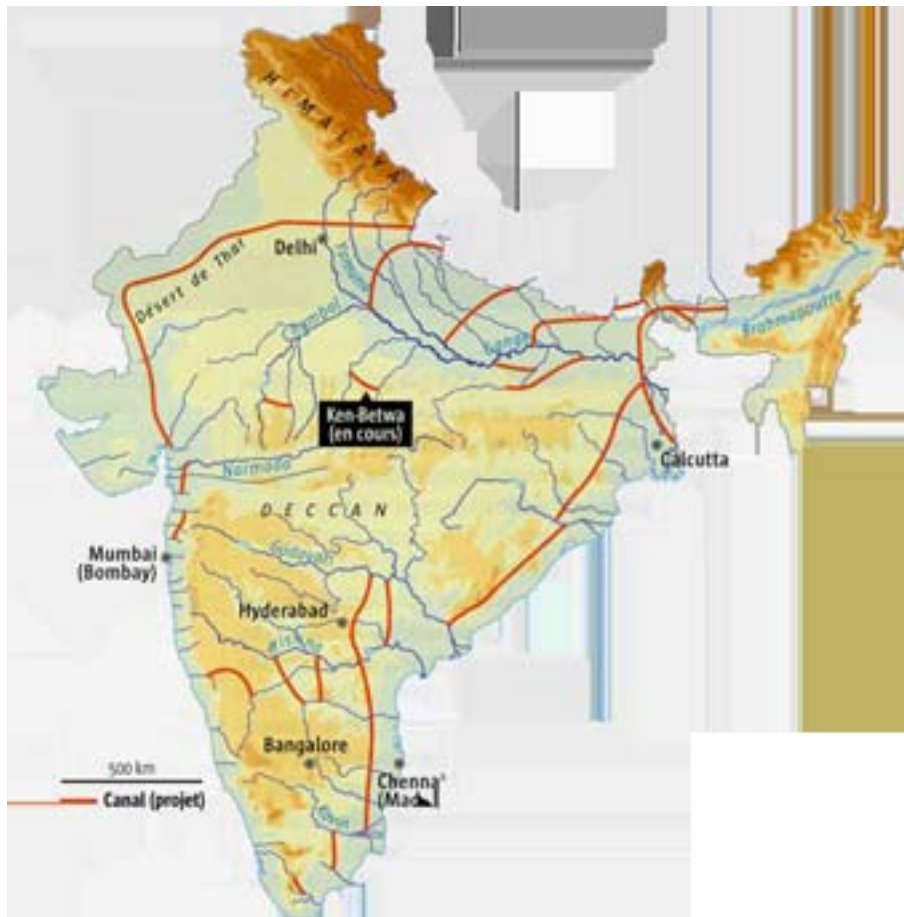
²⁷ See also IPCC "Climate change and water", <http://www.ipcc.ch/ipccreports/tp-climate-change-water.htm>



Desalination around the Mediterranean sea

The water over consumption and mismanagement leads to severe questions all over the planet. The Aral sea, had lost more than 75% of its surface between 1960 and 2000 and is now slowly recovering, helped by Kazakhstan and Uzbekistan public works. Lake Chad in Africa has lost more than 90% of its surface. Some rivers are so much diverted for irrigation that their water does not reach the sea any more. It is sometimes the case of the river Colorado in United States.

To overcome water scarcity, many countries are planning immense water derivations. In North America, the project named GRAND would capture water in Canadian Hudson bay and James bay, drive it to the great lakes by a 800 Km canal and, from there, by a second 2000 Km canal, to the south of United States. China is completing an irrigation water transfer from the Yangtse to the North plains. Brazil is planning to drive the water of the San Francisco River to the Nordeste through a 500 Km canal and India is planning a global interconnection of its water system, concerning 46 rivers connected by 30 canals.



The Indian project: 46 rivers connected by 30 canals representing a total distance of 10000 Km. It should be able to move the water across the country, according to the needs. 30 dams will be associated.

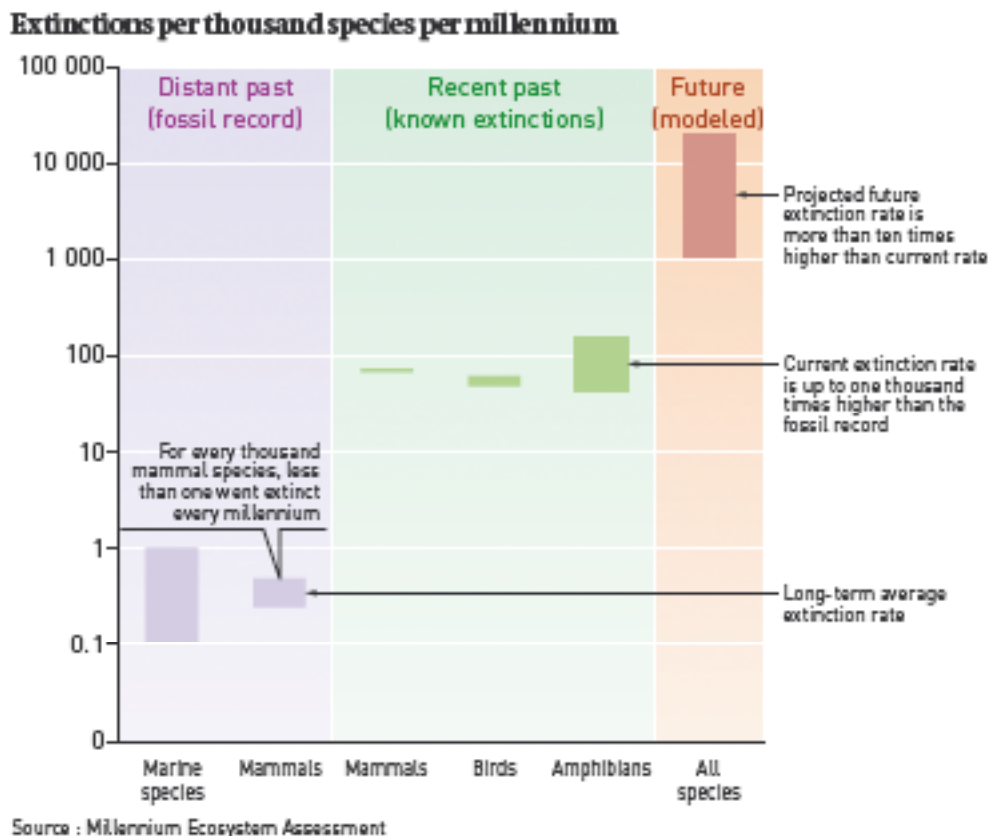
These examples show that until 2025, huge investments aiming at water supply are likely to be decided or realized. Probably the period might stay in history as the starting point of global water management.

2.1.3 Biodiversity: species and mankind in danger

“So far, about 1.75 million species have been identified, mostly small creatures such as insects. Estimates of the present global macroscopic species diversity vary from 2 million to 100 million species, with a best estimate of somewhere near 13-14 million, the vast majority of multi-cellular ones being arthropods.

Most biologists agree however that the period since the emergence of humanity is part of a new mass extinction, caused primarily by the impact of humans on the environment. It has been argued that the present rate of extinction is sufficient to eliminate most species on the planet Earth within 100 years²⁸

²⁸ Edward O. Wilson (2002). *The Future of Life*. New York: Alfred A. Knopf.



Species have been disappearing at 50-100 times the natural rate, and this rate is predicted to rise dramatically. Based on current trends, up to 34,000 plant and 5,200 animal species - including one in eight of the world's bird species – may face extinction. For thousands of years humans have been developing a vast array of domesticated plants and animals important for food. But this treasure house is shrinking as modern commercial agriculture focuses on relatively few crop varieties.

About 30% of breeds of the main farm animal species are currently at high risk of extinction. While the loss of some individual species catches our attention (whales, bears and our cousins primates for instance), it is the fragmentation, degradation, and outright loss of forests, wetlands, coral reefs, and other ecosystems that poses the gravest threat to biological diversity.

Forests are the home of much of the known terrestrial biodiversity, but about 45 per cent of the Earth's original forests are gone, cleared mostly during the past century. Despite some revival, the world's total forests are still shrinking rapidly, particularly in the tropics.

Up to 10 per cent of coral reefs - among the richest ecosystems - have been destroyed, and one third of the remainder face collapse over the next 10 to 20 years. Coastal mangroves, a vital nursery habitat for countless species, are also vulnerable, with half already gone.²⁹

The main pressures on biodiversity result from land use changes (usually associated with increasing populations); unsustainable use and exploitation of natural resources (especially fisheries, agriculture, and forestry); global climate change; and industrial pollution. At the same time, biotechnology is introducing new organisms and their effect on existing organisms and habitats also needs to be considered.

In some instances, these pressures can actually be positive for biodiversity. Agricultural activity sometimes improves the habitat and even helps increase the variety of species; the

²⁹ The convention on biological diversity, UNEP.

Mediterranean basin is considered a biodiversity “hot spot” in part because of its human-induced agricultural biodiversity.

The available evidence suggests that, in most regions of the world, the effects of economic activity are negative for biodiversity³⁰. And neglecting biodiversity may cause catastrophic events: let us remind the Irish potato blight of 1846, which was a major factor in the deaths of a million people and migration of another million, was the result of planting only two potato varieties, both of which were vulnerable.

"Goods and Services" provided by ecosystems include:

- * Provision of food, fuel and fibre
- * Provision of shelter and building materials
- * Purification of air and water
- * Detoxification and decomposition of wastes
- * Stabilization and moderation of the Earth's climate
- * Moderation of floods, droughts, temperature extremes and the forces of wind
- * Generation and renewal of soil fertility, including nutrient cycling
- * Pollination of plants, including many crops
- * Control of pests and diseases
- * Maintenance of genetic resources as key inputs to crop varieties and livestock breeds, medicines, and other products
- * Cultural and aesthetic benefits
- * Ability to adapt to change

The economic “free” services rendered by ecosystems have been estimated between 2900 and 38000 billion \$ compared to a world GDP of 54000 billion \$.

But the question appears more serious than a simple accounting measurement. It lies in the great ignorance of ecosystems evolution, concerning not only the number of species identified, but, above all the risk of collapse of ecosystems due to their lack of diversity. The souvenir of “Biosphere II” experience in Arizona, settled during the 80’s, leads to scepticism regarding the viability and stability of small diversity ecosystems, including only some thousands of different species (2800 in Biosphere II).

Albert Einstein used to say that if the bees would disappear, mankind would soon disappear too. Indeed, pollinators are necessary to the survival of vegetables involved in the production of approximately one third of human food. Multinational firms promoting genetic manipulation advocate that their activity contributes to restore biodiversity. Anyhow, there is clearly an important gap between generating some new species and the building of sustainable ecosystems. Their proposals, motivated by their intellectual property rights, though mentioned by OECD³¹, are to be considered with scepticism.

The impotence of present planetary organization, based on nation states, is particularly critical, and may be qualified as anarchic, regarding for instance oceanic ecosystems³². During the last decades, enormous fishing boats, equipped with all sorts of electronic detection systems, have been operating. The outstanding efficiency of these equipments has destroyed a number of species, cod being the best known example. In spite of the moratorium decided in 1992, the cod is still absent from the Canadian seashore. Many other species are threatened, not only big ones like whales, but also a part of the biodiversity located in coral reefs that suffer from global warming. The two great sources of biodiversity are tropical rainforest and coral reefs. Both are threatened by human activities, and the present state of the planetary organization is unable to contain their destruction.

³⁰ Oecd observer, Policy brief, 2005.

³¹ May 2005 Policy brief: Preserving biodiversity and promoting biosafety.

³² See for instance : Atlas géopolitique des espaces maritimes, éditions Technip.

To conclude, biodiversity raises a global security problem. It needs a systemic approach, shows a complexity difficult to handle, and is presently out of the scope of existing economic approaches³³. It leads also to a different attitude towards nature, the one of the gardener. The cultural shift from an exploiter attitude to a planetary gardening attitude, respectful of the even mysterious law of nature, has started and is likely to expand worldwide during 21st century. It is a sign of the emergence of a new consciousness: the one of the limits of the planet.

2.2 Internet: the global connection

Internet is a major factor of transformation of the way of life, the way of doing business and the **awareness of planetary preservation** problems. Thus we need an estimation of the Internet penetration and its consequences to build the landscape of 2025.

Looking at the situation in 2007 and its evolution since year 2000, we come to the following trends:

2.2.1 Technology evolution

The classical view of technological progress is now outdated. But it is useful to have it in mind as a starting point. Let us, for instance, look at Ray Hammond's views on 2030:

"Some aspects of daily life in 2030 will seem very similar to today. We will still live in houses and apartments as we do today (although even older properties will have been upgraded to maximum energy efficiency), children will still go to school (the interpersonal dynamic between teachers and children and between children and their peers is a vital part of learning that cannot be replaced wholly by virtual communications) and we will, it is to be hoped, still have all of the political, legal and social institutions which make the developed economies civilised; parliaments, the law, police, free media, hospitals, universities and so on."³⁴

"By 2030 all cars travelling on major roads will be under the control of satellite and roadside control systems and many cars will be driving themselves. Apart from the need to reduce the present appalling death toll from road accidents³⁵ – and the need to squeeze many more cars onto crowded roads – automated vehicle and traffic systems will make it safer to travel through the extreme weather systems that we are likely to be suffering constantly in twenty-five years' time. All road vehicles (except licensed vintage and classic vehicles) will produce very low or zero carbon emissions. Most large cities will operate congestion charging systems and, in countries with severe traffic congestion, road pricing will be widespread."³⁶

These views are still inspired by the old idea of progress: an improvement in lifestyle following the path of the American way of life. Unfortunately, times may be harder, and these predictions slightly outdated.

Anyhow, regarding the Internet and communication technology, the evolution looks widely predictable: the merging of the portable phone and the portable computer, the increase in memories capacity and in processing speed and, more important, the building of the wide band infrastructure allowing transmission of live conversation and video streaming through wireless and/or optic fibre communication. The portable phone and the laptop computer merging and/or leaving place to a set of interactive instruments even located in different places. One may add also the use of movements that started with the Wii game platform.

³³ The most relevant scientific approaches are based on biology. See for instance **Jared Diamond's** "Guns, Germs, and Steel: The Fates of Human Societies", and also "Collapse"

³⁴ Ray Hammond The world in 2030

³⁵ Almost **1.2 million people are killed** each year and 20-50 million are injured or disabled, although most people are unaware that road traffic injuries are a leading cause of death and disability.

³⁶ idem

Ray Hammond, following his dream, goes to fiction: "By 2030 we will be constantly connected to what, today, we can only think of as a 'super-web' and that connection will, for those of us who chose to make the transition, be a bio-digital interface. At the very least our senses will be connected to the super-web by microphones and mini-projectors and, perhaps, some of us will have direct neural connections between our own brains and the 'global brain' – which is what the super-web will have become. Our communications and entertainment will be wholly 'immersory', multi-media, multi-sensory, 3D, holographic and fully tactile, telekinetic and olfactory.

It will be almost impossible to tell the difference between a real world experience and a virtual experience and many of us will be engaged with the real world and several virtual worlds (and other versions of ourselves) at one and the same time.

On our way towards our virtual lives of the future we will be able to understand, and to speak and write, in all languages, as super-intelligent computers on our body and in the networks translate speech and the written word in real time.³⁷

"Our leisure activities in 2030 will be similar to today's but our time spent in virtual leisure (watching movies, playing games, chatting with each other, exchanging videos, etc.) will be a lot more intense.

Because so much of our time will be spent on the superweb it is likely that the present trend towards increased sporting activity and increased public support for sports will be even stronger by 2030"³⁸

Anyway, the real limitation of the speed of change is not due to technology, but to the delay human beings need to become familiar with it. Between the first contact with the web and a current clever manipulation of its various opportunities, it takes approximately one generation.

2.2.2 Speed of change

Therefore, the full transformation of civilization due to the web will be advanced but not complete in 2025.

The changes in behaviour associated with Internet diffusion starts on

- A first stage around 8% when it leaves the expert community to become an information diffusion tool for a wider public.
- over 30%, it becomes a usual business tool
- When 70% is passed, anyone is supposed to be reached through Internet either directly or through family, friends or an organization. In many countries, the connections are not operated through personal computers but at Internet cafés.

For a given country, looking at the evolution between 2000 and 2007,

- it takes approximately 7 years to go from a penetration of less than 1% to 8% (phase 1: the experts),

³⁷ Ford Motor Co. began using '[machine translation](#)' software in 1998 and has so far translated 5 million automobile assembly instructions into Spanish, German, Portuguese and Mexican Spanish. Assembly manuals are updated in English every day, and their translations — some 5,000 pages a day — are beamed overnight to plants around the world.

³⁸ Ray Hammond The world in 2030

- then another 7 years from 8 to 30% (Phase 2: the professional business people)
 - and another 7 years from 30 to 75% (Phase 3: the generalization to all public)
- 75% is presently (2007) the percentage of Internet connected in the equipped countries like USA, some countries being even more equipped: Iceland 85%, Norway and Netherlands 88%.

2.2.3 Present stage of equipment

In 2007, most countries in the world have started to build their Internet infrastructure: European ones like UK, Germany, Spain, Portugal, Italy, France, Scandinavia, are all over 50 % and many over 60%. Turkey is at 23% and Ukraine at 12%.

In Asia, some countries are highly equipped: Korea 71%, Japan 69%, Hong Kong 70% Taiwan 67%, while others are much lower: Vietnam 21%, Indonesia 9% Pakistan 7%, and others have not entered yet: Afghanistan 2% Cambodia 0.3%.

In Middle East, Saudi Arabia is at 17% Lebanon at 24% and Iran at 27%, the Emirates at 38%, Israel at 57%. Only Iraq stays under equipped at 0.1%.

In Latin America, Argentina is at 40%, Chile at 43% and Mexico at 22%.

Only Africa has still a low penetration of approximately 5%, in spite of some exceptions, like Morocco 18% and Tunisia 17%³⁹.

One may quote that the countries that suffered recently from war, military occupation or other troubles have not yet entered the Internet community.



Internet world map (Dimes project, Chris Harrison, 2007)

A fast look to the above map shows that, even though Internet is present worldwide on all continents, it still concerns expert or business minorities. The major part of the population is not yet connected. But they will be before 2025. Therefore, the **evolution of behaviours it allows is still widely to come**. It will start during the next decade and last for at least one generation.

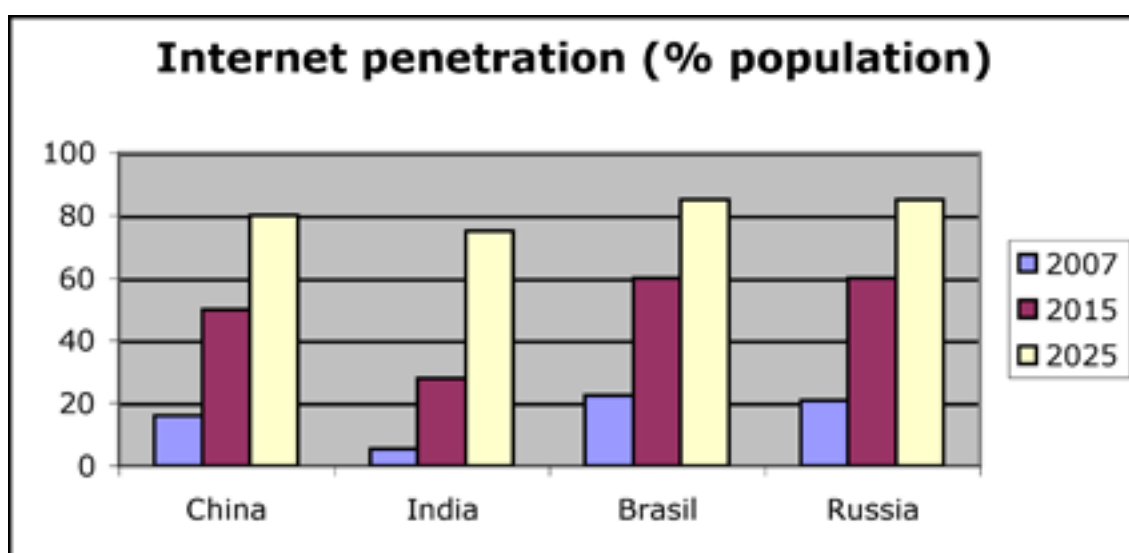
³⁹ source internetworldstats.com

2.2.4 The case of the BRICs

When looking more precisely at BRIC (Brazil, Russia, India, China), which counts nearly half of the world population, we have the following evolution:

	Population 2007	Internauts 2007	Growth 2000-2007	Penetration 2007	2015 estim	2025 estim
China	1321851888	210000000	833,30%	15,89%	50%	80%
India	1129866154	60000000	1100,00%	5,31%	28%	75%
Brazil	190010647	42600000	752,00%	22,42%	60%	85%
Russia	141377752	29400000	848,40%	20,80%	60%	85%
BRIC Total	2783106441	342000000	860,42%	12,29%	50%	80%

Therefore, we can assume that in 2025 these BRIC countries will be as familiar with Internet as the most developed and equipped countries are now. The diversity of services and also of languages used on the Internet will be, at that time, much wider.



The above estimations rely on the shape of the S curve followed by developed countries since 2000. The speed of equipment may be faster during the following decades, due to the mini laptops appeared in the market in 2008 connected to the 3G cellular phone network (replaced by 4G after 2010). Anyhow, the rate of illiteracy will certainly be an obstacle to the participation of many communities to Internet exchanges.

2.2.5 Lisbon plus plus?

The so called Lisbon strategy shifted from a first statement in year 2000: "to make the EU "the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment by 2010",

To a second statement in 2005, after the Kok report: "making growth and jobs the immediate target goes hand in hand with promoting social or environmental objectives."

The European Parliament followed this path expressing his belief that "sustainable growth and employment are Europe's most pressing goals and underpin social and environmental progress" and "that well-designed social and environmental policies are themselves key elements in strengthening Europe's economic performance".

Between 2000 and 2005, the reference to "competitive knowledge based economy" disappeared and the environmental and social objectives came in the front scene. But the belief in growth and economic performance stayed. Anyhow, seen by many local politicians, the reference to the "competitive knowledge based economy" stayed as a basic statement, the rest being considered as bearing nothing new.

The hypothesis of a "Lisbon plus plus strategy" is now under discussion inside European Commission. If referred to 2005 statements, it should be strongly updated according the consequences of the financial crisis. If referred to 2000 statement, it appears clearly that **a second generation of the Internet infrastructure** is now at stake: wide band (ADSL, Wi-fi, Wi-max...) and a third generation too (optic fiber, as in Japan). It would certainly be positive to express a clear position of the European Union regarding these equipments.

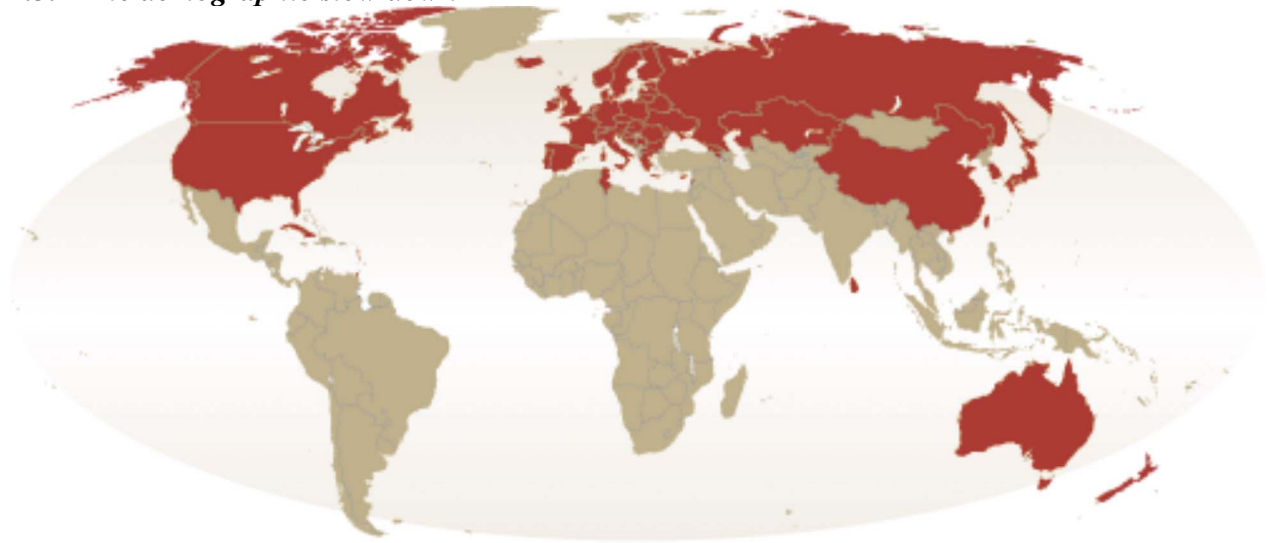
Anyhow, Alvin Toffler, when he first read the 2000 Lisbon strategy could not stop laughing. Being the best known futurist in the world, and the first one who announced the change towards a knowledge based society, it is important to understand why he laughed so much. Apparently, he thought that Europe had no chance to sustain the competition in information technology either with US and Canada or with China, India and Japan. Europe has brilliant brains, but, even in the business community, a rather conservative mentality and is embedded in bureaucratic constraints.

If we refer, not to Toffler, but to the reactions of the "digital native" generation, which will be on command in 2025, the reaction may be even stronger. According to the amount of disinformation circulating on the web, this generation does not any more believe in official statements. They look at facts. For instance, they would welcome the trial against Microsoft monopolistic abuses, but laugh at the fact that Microsoft software is daily used by the commission services instead of free software. They would welcome the deliberations on intellectual property at the European Parliament, but laugh at the fact that free access to culture, obviously indispensable to popular creativity, is still hindered by the copyrights of the producers, and free download considered as illegal.

Therefore, if the idea of a "Lisbon plus plus" strategy is at stake, it should be seriously updated to be credible. It should probably avoid to pretend being "competitive". The word "competition" appears to refer to the present US collapsing economic ideology and does not fit modern biology. We are all made of billions of cells cooperating with each other. Cooperation would be a better word, and more directly linked to Internet and free software community daily life. And in the same line it would be also necessary to restore the "commons", particularly in the field of culture.

2.3 The demographic/natural resources tension

2.3.1 The demographic slow down



Brown: countries under self renewal (2.1 children per woman)
Grey: countries above self renewal (source World Bank)

“Connected with the spread of modern contraceptives and the increased educational levels is the fact that young western adults can experiment more extensively with union formation before settling down and start a family. As a result patterns of union formation (and dissolution) have changed substantially: unmarried cohabitation has increased, marriage takes place later and divorce occurs more often. Childbearing has become a result of deliberate reflections (i.e. unwanted pregnancies are getting scarce) and occur much later in people’s lives;

The best way to understand fertility behaviour is via *birth cohort* (birth year) analysis, not via *period* (calendar year) analysis. If women postpone childbearing (Phase 1) i.e. they have their first child later in their life than women born in previous cohorts, one will observe a rise in the age at first birth and, as a consequence, a drop in the number of children born per calendar year (period Total Fertility Rate – TFR). This ‘tempo effect’ may sometimes lead to ‘dramatically low’ TFR levels, like currently in several Central and Eastern European countries. Because the first postponing couples start to catch up having children but those from subsequent birth cohorts are now postponing. Phase 2 is characterized by a more or less stable low period TFR. When the increase in the age at first birth starts to diminish (Phase 3) or stalls completely (Phase 4) people are catching up having children that were postponed before, and the period TFR increases substantially again. However it will not reach the initial higher (cohort) level, since a later start normally leads to a lower ultimate number of children (quantum decline). Making a forecast with keeping lowest low TFR constant in a period of a rising age at first birth may lead to a very inaccurate picture of the future.

There is increasing evidence that it may be easier to influence the timing of children than the ultimate number of children. If policy measures appeal to people they may be stimulated to have a child rather soon, but not necessarily have more children in their lifetime. If all of a sudden children are only born earlier, one will observe a baby boom, together with stagnation in the increase of the mother’s age at first birth, followed rather rapidly by a baby bust (see Sweden 1990-1995).

It will be an enormous challenge to get population sizes more sustainable, and, more important, their life style? If that would be similar to what is normal now in the USA or in Europe then there is a major food and energy challenge. We do not know what is neither the maximum nor the optimal world population size, and have probably only ideas about the optimal worldwide life style. Both the optimal population size and life style depend on food and energy supply, on peaceful international cooperation, as well as on where these persons prefer to live (cities or countryside)⁴⁰.

"According to ILO's projection, total population is to **increase from 6.6 in 2007 to more than 8 billion people in 2025**. The most important increase will come from Africa (North Africa, SADC and Rest of Africa should have around 404,000 extra persons), India (around 267,000 extra person), Asia (without China and India around 264,000 extra persons) and China (+144,000 extra persons). China increase appears limited considering its current total population. China will start to lose active population over the period: it should reach its maximum in 2015 at around 830,000 persons and decrease to 809,000 by 2025. As a consequence, China will be in a comparable situation with the countries from the previous Soviet bloc and developed countries with an aging population.

This is apparent as well in the shares of the future world population. China's share is to shrink by 2 percentage points, the European Union by 1.4 points, while Africa's share should increase by 3 points."⁴¹

2.3.2 Ageing populations and young ones

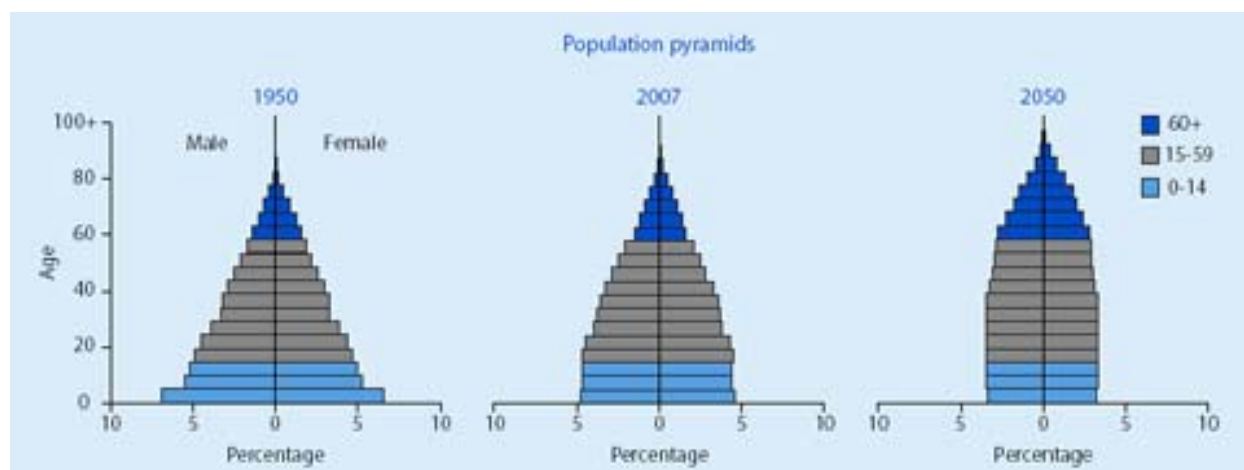
"The current process of population ageing that started already more than 100 years ago is "unprecedented, pervasive, profound, and enduring" (UN, 2007). World wide the percentage of persons of 60 years or over was 8 in 1950, 11 in 2007 and it is expected to rise to 22 by 2050. Almost no country escapes from this trend. Europe is frontrunner but also the first to see some relief by mid-century. Variation within Europe is large; specifically Eastern Europe was hit by the world wars, which is still visible (also because of its recurrent effects in the next generations).

As ageing basically results from falling numbers of children, the process normally shows that first the youngest age groups get smaller, but with time running the following age groups are 'affected'. Gradually the labour market population will start ageing as well, first due to lower entrance streams, many years later due to larger exit streams. Then a boom in retirement follows (which is expected at short notice when birth cohort 1946 turns 65 years), later on followed by a boom in the number of very old people. Consequence of this process is of course that the dependency ratios are changing fundamentally as well, in the sense that the number of dependent people per independent person will rise substantially. Currently the 'window of opportunities' or 'demographic bonus' is in many countries relatively large: the number of 0-19 years together with the number of 65+ years compared to the number of 20-64 years (the potential labour market population) is around the lowest point, i.e. those who are economically active have only to care for a small number of dependents (who were mainly youngsters in the past, but now increasingly older).

⁴⁰ from Gijs. Beets contribution

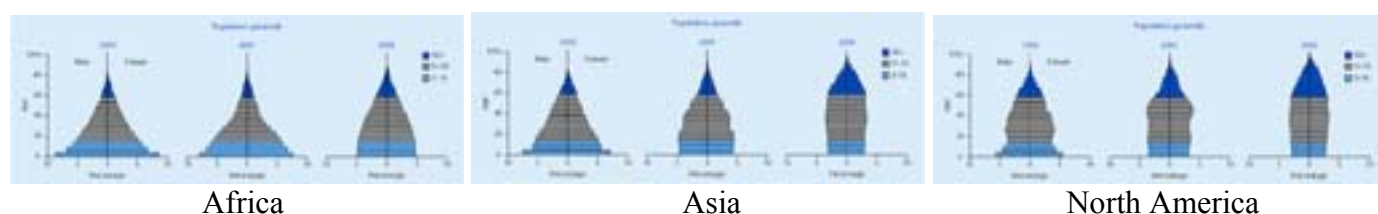
⁴¹ CEPII Mirage exercise

The attitude of the politicians and the press regarding ageing is ambiguous. They may agree that the planet is over crowded, but the ageing in their country is still perceived as a problem. Ageing is not a disaster but a challenge⁴². Ageing will challenge intergenerational solidarity due to changes in family patterns (more unmarried cohabitation, later marriage, more divorce, more re-partnering, smaller family sizes, and later childbearing). This will trigger social protection systems in finding social cohesion to support people to interact as much as possible within and between generations, both in countries with cultural traditions of stronger or weaker family ties. Measures in support of child and elderly care as well as measures that make work-family balances more compatible can strengthen intergenerational solidarity”⁴³.



Population ageing 1950-2050 (source United Nations, 2007)

The projection above shows at the same time the growing share of elderly people and the end of growth of world population around the middle of 21st century, as a result of the decline of global fertility rates. It covers very different situations: African countries still have a high fertility and an important base of young generations, as shown by the following graphs:



The demographic regulation of Europe and North America is already at work. The one of Asia and South America is taking place between now and 2025. And the one of Africa will not be operating before 2040, according to the projections made by professional demographers⁴⁴. Anyhow, some countries, Russia for instance, who suffered an important demographic slow down during the past decades; tend to foresee the possibility of a future “baby boom” before 2025⁴⁵.

Demographic forecasts are traditionally the most secure predictions for the long term. In our present situation, it is however necessary to point some important uncertainties regarding 21st century’s evolution:

⁴² Gijs Beets observation.

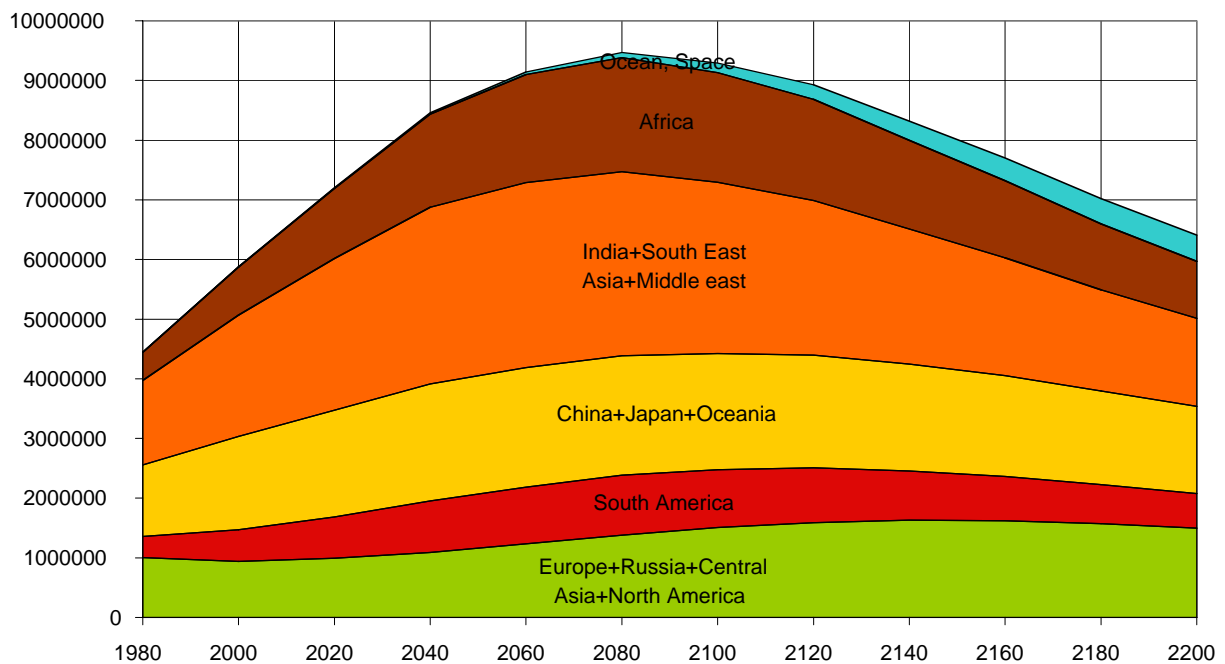
⁴³ from Gijs Beets contribution

⁴⁴ The source of the above graphs is United Nations, transmitted by Gijs Beets.

⁴⁵ Quotation from Irina Kuklina.

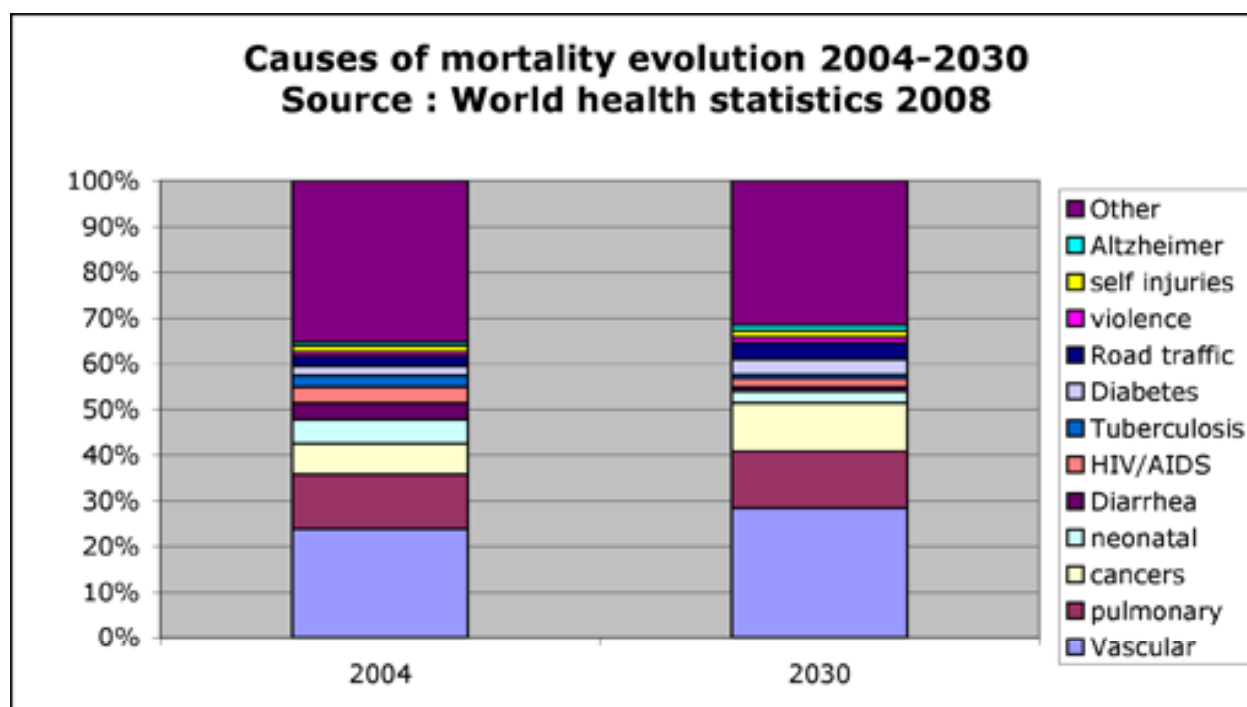
1-Stabilization or maximum followed by a slow down? Since the end of the 80's, the common knowledge of the demographer's community describes the present evolution as a "demographic transition". It means more precisely the transition between an evolution with high fertility and high mortality to an evolution with low fertility and low mortality, leading to a stabilization of the world population around 10 Billion, with an average fertility of 2.1 children per woman.

World demography, projection 2200, limit 1.8 children per woman



But according to the fact that fertility rates are lowered by female education and urban way of life where both members of the couple work; according also to the fact that a world population of 10 billion reaching a consumption level of natural resources close to the one of the average European in 2000 would not lead to a sustainable world by a factor of 4, it is more realistic to predict a maximum followed by a slow decline lasting one or two centuries. That hypothesis would fit with a stabilization of the birth rate around 1.8 children per woman, instead of the 2.1 stabilization hypothesis.

2- Mortality evolution. Inside the demographer community, an important debate is taking place about mortality. Here is a graph made out of the official World Health Organisation figures:



Some demographers, following the medical community, point the progresses in vaccination and treatment of developing countries diseases like neonatal, diarrhoea, tuberculosis, malaria... Other experts point the deterioration of health conditions in so-called developed countries, due to unhealthy food, stress, lack of exercise, leading to obesity, tobacco alcohol and drugs, hard working stress and poor living conditions. The above graph shows the growing importance of vascular diseases and cancer, which are typical of modern urban environment.

The demographers also point the growing proportion of elderly people, which may be felt as a burden by younger and less numerous new generations. These elderly may suffer less care than the previous old people who, having many children, could expect to be assisted and live peacefully over 90. All these factors would lead to estimate not a reduction of mortality as during the previous half century, but on the contrary an increase of mortality rates.

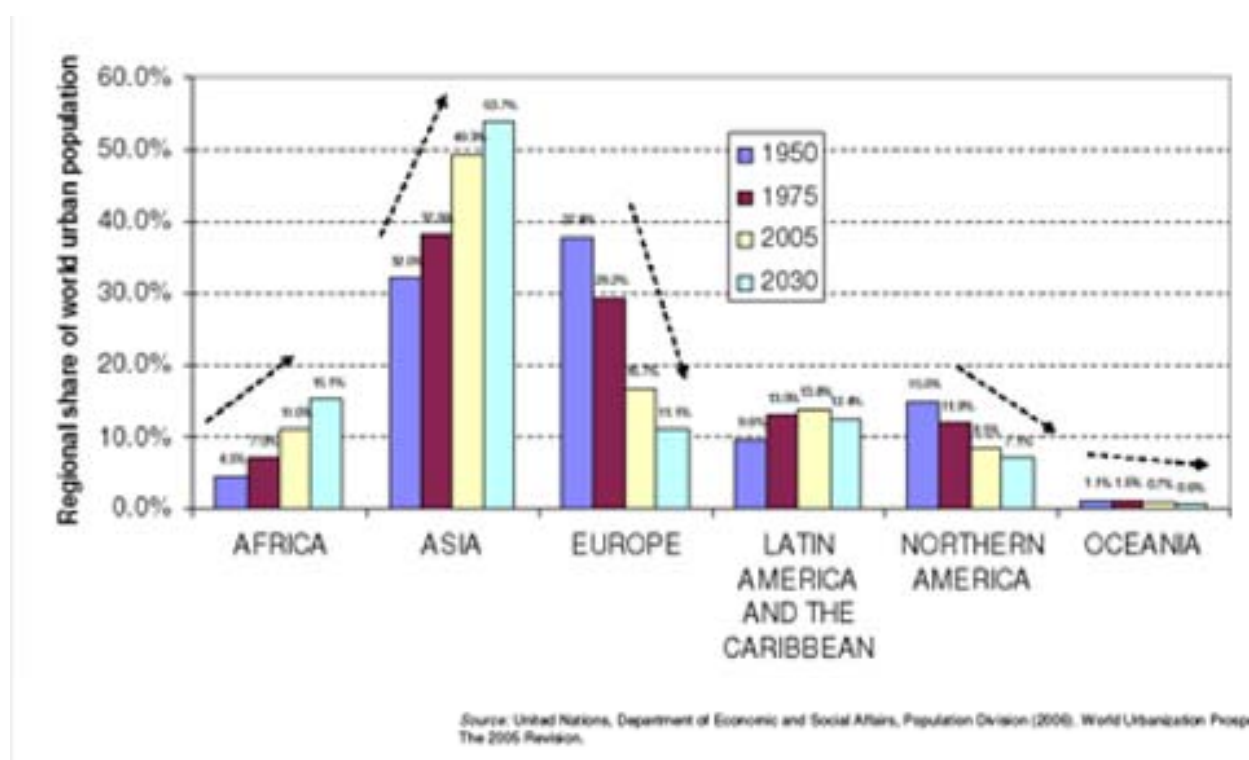
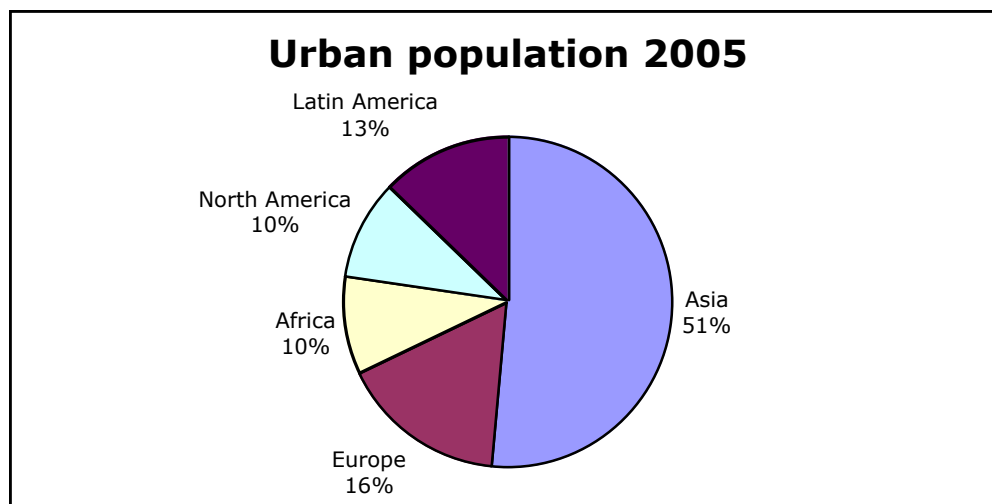
This debate shows clearly that medical research is not the determining factor. It may help to cure difficult illnesses like AIDS. It has no influence on the environment factors that determine most modern pathologies. Looking at mortality globally, as shown by the above graph, the question is raised to the social and economic organization, to social sciences and governance rather than to hard sciences.

3- The third question mark about **demography** is the one of migrations:

2.3.3 Migration to cities

The first and massive migration in 21st century is the one to cities. Urban population passed 50% in 2008: 3.3 billion.

Urban population grows twice faster than total population growth (1.78% vs. 0.95% annual rate for 2005-2030): projected resulting 4.9 Billion (about 60% of total population) by 2030 (out of 8.2 billion) 1.8 Billion urban population will be added in 2005-2030 out of which 1.1 Billion will be added in Asia.



Regional distribution of world urban population (source UN)

Cities in Asia:

- 11 out of 20 world mega-cities (over 10 million),
- 17 out of 30 cities of 5-10 million,
- 184 out of 364 cities of 1-5 million,
- 225 out of 455 cities of 0.5-1 million.

From these data, we can make a simple and clear statement: 21st century is, at least during the first half, a period where the majority of world population lives in cities. And the majority of these city dwellers are in Asia. The first impression given by these facts is that the new “centre of the world” (if there is any) will be Asiatic.

The second impression is that, at least in developed countries, the retirement of the baby boom generation may curb the urbanization trend, following the preference of recently retired people (between 60 and 80) to live in the countryside. This preference declines when these ageing people go over 80, according to their need for urban health services and assistance. But this temporary movement back to the countryside of experienced people may give the opportunity to build a new type of rural settlements that may be transferred to younger generations.

The third impression relates to daily life. Most mega cities are highly energy consuming, they contribute massively to carbon dioxide emissions and they experience enormous traffic congestion, air pollution and unhealthy environment. Some of these negative points may lead to popular protests and rebellions. And, as it happened previously in history, at the middle of 19th century in Europe for instance, the public authorities would launch in response huge reshaping programs, including common transportation, green spaces, energy conservation, floating structures for the seashore towns (as quoted previously), and many other initiatives aiming at ecological sustainability.

2.3.4 Migrations increased by climate refugees

“International migration has become a larger player in demographic trends. International comparable statistics are scarce, also because the definition of what is a migrant varies. Migrants are mainly driven due to economic reasons or to political instability (refugees / asylum seeking), in the future likely more often also to natural disasters of which some may be the result of climate change. Migrants orient towards countries where they have historical or cultural bonds with (including language bonds), or where already larger groups from the same country of origin have settled and have send positive information. UN estimates suggest that about one third of all international migrants in the world live in Europe (i.e. persons born in another country). These 64 million persons make up 9% of the total European population. North America (44 million) and Oceania (5 million) have lower absolute numbers but higher shares of their population being born in another country than where they live, respectively 13 and 25%”⁴⁶.

Observing the present movements, it is possible to anticipate strategic questions that may come on the front of the stage before 2025. Important flows of migrants silently move from overcrowded countries to places less occupied and with a low birth rate. Three places of the world can be mentioned:

United States and Canada, target of an important flow from Mexico, South America and from different Asiatic countries;

Europe, target of an important flow from North and sub Saharan Africa and Turkey;

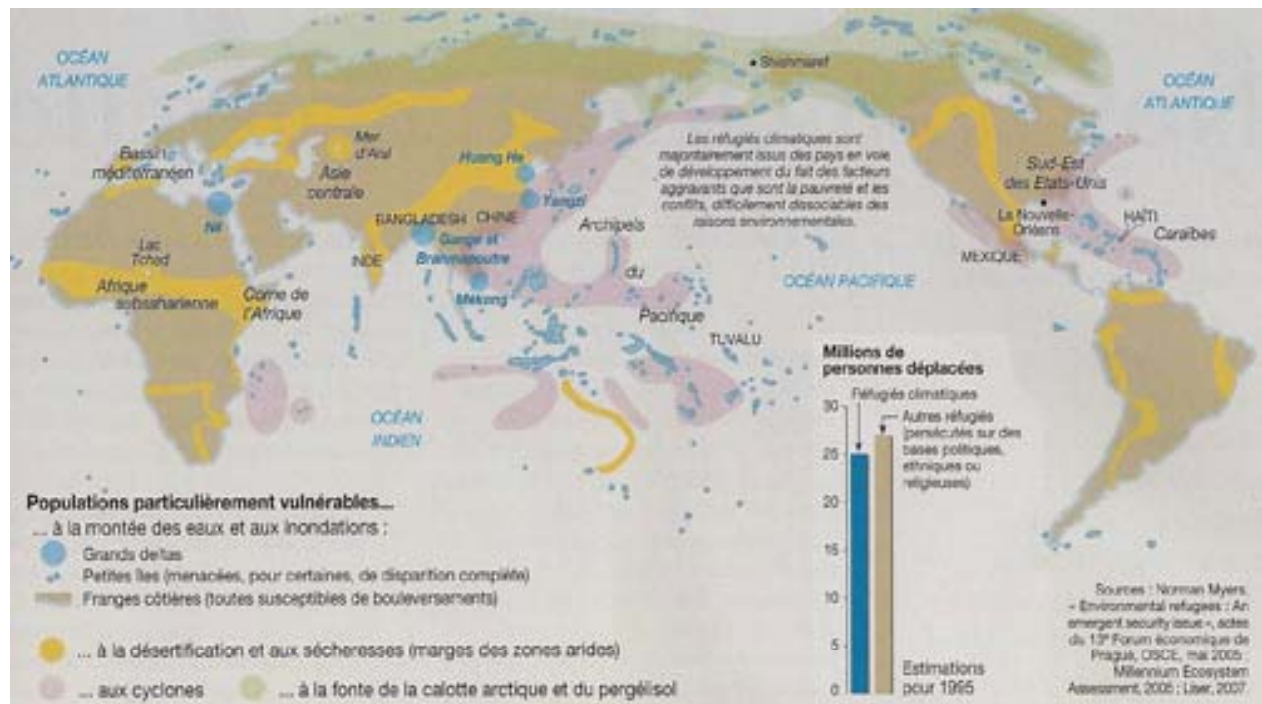
Siberia, target of an important flow from China.

The key question is raised by the cultural difference of the migrants and the tensions it may generate with the existing population.

Regarding climate refugees⁴⁷, the estimation by Norman Myers, published also by IPCC is 150 million in 2050. It shows an order of magnitude of the climate impact on migration comparable to the one of international migrations for economic and social motivations at the end of 20th century. It should be added to these figures that the estimation of climate effects in terms of hurricanes (like New Orleans Katrina), floods and drought are rough ones. And if, as explained previously, the rise of the ocean level would reach 3 meters, most mega cities being built on the seashore, another 135 million displaced people should be added (OECD).

⁴⁶ From Gijs Beets contribution

⁴⁷ Estimated 25 Million at the beginning of 2008, by European deputy Hélène Flautre.



The map of vulnerable to climate change populations

The conclusion of these estimations is that **huge public works should be expected (reshaping town, water supply, ocean cities...), which will probably determine the shape of 21st century's economy.**

2.3.5 The future of poverty

Ray Hammond writes: "Within our societies inequality will continue to increase, as it is increasing today. Even though the poorest groups in developed societies have become much better off over the last twenty-five years (and will be very much better off comparatively by 2030) the wealth of the richest in our society has grown far faster. This trend will continue and although the middle-classes will continue to expand and become more affluent, the super-rich will become mega-rich and then hyper-rich. And there will be many more hyper-rich people in the world of 2030."⁴⁸

Displacement of tenth of million people means an increase of poverty, even in case of important solidarity mobilization. The fast urbanization process, often due to the migration of poor peasants searching for survival opportunities in a big city, is also generating poverty.

The classical economic definition, often quoted in international talks, considers as poor a person earning less than 2\$ per day. According to this kind of definition, one third of mankind would be in a situation close to poverty. But we should remind that our ancestors lived in the countryside earning less, and survived producing freely for their own consumption. Many civilizations: Aborigines, Inuits, some Amerindians and Africans still survive that way.

⁴⁸ Ray Hammond The world in 2030 "But this could change – nothing can be ruled out when politics is considered. For this reason long before we get to 2030 we must strengthen our national and federal laws to control who has access to such surveillance information and we must develop much stricter rules about how it can be used"

It is necessary to take a distance with the previous definition. It is the one that suits to the merchants, which are not interested by people not using money. Anyhow, if we follow Toffler's analysis on the rising "prosumer" attitude⁴⁹, we must take into account the development of investment strategies aimed at escaping the merchant power by developing self-production systems. Seen by the merchants, it looks like impoverishment (economists would call it recession), but seen by the end user, it looks like an improvement in safety and comfort.

The important point, anyhow, is that, **in a big city**, survival is difficult or even impossible with 2\$ a day because, there, survival needs a minimal compulsory consumption. A recent analysis in France⁵⁰ shows that compulsory expenses (housing, electricity, telecom, but food not included) mobilizes in average more than 40% of the revenue of the households. And this percentage has grown approximately 5% during the last 5 years. In spite of the increase of their revenues, the citizens feel a decline in their standard of living, because their freedom of choice is reduced. In many cases, poverty occurs when the prices increasing and the debts too, compulsory expenses grow over the level of the income of the household. Such situations are exemplified by the "sub-prime" crisis (2007, 2008...) in United States.

It shows at least that poverty has two faces: the one for instance of refugees in a poor country, and the one of decay in wealthier countries for those who has lost access to the minimal survival needs. Therefore, the "wealth of nations" should not be measured through their GNP but, as suggested by Amartya Sen, at least by the non-compulsory expenses for which the average citizen keeps a freedom of choice. In many countries, very rich people and very poor people live close to each other, particularly in big cities. But very rich people may have a great freedom of choice, without having time for it. Cognitive saturation⁵¹ lowers also governance awareness, increasing the gap between rich and poor.

Deep poverty escapes to present statistics⁵². But common sense would accept that when a human being has to sell a part of his body (the kidney for instance), or to get his food out of municipal waste piles (like in some Brazilian towns), or to sleep in the street, or to accept situations offending his dignity to survive, she/he is in poverty. But this is not the case of most village traditional communities, in spite of their low purchase power.

Outsights scenarios

In 2004, the "outsights" consultancy⁵³ has been commissioned by UK department for international development to elaborate scenarios for the poorest in 2030.

In one of them, named "moral warming", the companies begin to sign up the UN declaration of human rights, the shareholders police the ethical codes of conduct, the consumers turn to fair trade and ethical products and the super rich host philanthropic foundations.

In another scenario, named "on the move" it is assumed that in 2030 the proportion of the world population who live and work outside its mother country has doubled compared to year 2000 (from 1.5 to 3%), due to economic globalization, rural to urban shift and global warming. Deregulation removes the obstacles to migrations. **Informal economy is accepted**, except in the case it shelters criminal activities. The social and health services are harmonised internationally.

⁴⁹ In Toffler's vocabulary, prosumer is a contraction of producer and consumer. It describes the attitude of people who choose to produce by themselves for their own needs. The present development of kitchen gardens and do it yourself practices testify this trend.

⁵⁰ France 2025 report, CASE, 2008 p58.

⁵¹ hyperchoice concept stated by Toffler (the future shock)

⁵² One of the best definition has been given by Amartya Sen "depriving of elementary capacities". The quotation of Joseph Wresinski, founder of "ATD quart monde" is also essential: "where humans live in misery, human rights are not respected".

⁵³ <http://www.outsights.co.uk>

Another approach for Europe has been published in *Futuribles*⁵⁴. It focuses on states or EU intervention, either through financial and education support of the poorest or even declaring misery outlaw.

Obviously, the weakness of all these scenarios lies in minimizing the role of NGO's.

This difficult question of poverty should be analysed also through **historical references**. A global change concerning at the same time technology and civilization as a whole, like was the Industrial revolution in the 19th century, generates huge social difficulties. During a first period, the technology provides new unexpected services and brings satisfactions to the customer. In a second stage, the new activities displace the employment of the old ones and may generate a social crisis.

It was the case in Europe in 1848, when the competition of industrial manufactures had cut down craftsmen's market. Migration to towns and poverty increased, as described in the novels of Dickens (*Oliver Twist*) and Victor Hugo (*Les Misérables*). The 1848 revolution, all over Europe, gave the powers to new teams who operated a new set of policies: great public works (Hausmann's urban planning in France for instance) and compulsory popular education, in order to give to the lower class access to the minimal knowledge necessary to operate in the new technical system. This effort lasted for half a century and was successful.

Clearly, 21st century is also a period of transition between an old technical system, the industrial one, and a new one, quoted as the "cognitive civilization". Therefore, a similar strategy of the ruling class is to be expected: **huge public works and popular education**. Public works, necessary to reshape the cities and face global warming consequences, will provide employment. Renewed education will be necessary to get familiar with the new tools (Internet) and the new goals (planetary gardening).

2.4 Sustainable technologies are well known

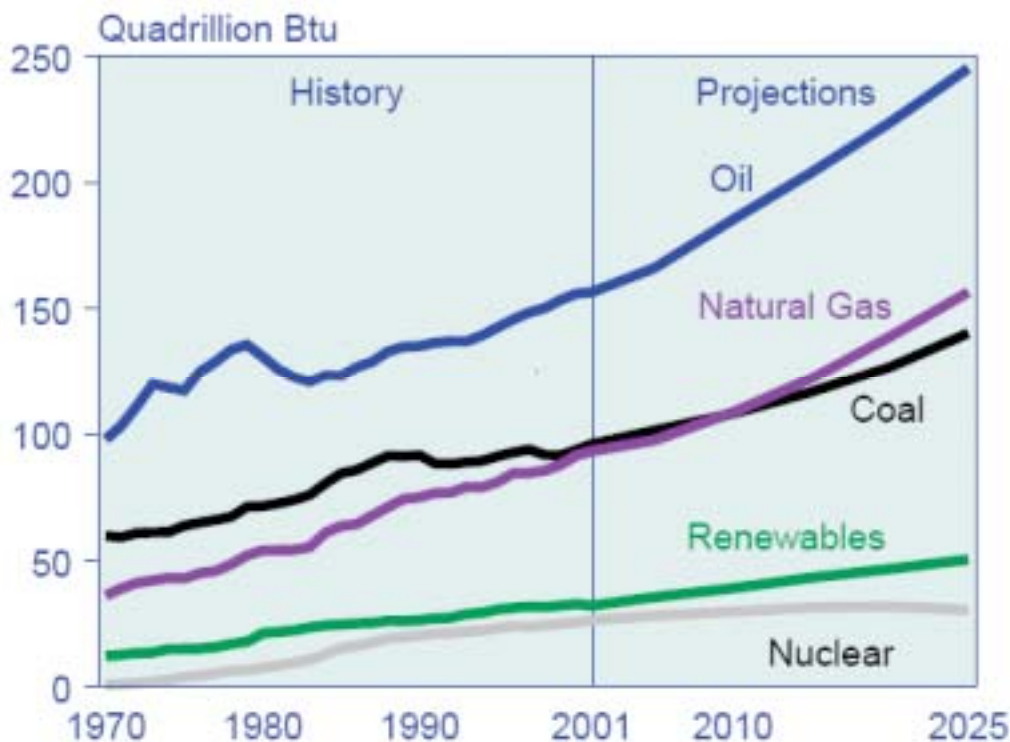
The debate around energy supply, agriculture policies and environment care has generated an important scenario building activity, in companies as well as in governments and international organizations⁵⁵.

2.4.1 Energy and economic growth

Regarding energy, the present trend shows clearly an unsustainable future in which the 2025 consumption would be 60% higher than the 2000 one, this increase relying on carbon dioxide emitting energies, namely coal, oil and natural gas. China, Russia and US would contribute for two thirds of this increase.

⁵⁴ by Xavier Godinot and Saphia Richou, n° 290 oct 2003.

⁵⁵ Ref: Towards a post carbon society, European research on economic incentives and social behaviour, Conference proceedings, Brussels, 24 Oct 2007, European commission, DG Research, dir L.



World energy consumption trend.

Source International Energy Agency (created by OECD)⁵⁶

Such an evolution has motivated the following strong warning of the IEA:

“Urgent action is needed if greenhouse-gas concentrations are to be stabilised at a level that would prevent dangerous interference with the climate system. The Alternative Policy Scenario shows that measures currently being considered by governments around the world could lead to a stabilisation of global emissions in the mid-2020s and cut their level in 2030 by 19% relative to the Reference Scenario. OECD emissions peak and begin to decline after 2015. Yet global emissions would still be 27% higher than in 2005. Assuming continued emissions reductions after 2030, the Alternative Policy Scenario projections are consistent with stabilisation of long-term CO₂-equivalent concentration in the atmosphere at about 550 parts per million.

According to the best estimates of the Intergovernmental Panel on Climate Change, this concentration would correspond to an increase in average temperature of around 3°C above pre-industrial levels. In order to limit the average increase in global temperatures to a maximum of 2.4°C, the smallest increase in any of the IPCC scenarios, the concentration of greenhouse gases in the atmosphere would need to be stabilised at around 450 ppm.

To achieve this, CO₂ emissions would need to peak by 2015 at the latest and to fall between 50% and 85% below 2000 levels by 2050. We estimate that this would require energy-related CO₂ emissions to be cut to around 23 Gt in 2030 – 19 Gt less than in the Reference Scenario and 11 Gt less than in the Alternative Policy Scenario. In a “450 Stabilisation Case”, which describes a notional pathway to achieving this outcome, global emissions peak in 2012 at around 30 Gt.

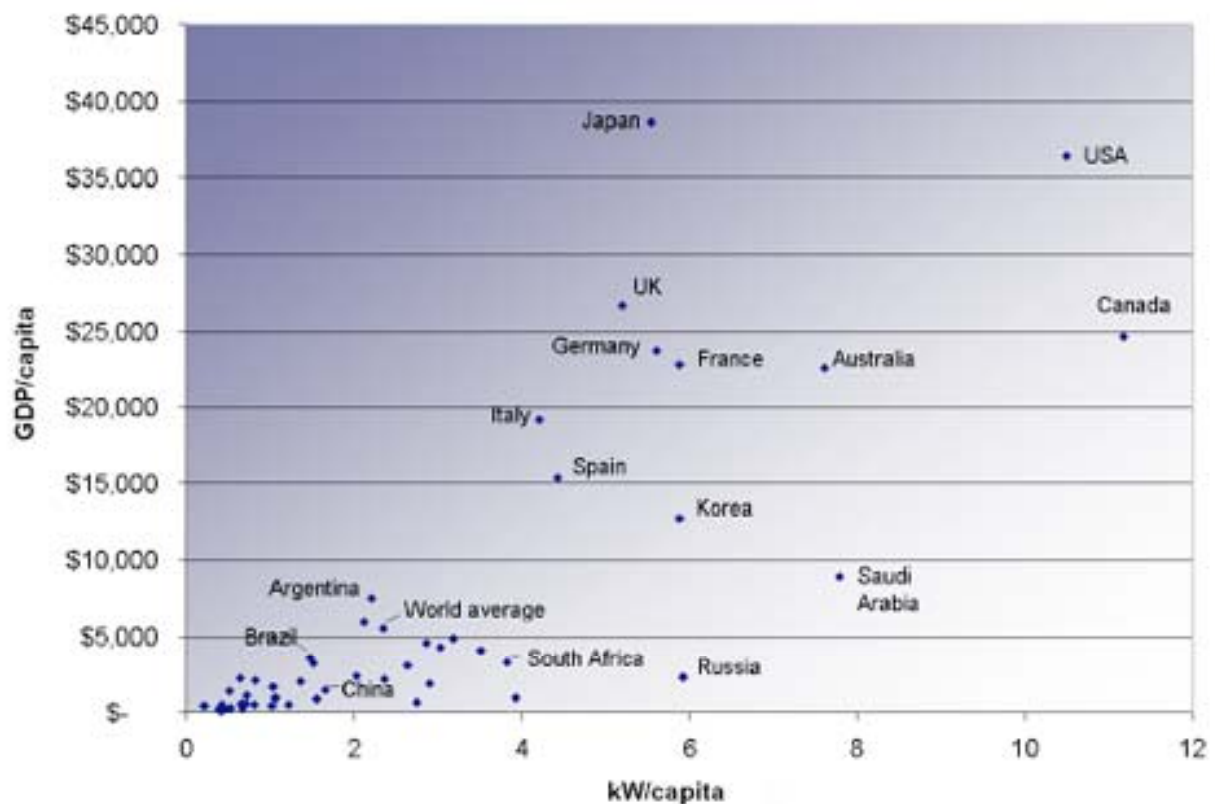
⁵⁶ This graph out the 2007 report, assumes an oil price around 60\$/bl. In 2008, this price level has doubled and adaptation reactions of the public (less consuming cars for instance) appeared, even in United States.

Emissions savings come from improved efficiency in fossil fuel use in industry, buildings and transport, switching to nuclear power and renewables, and the widespread deployment of CO₂ capture and storage (CCS) in power generation and industry. Exceptionally quick and vigorous policy action by all countries, and unprecedented technological advances, entailing substantial costs, would be needed to make this case a reality.”

Such a position, following several other warnings of the IEA (in spite of the protests of US government), raises two questions:

- 1- Is the GDP growth inevitably generating energy consumption?
- 2- Are sober technologies existing ones or are they still in a research stage?

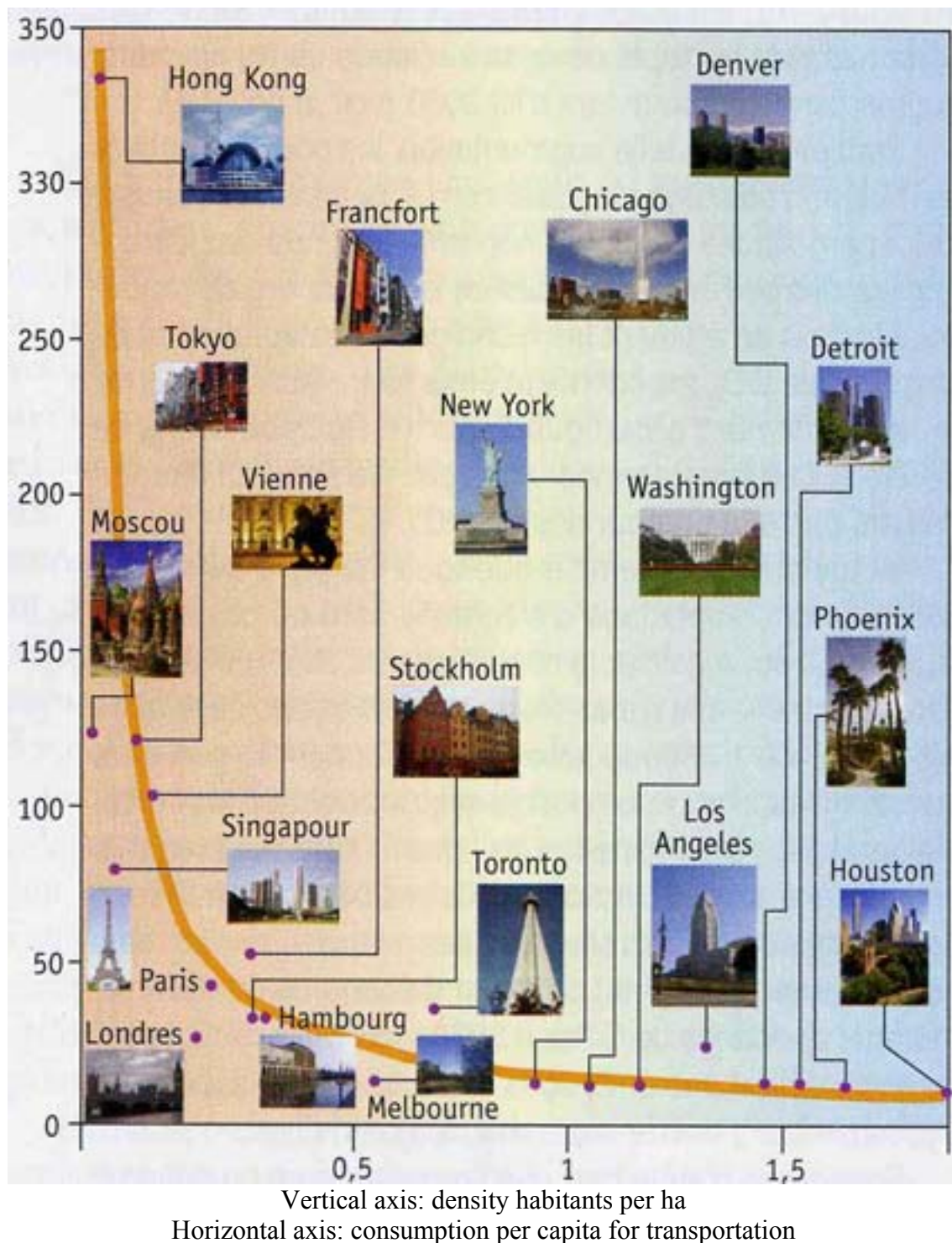
The answer to the first question is clearly no, as demonstrated by the following graph:



Energy consumption compared to GDP per capita (Source IEA)

On the above graph, let us look at the triangle Japan-Russia-Canada. Canada has a GNP per capita 30% lower than Japan and a consumption of energy per capita double than Japan. The cause is not a colder climate: if it were the case, USA, being warmer than Canada, would have a lower consumption per capita. The graph shows it has nearly the same. Other example: Russia, with a low GDP par capita (one tenth of Japan) consumes more energy per capita, why? Anyone who visited Russia knows that, for instance, buildings older than 1990 were poorly isolated. More generally, public free access to energy suppressed any incentive for energy saving.

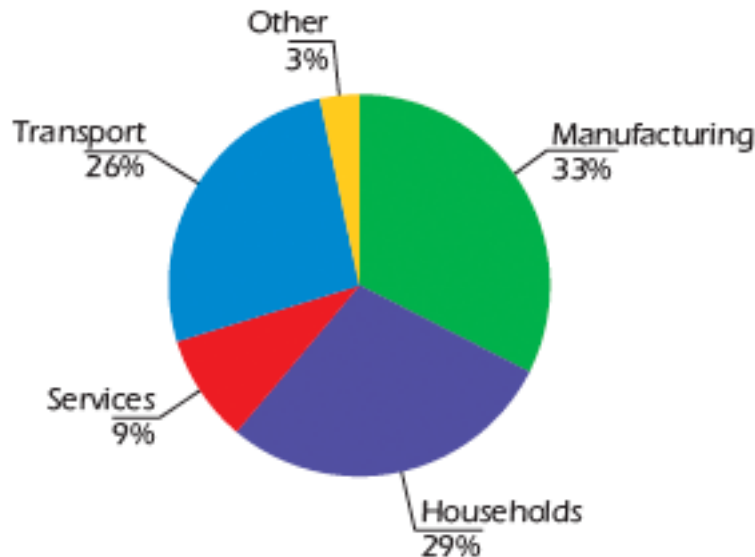
2.4.2 Structural effects



In USA and Canada, prices of energy were driven, during the late century, by international market prices, with low taxes added. It was not the case in Europe, where taxes represented the great majority of the price paid by the consumer. US position, being faithful to market ideology, stayed short sighted, because markets are short sighted, but generated long term consequences (as shown by the graph below), that may lead to a collapse of the so-called American way of life (and the US leadership too) during the following decades.

The above graph gives the position of several big cities regarding their density and their consumption of energy per capita for transportation needs. It shows clearly that low density towns that expanded in US during the easy energy half century spend 6 times more energy per capita for transportation than Paris, London or Vienna and some 12 times more than Singapore, Tokyo and Hong Kong. Therefore, the people living in these American cities are trapped in a compulsory consumption out of which there is no fast escape.

2.4.3 Shift in consumption



Total world energy consumption 2005 (source IEA)

As shown by the above graph, energy consumption can be roughly divided into 3 parts: manufacturing, households and transportation. Manufacturing has already taken initiatives to reduce its consumptions. Reducing households and buildings consumptions needs important isolation investments. It takes time and money, but the technologies are well known.

Transportation consumption is growing faster but could be massively reduced.

From a technical point of view, reducing energy consumption and consequently carbon dioxide emissions would be feasible with the existing technologies. The wide gap between the different cities and the different nations shown by the above graphs demonstrate that **it would be feasible only by imitating** the best performances already existing worldwide.

For instance⁵⁷, Paris, London and Tokyo have a powerful metro infrastructure transporting 10 million passengers per day in Paris and 5.7 million in Tokyo. In most American cities, except New York, common transportation is weak. Using a car is nearly compulsory. And the consumption of American cars per Km is approximately twice the one of Japanese and European cars, as a result of the past absence of tax incentives.

To go further in the existing technologies, the feasibility of hybrid vehicles was already well known in the 70's when took place the first energy crisis. The one of electric cars was known too. The first car that passed 100 Km/h was electric. And this occurred in 19th century⁵⁸! During 20th century, electricity storage needed heavy batteries. Nowadays, we can expect that either fuel cells or lithium batteries, as used in cellular phones, will overcome partly this inconvenient.

⁵⁷ as quoted by Rajendra Pachauri, president of IPCC.

⁵⁸ 1899, la "jamais contente"

Regarding air transportation, for ground distances less than 1000Km, the high speed train can compete saving important carbon dioxide emissions, even more if the electricity is not generated by fuel, coal or gas combustion, for instance, if it is produced by hydropower, solar, windmills or nuclear.

Jet airplanes are basically derived from military. The great manufacturers financed their research through military procurements and, in a second stage, used their know how to adapt the planes to civilian use. More recently, they made an effort to reduce the kerosene consumption.

The more radical changes that would cut most of air transportation carbon dioxide emissions are well known but still waiting for a decision.

The first one is known as the “cryoplane”, a jet plane burning hydrogen instead of kerosene, inspired by the hydrogen technologies developed for space propulsion. The combustion of hydrogen produces only water. It means nearly zero emission of carbon dioxide and other greenhouse gases, as far as the hydrogen is produced out of a non-emitting source of energy (again electricity out of hydropower, solar, windmills or nuclear).

The second one is the airship, an old technology that was developed at the beginning of 20th century. The airship floats in the air and therefore consumes no energy for sustentation and very little for propulsion. The airship is also able to carry important volumes or weights (some hundred tons, much more than helicopters, that culminate around 20 tons) and does not need an airport to land its charge. It could not only replace some air and ground transportation, but also bring rescue everywhere in case of natural disease or transform building technologies, being able to carry by air a completely equipped house previously assembled in a factory.

Regarding households and more generally buildings, most energy consumptions are due to heating or cooling. But the isolation technologies are also well known. The buildings are consuming an important share of the energy because they were built in a time where energy was cheap and decision makers improvident. This points again the absence of initiative of public authorities (or their submission to lobby pressure).

Conversely, the case of the city of Freiburg im Breisgau⁵⁹, Germany (215000 inhabitants), shows how a municipal initiative can transform an entire part of the city (Quartier Vauban) in a self sustainable living place, with “passivhaus” (zero energy consumption habitat), green environment, photovoltaic electricity, trams and bicycles, ecological waste treatment and so on. Other examples can be found, the industrial Swedish city of Händelö for instance. An informal network of such ecological cities is now built in Europe. It exchanges experiences and promotes the sober and sustainable technologies.

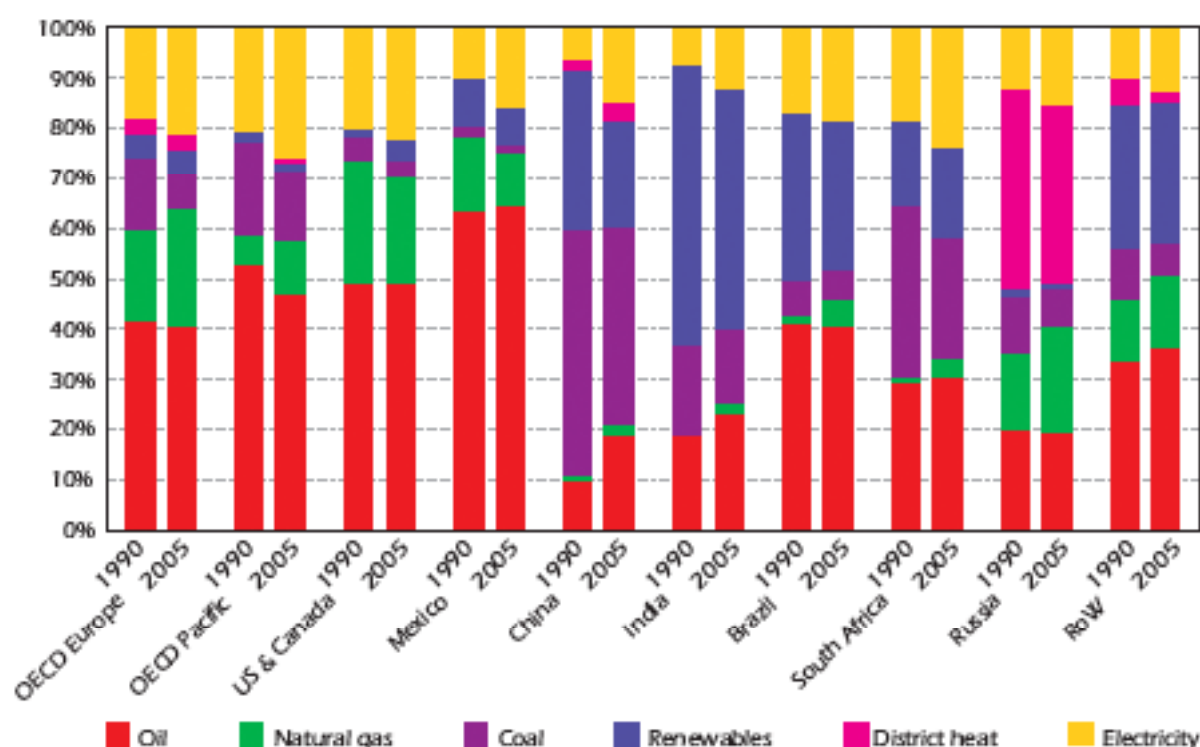
2.4.4 Shifts in energy production⁶⁰

It is well known that many ways exist to produce energy without burning fuel coal or gas. But a clear understanding of the situation is not possible considering only production, as if all types of energies were equivalent.

⁵⁹ <http://www.freiburg.de/>

⁶⁰ For another approach of the energy question see Irina Kuklina’s contribution

Figure 2.3 ► **Total Final Energy Consumption by Energy Commodity**



Sources: IEA, 2007 c; IEA, 2007 d; IEA estimates.

Note: Excludes fuel use in electricity and heat production.

Here is the graph of the final energy consumption by type of energy and by region (in which fuel or coal use for electricity production is counted in fuel or coal and not as electricity). It shows very different patterns depending on local ways of living and equipment. During the last half century, the access to oil and gas has been easy and relatively cheap. This has come to an end. And the greenhouse effect will impose anyway restriction in their consumption and in that of coal too.

"Prices: a general equilibrium model represents price evolution in real term and relatively to a world price index used as reference. Inflation and monetary policy effects are not taken in consideration. Change in relative prices indicates the evolution of world producer prices, without any change in the aggregate level of prices.

The sectors that rely on the exploitation of some limited natural resource are to experience the most significant price increase. It is the case for **agricultural** products that use land in the production process. *The price of primary energy, namely coal, gas and oil, is expected to decrease slightly as defined by the official EIA scenario, and in reaction to new significant capital investment and technologic progress.*"⁶¹

Looking at the possible substitutes, one should distinguish between different uses. These are roughly heat, propulsion and electricity. In order produce heat, more precisely to heat buildings and domestic housing, a first solution is the "passivhaus" capturing as much energy as needed from the sun, another substitute is burning wood, and a second one is electricity, even amplified by heat pumps.

⁶¹ CEPII Mirage exercise

For propulsion, a first substitute is given by hydrogen, which can be produced out of electricity, by electrolysis of water, and a second one is electricity. Therefore, **electricity** should play a key intermediate role in the forthcoming energy system.

Then the question raised is: how electricity will be produced and distributed to the users? At that stage, we have to make another distinction: Electricity mass production distributed through a network on one side, or decentralised production, linked or not to a network on the other side.

For mass production distributed through a network two carbon free technologies are available: nuclear and hydropower⁶². As this centralisation fits with high population density and big towns, there is a high probability for these technologies⁶³ to be developed for city uses during the following decades, particularly in China, India and South America.

Regarding decentralised consumption, the question of energy production and storage appears quite different. A wide range of technologies is available: photovoltaic solar panels, windmills, biogas out of waste fermentation, wave energy at the seashore⁶⁴. The link to a network is feasible but not necessary. It can be expected, following Toffler's "prosumer" attitude that many end users would prefer to complete their autonomy in order to escape the world market fluctuations.

Finally, the answer to the second question is that most technologies avoiding carbon dioxide emission are already available on the shelf. Research may be useful to improve them, but the real question is the one of the governance necessary to put them in function, related more to social sciences than to hard science.

This appeal to turn now to the new set of actors involved in the cognitive civilization

3-Different actors

3.1 Why different actors?

The landscape of the future has been at first quoted by Toffler⁶⁵, followed by many other futurists. The following decades are clearly a disruption in the very nature of civilisation. To describe it simply, it is a transition between the industrial age, which started during the 18th century and is still developing in emerging countries, to the **cognitive civilisation**, in which the basic concern is relying on digital communication and nature care.

If the present transformation is comparable in magnitude to the industrial revolution, it should bear also a complete reshaping of the organization of the society. The behaviours should be different and the institutions too, both public and private. Most experts agree on the magnitude of the disruption. But how can we imagine a world where the actors behave differently than the way we know and where the institutional landscape is reshaped and grounded on other legitimacies?

⁶² Let us mention also the "solar power from space" project, capturing solar energy by satellite the transmission to earth being operated by microwave beams.

⁶³ This is not the place to discuss whether these technologies should be developed or not. The attitudes of the Chinese and Indian authorities are clear enough to say that they will be developed.

⁶⁴ Research facilities are being built in Orkney Islands to test wave energy technologies.

⁶⁵ Alvin Toffler, *The future shock*, 1970; *The third wave*, 1980; *Revolutionary wealth*, 2006.

Some authors already tried first speculations: Manuel Castells, Sherry Turkle, Pierre Lévy for instance, and also Alvin Toffler. To go deeper one needs an important amount of work in social sciences observations and interpretation. Regarding the present report, it will be more productive to take the risk. According to the high probability of change, imagining a different world will be a better preparation than staying in the present one.

Anyway, this exercise needs to get rid of the present concepts. May be, in 2025, a nation-state would not be a nation-state any more, a firm would not be a firm as we know it today and the individual attachments would be different. Let us get free to imagine it. Anyhow, let us also take into account the weak signals. New practices appear first in minor initiatives and diffuse in a second stage.

3.1.1 Nature care

The Nature care question has been described earlier through scientific and technical available data. But the important point, regarding the evolution of civilization, is the perception of this question by the public and the actions that may be operated by the different forces at stake. Common economic knowledge would assume that “homo economicus”, being concerned by profit expectancies, would not be interested in long term planet preservation. But, in daily life, she/he has children, listens to the information channels, completed by Internet surfing. She/he builds his opinion as a citizen too.

Since images of the earth seen from space have been broadcasted, a wider consciousness is at work that reaches even obstinately short-sighted people.

Well known NGO's (Greenpeace, World Wildlife Fund, Environment Defence Fund...) have developed worldwide actions for nature protection. The increase of their influence has been impressively fast during the last decades. It may be due to their management skills, but not only. The recent development of the information system enabled public access to scientific information and made visible, through satellite images for instance, the problems due to uncontrolled exploitation of nature.

The cognitive aspect is the central part of the analysis. The hypothesis that a diffuse consciousness has grown in the mind of the public fits with observation. At the same time, the opportunities offered by distance work and learning allows the individual to be simultaneously a citizen of the world and a locally rooted person, participating less in urban agitation. This attitude is not only visible at family level. It is also present in firms, where economic decisions are made⁶⁶.

Pushing this trend further, it leads to foresee a shift in the philosophical attitude towards nature. During the industrial age, human activities were implicitly understood in terms of production and consumption. Nature was only a source of raw materials and a place to get rid of waste.

If natural life, for the cognitive civilization, is perceived as a key factor for future children survival, the relationship should turn to a symbiosis attitude. Such an evolution means a shift

⁶⁶ For instance in oil companies like BP (who claim to be “Beyond Petroleum”) and Shell (see for instance the most interesting “Shell energy scenarios for 2050” published in 2008. The extreme conservative attitude of Exxon, financing experts to refute the greenhouse effect, is an exception, and is even not unanimous in that company, as shown by the 2008 debates at its shareholder's assembly.

in the mentalities from production to gardening. It assumes that the gardener is more than a producer. She/he is the guardian of life perpetuation, and also a poet modelling life as an artist.

To sum it up, nature care generates local rooting, worldwide warning and renewal of art.

3.1.2 Digital communication⁶⁷

The web 2.0, where the connected persons can become authors, started a few years ago. Therefore today, in 2008, is early to estimate the changes in behaviour generated by this new opportunity, including ordinary information, sound and broadcast. Attention should be paid also to games, serious or not, and to massively multi players on line role playing games (MMORPGs), in which are already involved several million players from all continents. In developed countries, a new digital generation is already on line, born with a keyboard a touchpad and a mouse. Other young people from other parts of the world will follow during the next decade. This generation thinks different and will be on command in 2025. Therefore, we need to understand their way of thinking as precisely as possible.

For instance, the attachment to institutions, which was one of the bases of industrial organisation, through the employer-employee and/or citizen-nation relationships, may not be so essential for this generation.

If it is the case, the institutional personification that we take for granted should be left aside and replaced by other concepts. In 2025, will it still be possible to articulate sentences like “Shell has the feeling that...” or “Peru will never accept that...” as if these entities had a personality similar to humans?

3.2 Education and health

3.2.1 Education and self training⁶⁸

Toffler's ranking⁶⁹ points education as the slowest and last to adapt to the modern communication system, the firms being the first, then the NGO's, then the governmental institutions. Such a statement may be exaggerated. In developed countries, children can be observed, inspired by their school learning, correcting the attitudes of their parents, saying things like: you should put out the light, consume less meat and more vegetables, isolate your windows and so on.

In developing countries, the access to modern economy often rely on schools, many, as in India, connecting to Internet. Such weak signals show that the education community is moving, in some cases faster than the families and the firms. This may be explained by the position of the teachers. The meaning they would normally give to their profession is to serve the common good in a long-term perspective.

The evolution of **education** appears relatively easy to foresee, but may be difficult to put into practice, because of the magnitude and deepness of the changes it assumes for the existing institutions and the huge number of persons involved. Some foresights already show audacious prospects:

“Imagine a university without buildings or classrooms or even library. Imagine a university ten thousand miles away from its students. Imagine a university without academic departments, without required courses or major or grades. Imagine a college open 24 hours a

⁶⁷ See also Geoff Mulgan contribution

⁶⁸ See also the Russian approach in Irina Kuklina contribution

⁶⁹ see below section 3.3.3

day, seven days a week, 365 days a year. Imagine a college proposing a bachelor degree in individualized studies or in interdisciplinary studies, with a catalogue of more than 4000 different courses. Imagine a degree valid only for five years after graduation. Imagine a college willing to reimburse its students if they don't find a suitable job within six month of graduation. Imagine a higher education system where institutions are ranked not by the quality of their teachers, but by the intensity of electronic wiring and the degree of internet connectivity. Imagine a country whose main export earnings come from the sale of higher education services...⁷⁰

The first element to consider is that, through Internet, **the most successful courses of the best teachers of the best universities will be made accessible**. MIT courses and many European ones too, are already on line, only in their classical shape. Therefore, one can foresee that the direct competition between teachers of all universities, due to this new accessibility, combined with accounting of customers download, will be a powerful incentive to improve their presentations, using images, videos, even **games**. Such an evolution assumes the financing of virtual universes creations rather than the financing of classrooms. It assumes also that the role of a mediocre teacher of a mediocre university will be reduced to comment and explain the presentation of the high-level scientist. And test its assimilation by the students.

The second element is the development, not only of distance learning, but also **cooperative learning** as practiced in the free software community. Self-trained persons should play a greater role in the future economy. Many skills may be tested through Internet, and the present system of exams may become obsolete. An employer would prefer to test the present capabilities of a candidate and would disregard to know she/he has been twenty years ago a student in a formerly well-known university. Anyhow, collective life on a campus or even in a classroom generates solidarities that cannot be replaced by distance communication. This fact may moderate the shift towards distance learning. In the competition between schools and universities, the quality of life should play a greater role in the future.

The third element is the hierarchy between theory and practice that might be turned upside down. Theoretical knowledge is transferable through Internet, as well as theoretical exercises. Physical attendance to courses remains necessary for **practical skills**, the ones of gardeners, craftsmen for instance, as well as the ones of surgeons or sport champions. Therefore these practical skills should be promoted to a higher social status, as a consequence of their less easy access and also of their scarcity, due to the present overpopulation of professions relying on discourse.

To conclude, the education system will become international and completely reshaped by the Internet access, not only to information, but also to training processes (games) and validation tests. What is nowadays considered as being a high level knowledge will become currently accessible by anyone, and what are considered as second level skills, like the handicraft skills, becoming rare, will be appreciated because of their scarcity.

3.2.2 Health and self care

Regarding **health**, major evolutions are also to be expected:

⁷⁰ Beginning of the article "Tertiary education in the 21st century. Challenges and opportunities" by Jamil Salimi, World Bank, United states, published by OECD 2001.

The first one is **distance health care**. With adequate measurement instruments and teleprocessing, a sick person can be followed and monitored having a normal life, instead of being stuck in a hospital bed. Even if hospitalization is required, it may be handled in small hospitals, assuming they are connected with distant expertise systems and specialists. One can assume, therefore, that the whole logistics of the health care system will be transformed.

The so-called “**medical tourism**” is already developing and will develop faster as a consequence of the opportunities offered by the Internet. The international competition resulting between health services will appeal for harmonization of the various health care systems and the legislations attached to them. The complexity raised by this question is still higher than the one dealt by WTO. Health care being a very sensitive question, close to human rights, it can be foreseen as an important political topic of the next decades.

As for education, **self-care** should increase. In the case of AIDS, some patients have so well documented themselves through Internet that they have been able to teach their doctors. Self-care increase is also a consequence of the accessibility of information through the Internet. The sick person may acquire directly the knowledge of his/her illness, compare the current medical information to his/her feelings, and even test various treatments. The medical corporation may not be satisfied of it and may point out the risks of self-medication; no one can abolish the desire of the people to care for oneself.

3.3 Multiple individuals and networks

3.3.1 *Avatars: assuming several identities*

Sherry Turkle⁷¹ devoted her academic life to understand the evolution of mentalities and behaviours induced by young people's computer practice, Internet and games. She used direct observation, psychoanalysis and philosophy. Her books on the topic, “the second self, computers and the human spirit” (1984) and “Life on the screen, identity at the age of Internet” (1995) still considered in 2006 as a basic reference⁷².

The major observation she derives from her studies is the constant struggle by people to make a distinction between humans and machines. Once people refused to imagine machines as a very basic human mind, now they refer to their own mind as machine-like at times. She also noticed that people now began to talk to machines freely without much embarrassment. The boundary between humans and machines has been broken down to one point: humans are alive where machines aren't. With the development of a-life, that weak boundary is becoming weaker.⁷³

Other observations have been made on avatars in multiplayer games. The addicted player assumes through avatars several identities simultaneously. Misrepresenting oneself in an avatar may have the benefit of being therapeutic. It may also generate troubles.

The major result of these observations is the easy ability of human mind to recognise communication partners, even non-human, as bearing a personality similar to humans. This

⁷¹ Professor at MIT.

⁷² Many expert views have been expressed on the topic. The PEW Internet gives a good sample involving 742 correspondents (<http://www.pewinternet.org>). But Sherry Turkle offers a deeper reading, based on observation.

⁷³ Turkle also observes that women have a “non-linear” approach to computers. This she calls “soft mastery” and “bricolage” (as opposed to the “hard mastery” of linear, abstract thinking and computer programming).

fact, issued from cognitive science, leads to a provocative assumption regarding cognitive civilization: according to the past way of thinking, issued from the industrial age, some institutions are legitimate, the nation-state, the firm, the family, others are less legitimate, informal groups for instance.

It is likely that the new legitimacy feeling would rely not on the official recognition but on the intensity of information exchange, fast reaction and presence. This may lead to some misunderstandings. For instance, new generations may ask why they have to pay taxes to the government, in spite of its poor efficiency, and not to an NGO which is really serving the common good. Tensions should be foreseen that should weaken old legitimacies.

Completely different situation may also happen: automats on the Internet are taken as partners for games, psychoanalysts of even prophets. The experiences have already been made successfully, but not widely diffused. Personification of machines therefore may transform the relationship to oneself.

Automat partners are presently at work for information retrieval and training. They should play an important role in teaching. They are already replacing some bureaucratic treatments and interfaces with the public in Internet connected countries.

3.3.2 International networking: the global individual

Internet gives the floor to knowledge mining individuals, whatever being their institutional position. It promotes also the “information gatekeepers”, who push the circulation of knowledge even before any reward expectancy.

The role of these gatekeepers has been quoted as essential⁷⁴ in the innovation process, particularly in big organisations. Their warning role is not transactional. They provide information as a gift, a free participation to the common movement.

Free input to common understanding is probably the key point of the creation of informal communities. And it is important to remind that any organisation started informally, and maintains itself through informal relations.

Being now facilitated by communication technologies, cellular phones and Internet, which ignore the frontiers and goes over the institutional cleavages, a deep restructuring of world organisational landscape should be foreseen when the net generation will be on command, around 2025.

3.3.3 Institutions ranking

Alvin Toffler, in “Revolutionary wealth, 2006” raises an important question: what are the actors best adapted to operate on the new connected instantaneous information system? His ranking is the following:

- 1- the private enterprise, jumping as usual on new opportunities for business
- 2- the NGO's, who have recently progressed in expertise and efficiency
- 3- the governments and their bureaucracies
- 4- the education system, the slowest and the most reluctant to change.

It is important to keep in mind Toffler's judgement, which expresses a sort of common understanding of the United States ruling class. As Toffler is a well-known lecturer, often invited to speak in firms or in business officials meetings, he is probably paying attention to the basic assumptions of his public, considering that too provocative statements would not be acceptable or even understood.

⁷⁴ The five roles in the innovation process are known as: the inventor, the entrepreneur, the facilitator, the godfather and the information gatekeeper (six countries program on innovation policies).

But if we look at this ranking more closely, it may appear different in relation to global change. First, since 1990, no important concept emerged from the business community. The new ideas came from the research community through IPCC, (created under UN mandate), and also from NGO's, particularly WWF with the ecological footprint concept. It came also from the end users, through the free software community (in which some firms have been involved), and the intellectual property contest for music, videos, and also drugs to save developing world populations from chronic diseases.

3.3.4 GBN Scenarios

In the business community itself, the anticipation of a behavioural mutation is present for a long time. For instance, in 1995, the Global Business Network (GBN) issued a foresight 2010 in association with the Sloan School of management of MIT.

In scenario 1, named "small companies, large networks" says: "the corporation of the late 20th century was just a transitional form. It lasted more than one hundred years, but few corporations of that form remain today". The dinosaur era (General Motors, Microsoft, Sony...) is over. "Nearly every task is performed by autonomous teams of one to ten people, set up as independent contractors or small firms, linked by networks dissolving when the project is done"

In scenario 2, named "virtual countries", the opposite assumption appears. "The huge global conglomerate has emerged as the dominant way of organizing work." "These conglomerates operate in almost every industry and have minimal national allegiance. The alliances meet all our needs on a cradle-to-grave basis, income and job security. They are as powerful and influential as nations and we owe allegiance to them". They wage war on each other, using lawyers instead of armies. These days, if you want to define me, you can ignore my geographic location. I can be stereotyped according to the company I work for."

Obviously, these scenarios will not resemble to 2010 business organizations. Anyhow, they are meaningful describing the imaginary of the 90's business thinking. They question two opposite efficiencies: the flexibility aimed at fast adaptation to market opportunities on one side, the search for the loyalty of the employees in counterpart of safety on the other side.

Since 1995, between the market and the employees, the business community has clearly chosen the market. And the opportunity to transfer manufacturing to low wages unprotected workforce on the other side of the planet made this choice easy. This will come to an end before 2025, and the decision power will be transferred to other hands, located in the BRIC's. Let us look first at the trend of the last decades.

3.4 Business behaviours

3.4.1 Increased conservatism

Mass broadcasting through radio and TV has generated, during the last quarter of 20th century, an evolution of the behaviour in the business community. The opportunity to address at the same time millions of customers for several hours a day has increased the influence of the selling force inside the firms. Conversely, the engineering influence has declined. In

developed countries, many manufacturing activities have been delocalized to low wages and low manpower protection locations.

One of the unexpected consequences of this evolution is an increased conservative attitude of the big business, in spite of its declarations of faith in innovation and entrepreneurship. The example of the American automobile industry since the 70's illustrates the case. After the first oil shock in 73, it was clear that the heavy and high consumption vehicles would not survive oil scarcity and high prices gasoline.

But these cars were the ones that the selling force was used to sell. And, as the persuasion system had enormously increased its power over the customer's mind, the market tests and the public opinion analysis confirmed that this type of cars was the one the customer wanted. Persuasion of the public had given the floor to a self-confident conservative attitude, enough to neglect geopolitical evidence.

Following this path, the US government forgot to tax fuels as it was in Europe, where the price paid by the consumer included more than two third of taxation, pushing the car manufacturers to build more sober engines. And when the international price of crude oil was multiplied by nearly 10 during the last decade, when the purchase power of the average American was cut by the "sub-prime" crisis, the US automobile industry saw its customers turn to Japanese and European cars and went nearly bankrupt⁷⁵.

This example shows not only the **improvidence**, but also the **arrogance** of big business leaders relying on the firm belief that its selling force will anyway be able to convince the public to buy the products that they want to sell. It may be the case for a time, but harder will be the fall. And the ability, for the customer, to get more independent information through Internet has started to weaken the influence of the selling force on his mind.

3.4.2 Lobbycracy

One consequence of the cognitive overload of the public is the increase in spending for advertisement and, more generally, persuasion. Therefore the legitimacy of the well known "offer and demand law" is declining. Because of mental saturation, brands have to spend more and more to take a place in the brain of customers. Economy pretends to be legitimate because being demand driven. It has been in fact through mass medias more and more offer driven. And it is still for a time offer driven, as long as the customer listens to the TV instead of surfing for information on the Internet. Economy is no more liberal. It has turned progressively to a **lobbycracy**, where, in most countries, the public sector is serving the interests of the dominant firms. Except in few sectors, newcomers have little chances of success when they operate on the territory of vested interests.

Another example leads to a critical view of the privatisation policies of public infrastructures and services at the benefit of oligopoly lobbies. In cases, electricity and telephone, competition was supposed to lead to a better service to the customer. Such a view relies on the assumption that he/she (the customer) makes a rational choice, and the only legitimate one, being the end user. The practical result, due to information overload of this end user, has been that the companies have hired a sales force to persuade him/her, multiplied unreadable tariffs conditions and, in counterpart, made the sacrifice of their research units, useless to persuade the customer. The global result is likely to be a slow down in innovation and an enormous waste of time and skills.

But the deeper question is that economic doctrine has to be completely reshaped to fit the realities of cognitive civilization.

⁷⁵ Top management would not be affected: in case they are fired, their golden parachute opens and make them wealthy for the rest of their life.

3.4.3 Shell scenarios for hope

The perception of the lobbies influence is turned positively through the 2008 Shell energy scenarios. Shell has a long experience in foresight, and its top management is convinced that one of the roles of the big oil companies is to help solving planetary damages of the greenhouse effect. The document imagines two scenarios:

The first scenario is called **scramble**: “At the international level, scramble is a world of bilateral deals between energy producers and energy consumers, with national governments competing with each other for favourable terms of supply or for access for their energy companies. There is a strong element of rivalry between consumer governments, but they align with each other when their interests coincide. In this world, national energy companies play key intermediate roles, but themselves become increasingly mired in political machinations. Globalization exacerbates the tensions within and between nations and distracts policymakers from the need to take actions and to build international coalitions to face the energy and climate change challenge”.

The second scenario is called **blueprints**: “blueprints describe the dynamics behind new coalitions of interests. These do not necessarily reflect uniform objectives, but build on a combination of supply concerns, environmental interests, and associated entrepreneurial opportunities. It is a world where broader fears about life style and economic prospects forge new alliances that promote actions in both developed and developing nations. This leads to the emergence of a critical mass of parallel responses to supply, demand and climate stresses, and hence the relative promptness of some of these responses”

Clearly, the publication of these two scenarios takes into account both the lobbying influence of the great companies and the necessity to solve planetary problems. To our understanding, the underlying message could be translated as: let us get out this sterile competition and define a common lobbying strategy able to overcome global warming and energy scarcity. In other terms: why don't we turn lobbyocracy positively? It is sending a sign of hope for the citizen.

3.4.4 Free accesses

The so called “knowledge society” in which Europe was supposed to become the most “competitive” continent, has been looked at in classical economic terms. Namely, knowledge production and transfer were viewed first as sources of profit through copyrights, paid connexions and paid data circulation.

But, at the same time, signs of another logic appeared: the telephone through Internet did not charge the distance; some cities started offering free Wi-Fi access to their citizens; a young American company, Google, offered free access to its data retrieval system and, in a second stage, to the most detailed satellite images of the planet, assuming that it will generate such a huge amount of consultations that small advertisements added would overpay the costs. And it was the case. In the cognitive society, economy turns around a persuasion system.

These cases show that information desired by the customer tends to be given for free, and the payment is generated by the advertisement added. Therefore, from this viewpoint, an updated “Lisbon strategy” would tend to eliminate as much as possible tariffs on communications, intellectual property and all sorts of tolls slowing down the flow of information, in order to make the circulation of culture as fluid as possible, and also implement the principle that, as

in US, any information acquired with the taxpayer's money should be delivered in free access to the public on the Internet.

3.4.5 Bubble capitalism

The finance collapses of the 90's in Russia, Indonesia, Mexico, Korea, Argentina, the crashes of LTCM, Enron and Vivendi Universal, the new technology bubble in 2000 and the sub-prime crisis started in 2007, are all consequences of a basic statement: the present information system is unable to control itself and vulnerable to all sorts of manipulations. The crash of the Stock Exchange in 1987 was probably the first example of a worldwide interconnection in real time of financial investments, where a number of operators entrusted computers to buy and sell since human beings had become too slow for such a task.

The economic analysis still refers to concepts of 19th century. But this new **“bubble capitalism”** differs in essence from the capitalism at the time of Marx. And the mass persuasion system transforms the worshipped “invisible hand of the market” into an invasive conquest of the public's neurons.

Another factor seems to increase this bubble tendency: the approach of saturations. Let us make it easy to understand through an example. Here is a plot of land, located in a city; it is used as a parking place. The activity of the city grows, and the intensity of traffic too. The demand for parking places increases over the capacity of the existing places. The matching of the offer and demand is operated increasing the price rates. The owner of the land, therefore, grows suddenly rich. He produces nothing, and the standard of life is not improved by his activity.

Saturation situations become important when “approaching the limits”, as we stated before. The peak oil phenomenon is an illustration that shows it might reach a magnitude that can destabilize an economy. Going back to our parking place, we can predict that people being aware of this potential increase in revenues without any effort added would propose to buy the plot of land, the value of which becomes speculative.

In contemporary economics saturations multiply such situations, and the tendency to multiply speculative bubbles grows as a result of competition to capture rents. And most real goods underneath are not productions. They are in most cases assimilated to property rights: intellectual property patents and copyrights, tolls on highways, parking, telephone communications or electricity. Many compulsory consumptions of the average citizen are involved. Her/his perception is inevitably a reduction in his/her standard of living.

The free market approach of these situations would be an attempt to reduce the prices by increasing competition. But, going back to our parking plot, it does not work. The high prices are due to scarcity. In that case, it is insuperable. Another way to deal with the problem would be to ask about the nature of the saturation money: is it private or public? If it is private, it might generate bubbles and produce nothing. If it is public, assimilated to a common good, then the money, if conveniently managed, may be recycled in urban planning, common transportation or other means to overcome the saturations.

3.4.6 Local roots

The worldwide Internet and cell phone practice will inevitably transform the banking, insurance, tax and accountancy. Business orders and payments will be, if not simplified, at

least deeply transformed by distance treatment. The money itself may be touched⁷⁶, if local trade systems appear reliable enough to their users. It is likely that, at least in the so called developed world, an aware fraction of the populations will try to escape the weight of the bureaucratic burden paid through taxes, fees, tolls and tariffs, by restoring local exchange practices.

In some companies, the preparation of the great change has started. Josephine Green⁷⁷, from Philips says **"we are not in front of an age of change, but of a change of age"**. We are going beyond the consumption society, and she adds: "According to Peter Drucker, "Every few hundred years in Western history there occurs a sharp transformation. Within a few short decades, society rearranges itself; its worldview (paradigm), its basic values, its social and political structures, its arts, its key institutions. Fifty years later there is a new world." Such a dynamic change of age is not served by incremental innovation but by deeper structural change and radical innovation. An example is how we have to re-think and reinvent some of our basic social industries such as health, care, education, transport, and – beyond the social industries – our lifestyles. These are all things that grew out of and were styled around the industrial era but need to be re-invented for the 21st century. As this paper suggests, the more progressive and ultimately more successful companies will progress from a consumer/market-led approach to a people/social-led approach. To make sense of this we need to identify and understand some of the factors influencing the metamorphosis from a market-led to a socially-led company."

3.5 Scientific and cultural communities influence

Since Second World War, research activities have been boosted by military demand, which still represents in United States approximately half of the national expenses devoted to science. In a second period, starting approximately at the first energy crisis (1973), research budgets started to diversify. More was devoted to energy, health and, with the development of civilian electronics, telephone and computers, to high tech industry technologies, including biotechnologies, which dealt also with military issues. The research lobby grew in influence and was strong enough to obtain credits from governments and firms, arguing the needs for competitiveness and innovation.

Since year 2000, the scientific community looks like escaping progressively its dependence on economic forces. Internet offers a direct connection to the public, in which movements of amateur science have developed. The media become interested in scientific imaging.

Science fiction progressively became real when anyone could see images coming from inside a human body or images of the earth seen from a satellite. These contributed highly to the enlargement of public consciousness, the care for environment and the interrogations about the very nature of life.

On the industrial side, the realization of great equipments like the Hubble telescope, the LHC at CERN or ITER give opportunities to progress and improve technologies like supra conductivity, measurement, modelling and transmission techniques

3.5.1 The IPCC and the emergence of a global consciousness

IPCC (Intergovernmental Panel on Climate Change⁷⁸) was created 20 years ago, in 1988, by the WMO (World Meteorological organization) and the UNEP (United Nations Environment

⁷⁶ Bernard Lietaer, the future of money, beyond greed and scarcity.

⁷⁷ J. Green is in charge of foresight in Philips. See her important paper "democratizing the future"

⁷⁸ <http://www.ipcc.ch>

Program). In 2007, the Norwegian Nobel prize award has been given to IPCC (jointly with the former US vice president Al Gore). This award, known as the “Peace Nobel Prize” differs from the ordinary Nobel Prize delivered by the Swedish academy of Science under strictly scientific criteria. The Norwegian prize, more political, bears the recognition of an influence on the progress of international peace. Therefore, giving the reward to a scientific organization marks a date in history. Not only the scientific value of the work is rewarded, but also the impact it has on the public awareness regarding climate change nature and consequences.

This may be an historical reorientation: for half a century, research was supposed to be at the service of economic competitiveness and/or defence goals, except, of course, some minority “fundamental research”, supposed to find its own goal in itself. If the awareness of the public and the politicians is turned to climate change, research will conversely determine which orientations should be given to economic and industrial activities, and even to defence ones, which are supposed to be built to preserve global safety.

Some conservative lobbies reacted, preferring their “business as usual” game to long-term perspectives. Exxon financed several experts to bring controversy to IPCC statements. But even in the oil business, this “Texan” attitude appears isolated. The Europeans Shell, BP, Total and even in US Chevron are taking several initiatives to prepare the post-carbon society. The future enormous incomes due to the peak oil and the following price increase will probably be used to convert these companies to new jobs.

3.5.2 The IIASTD: reshaping research and agro policies

In April 2008, the International Assessment of Agricultural Knowledge, Science and Technology for Development presented its report in Johannesburg⁷⁹. It appears also as a turn point in agricultural management philosophy, a central input to European commission policy⁸⁰. Here is a meaningful extract of its executive summary:

“For many years, agricultural science focused on delivering component technologies to increase farm-level productivity where the market and institutional arrangements put in place by the state were the primary drivers of the adoption of new technologies. The general model has been to continuously innovate, reduce farm gate prices and externalize costs.

This model drove the phenomenal achievements of Agricultural Knowledge Science and Technology (AKST) in industrial countries after World War II and the spread of the Green Revolution beginning in the 1960s. But, given the new challenges we confront today, there is increasing recognition within formal S&T organizations that the current AKST model requires revision. Business as usual is no longer an option. This leads to rethinking the role of AKST in achieving development and sustainability goals; one that seeks more intensive engagement across diverse worldviews and possibly contradictory approaches in ways that can inform and suggest strategies for actions enabling to the multiple functions of agriculture.”

In other terms, the time of agricultural policies that were only productivity driven is over. After the post World War II period, another set of policies have to be built in order to fit the real needs, in other terms to face climate change and reduce poverty. Recognition of the value

⁷⁹ A video presentation is available at <http://www.youtube.com/watch?v=B-0B4Z-7A4s> and many comments are published on Internet.

⁸⁰ See also the FFRAF (Foresighting food, rural and agri future), issued by DG Research in 2007.

of traditional knowledge is necessary for that purpose. In the discussion following the presentation the Indian vice president, Ms Rajeswari Raina, completed saying that the objectives stated in the reports would inevitably lead to completely redesign agro-food research policy.

3.6 The rise of NGO's

In front of the business system, the power of NGO's has grown. As quoted by Toffler, they now mobilise high-level scientific expertise, and are able to organise lobbying as well as the companies. One of the basic example of the "environment defence fund", who succeeded not only in eliminating DDT, but also in forcing through the court, Mc Donald's to clean the streets where customers had thrown their Mc waste, shows that they can face heavy vested interests.

The number of NGO's operating at international level is estimated around 40000. Some countries, like India, would have more than one million NGOs. "They were important during 19th century in the anti-slavery movement and the movement for women's suffrage, and reached a peak at the time of the World Disarmament Conference. However, the phrase "non-governmental organization" only came into popular use with the establishment of the United Nations Organization in 1945 with provisions in Article 71 of Chapter 10 of the United Nations Charter for a consultative role for organizations which are neither governments nor member states".

In spite of this article 71, NGO's are not yet subjects of international law, except the Red Cross. Only the Council of Europe in Strasbourg drafted the European Convention on the Recognition of the Legal Personality of International Non-Governmental Organizations in 1986, which sets a common legal basis for the existence and work of NGOs in Europe. Article 11 of the European Convention on Human Rights protects the right to freedom of association, which is also a fundamental norm for NGOs.

The decline of the Nation states started at the time of the cold war. Small nations appeared easy to manipulate by the block leaders. Since that time, the centralized media broadcast favoured the influence of lobbies, even in big countries.

Internet generates a different situation, in which trans-national networks favour the coalition of common views. The resulting trend should be a growing influence of the NGO's that will appear more reliable than nations to take in charge at least humanitarian and planetary concerns. This logic should promote their recognition as subjects of international law under conditions to be defined probably by United Nations.

3.7 And what about "policies"?

The ability to search for worldwide connexions and state of the world information opens a new landscape to any citizen. Even now, through Google earth, she/he, from a global view of the planet, zooms to her/his own cottage. She/he owns the cottage and, at the same time has a direct perception of belonging the whole earth.

The consciousness of the citizen is enlarged by seeing and even more by acting. The time horizon differs according to the personalities and is also reduced by the constraints of daily life. But a free citizen would think at least one generation ahead to preserve the future of her/his children, though the time horizon of a politician is limited by the next election and the time of big company's managers by budget announcements and the financial raid risks.

As a consequence, most advanced initiatives are taken locally at individual or municipal level, the closest to individual consciousness. In Europe, the example of Freiburg am Brisgau

building a new ecological suburb (quartier Vauban) is well known. Other cities joined in a network the same inspiration and learned from this Vauban experience.

Starting from this example, it may be stated that the first policies in the new cognitive civilization follow the commandment: “Think globally, act locally”, but what about other levels of policies? In any society, policies depend on the consciousness of the public. Even dictatorship can continue only if the public tolerates. As public consciousness is evolving rapidly, policy makers will have to listen first.

They will probably find that the trust granted to the former institutions is declining. The firms are suspected to give priority to financial results and having little care for their employee’s safety. The states are suspected to multiply bureaucratic constraints and to act in favour of vested interests. These institutions will have to rebuild their image acting differently.

Many technical responses to planetary issues are already experimented around the world. Energy or GHG taxations, forestry control, protection of endangered species, fishing quotas, agencies in charge of helping energy saving or water management... Probably the main weakness remains in the warning, measurement and observation system. The fact that the number of different species on earth being estimated around 14 Million, out of which only 1.7 Million are known and described shows the carelessness of mankind.

Anyhow, the consciousness of the public regarding nature care is becoming more and more attentive. The policy builders will have to follow. The time when qualified officials felt they could know better than the public what is good for him is over. The public is on an immense web, linked to all sorts of knowledge.

3.7.1 The challenge to reason

Anyhow the time scales regarding the physical transformation of environment and human settlements are also widely different.

Presently the order of magnitude of the delay to:

Conceive and manufacture a new car	5 years
Build a high-speed train new line	10 years
Build a new city	20 years
Replace a cement plant or a nuclear plant	30 years
Shift to a hydrogen economy	50 years
Replace an over exploited forest by a new one	100 years

But⁸¹ the world might not have so much time before the energy crisis that may occur before 2025. It will not be a shortage of carbon. A “peak oil” is predicted, but there is enough coal supply to match consumption needs for more than a century. The restriction to GHG emissions for climate control will be the major argument⁸² to change the present energy system.

In some cases, old cities for instance, the transformations (isolation) to be made would be so costly and difficult to operate that it is almost impossible to define a time scale. The question anyhow will certainly be examined for all the skyscrapers built after the 60’s poorly isolated and even bearing asbestos (that was the case of the New York World Trade Centre)

⁸¹ As observed by Jacques Theys

⁸² This argument gets weaker if, as stated in Irina Kuklina’s paper, CO2 concentration is only partly due to human activities and global warming is also related to solar cycles.

The challenge to reason is therefore to adapt institutional organisation to physical realities. “Our political organization was designed for another world⁸³”. For instance, to solve local problems, like sewage or waste treatment there are local taxes. But to solve planetary problems like GHG emissions there should be planetary taxes⁸⁴ and worldwide agencies to use these tax money to help economic actors in reducing their emissions.

In other cases, like preventing oceanic ecosystem destruction by excessive fishing or pollution, financing is needed, but will not be sufficient. An international police force is also necessary. The same question will be raised for tropical rainforests, in that case operating over the sovereignty of great countries like Brazil, Indonesia and the central African countries.

Going back to physical reality, regarding taxation or intervention, the basic tool needed is a world detailed and precise observation system using satellites and other military observation equipment to detect the damage and even the risk and operate early intervention. This world force would also be able to rescue rapidly the population victim of hurricanes or other natural diseases.

Having these physical realities in mind, the present state of the world organization based on the nation state heritage may appear archaic to the younger generations born connected. A negotiation to build something else may start when they will be on power.

Leaving our mind dream⁸⁵ about it, we see NATO transformed into a world preservation and safety force, including the participation of Russia, China, India, Brazil and Middle East countries, placed under the authority of UN. We see also UN transformed⁸⁶, with a college of NGO’s and a third one for the business community. We see a WEO (World Environment Organization parallel to the WTO) to which this new force and warning system is the operational arm.

4-Other games are played

4.1 National and cultural identities

The person-to-person relationship through the web deeply transforms the landscape of solidarities. Roughly speaking, new solidarities are not relying on political, social or economic assumptions, but only on daily life exchanges, that appear to be based on three basic sharing:

The sharing of a profession

The sharing of a passion (for instance horticulture or surfing)

The sharing of a language and of a culture

We can already see some consequences of this third point: the revival of local languages and the claim for more independence for **local cultures**. The case of Belgium in 2007 is

⁸³ Joao Caraça intervention

⁸⁴ The sophisticated market mechanism that has been settled is financing intermediaries, but the assessment of the realities is lacking and the incentive stays weak.

⁸⁵ As shown by the well known Martin Luther King “I had a dream”, reason appears through dreams.

Mathematicians are well aware of that.

⁸⁶ Probably very small nations grouped and placed under international control to impose world regulations, regarding particularly finance.

particularly well known, but Spain has had also claims for autonomy in Catalunya, Galicia and Euskadi, Great Britain in Scotland and Wales, France in Corsica and Brittany, Italy in her northern league, and Czechoslovakia has been peacefully shared into 2 different nations.

The fact that Belgium has been able to function normally without government for half a year shows that the old structures, though still respected, are less necessary. If we imagine 2025, a **mosaic** of local cultures may be more likely than a federation of nation states. Europe may turn to a linguistic and cultural melting pot. Internet accelerates the revival and diffusion of local cultures and traditions. It is likely that the nation state type of organization, built in the 17th century to help ending the religious conflicts in Europe⁸⁷, and imposed later to colonized continents, will be progressively replaced by multiple affiliations, the shape of which is to be defined.

Internet crosses the barriers. It offers communication opportunities to people bearing the same culture but living far from each other, to retrieve their ancestral roots and rebuilt solidarities. Anyhow, local claims of minorities for independence, like the ones of the Kurds, the Ouigours, the Berbers, the Aborigines, the Inuits, most African and Amerindians ethnic communities, will be reinforced by the opportunities to illustrate and develop their culture and solidarity through Internet.

It will be more and more difficult to control and/or eliminate their claims for independence, as it has been done during 19th and 20th century, because of the numerous opportunities given by the web to escape any type of control.

To sum it up, digital communication should stimulate worldwide cultural solidarities and claims for independence.

4.1.1 Identities: China⁸⁸, Russia⁸⁹, India, Brazil, US, Europe

Europe has a high level of equipment in personal computers and connexions, and therefore will experiment the transition before the other continents. Anyhow, the question will progressively be raised worldwide. Most countries include a wide diversity of different cultures. Some African countries have more than a hundred different languages, South, middle and north Americans have hundreds of Amerindian cultures still alive and Russia (128 “national” ethnic groups), China (54 ethnic groups), India (23 official languages, some 4000 dialects) include also huge cultural diversity, as well as middle east and central Asia.

Anyhow, some countries/regions are under the domination of one ethnical culture, progressively built during centuries, even millenniums:

China by the Han imperial one, inspired both by Confucian duties and Taoist doubt.

Russia also by a central Russian imperial view, rooted in the orthodox religious inspiration.

United States have lived for 2 centuries under the WASP culture inherited from Great Britain, very different from the Chinese and Russian ones. Now, with the growing weight of the immigrants and their sons, US are becoming multiethnic: deep changes have to be expected during the following decades.

⁸⁷ Westphalia treaty, Oct 24 1648.

⁸⁸ See Mu Rong Ping contribution on technology foresight in China

⁸⁹ See Irina Kuklina contribution

The two main **multicultural and multiethnic** blocks are India and Europe, both supporting diversity and in quest for democratic and spiritual values. It is likely that, during 21st century, these two similar continents will try to promote the same universal values at world scale.

In spite of some Islamic attempts to restore a common destiny through religion and language, a wide part of the world stays a mosaic with no separation of powers, ruled by local barons. The prediction made by Samuel Huntington, namely the “clash of civilizations” Islam facing the western world may be still present in the mind of some excited cold warriors, but does not fit the understanding, nor of the majority of Europeans and Indians, nor of the majority of Muslims⁹⁰.

The present trend, due to the growing density of the communication network, is a slow decline of the nation state, which stands as a recent concept in mankind history, issued from the Westphalia treaty in 1648. The new generations, born with a laptop, will give their full potential in 2025. And they will act through new structures.

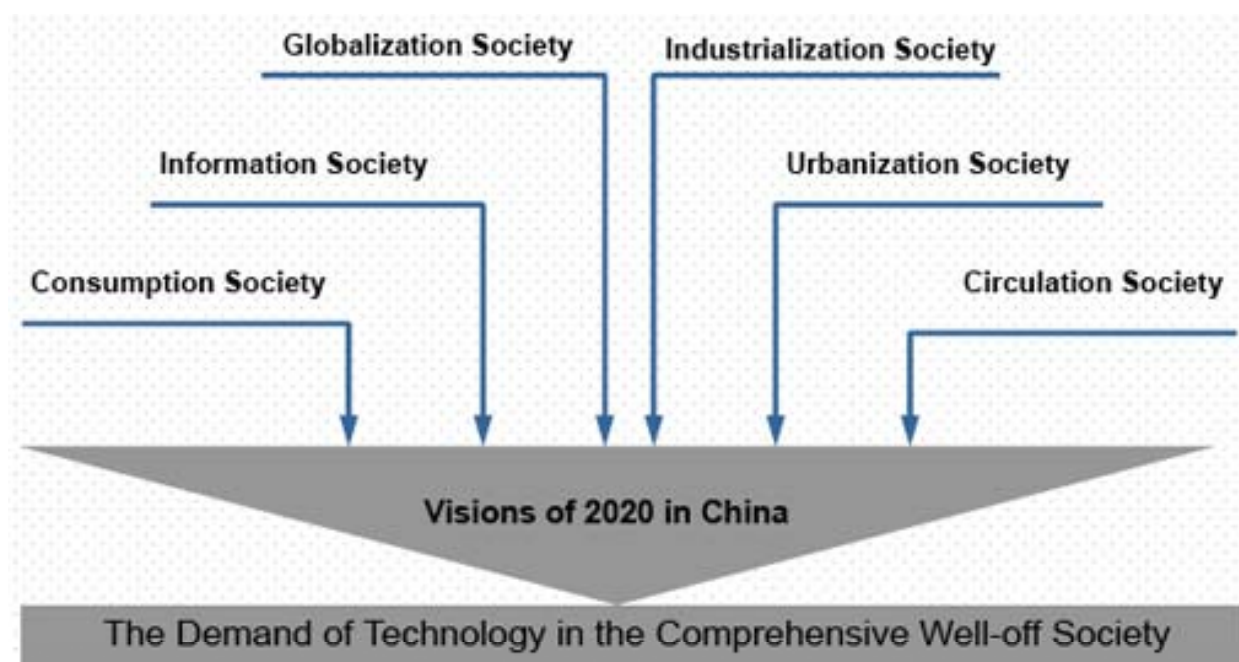
Through these new media, a revival of ethnic identities is to be expected. These bear not only claims for independence, but also music (Celtic, African, Indian..) which is the language of soul, traditions and philosophies of nature and human relations.

For instance, the Chinese vision of society is different from the “democracy” invented by the Greeks, though it includes Confucian duties for the dominants, judicial processes and limits to excess of power⁹¹. The millenary civilization of this part of the world has its own views and its own techniques to solve problems. It would be unwise and unrealistic to try to transfer there the western “democratic” model, which is only at work since industrial revolution, and may even be maladjusted to the new cognitive civilization.

⁹⁰ Huntington position has been recently refuted by an in depth inquiry of Emmanuel Todd and Youssef Courbage, who conclude that the Islamic countries are moving towards a separation of religious and civilian powers “Le rendez-vous des civilisations, Seuil, 2007”.

⁹¹ See “La chine et la démocratie”, Mireille Delmas Marty et Pierre Etienne Will, “La pensée chinoise”, Anne Cheng and the 2007 Euro-chinese meetings organised by European Commission and Fondation Charles Léopold Meyer.

Here is a contemporary foresight from the Chinese academy of Sciences:



Technology foresight scenario building in Chinese Science Academy from Mu Rong Ping

The Integrated index of importance of this Chinese technology foresight exercise, published in 2006 is calculated according to three indicators such as “contribution to economy increase”, “improve the quality of life” and “contribute to the security system”. According to the integrated index of importance, the **most important 10 topics** for China are following:

- 1-The solar cell will be developed successfully, which transfer efficiency reaches as high as 50%
- 2-The new technology about biological energy will be developed successfully, which can continuous produce ethanol with straw, biological diesel, hydrocarbon compound and so on
- 3-The metal material obtains the large-scale use, which has nature of high intensity and light weight.
- 4-The most security and cheapest control technologies of large-scale electrical network obtains the widespread use
- 5-The technologies about biology processing and mining for crude oil develop successfully;
- 6-The anti-viral medicine with highly efficiency applies to clinical medicine widely
- 7-The technologies about biochemistry, immunity, and gene etc. applies to food quarantine widely
- 8-The important character gene which decide the yield, quality and resistance of crops obtains comprehensive annotation and get practical use with biological technology
- 9-The 10nm processing technology obtains widespread use in the scale production, and integration rate of the integrated circuit achieves the 1000G transistor
- 10-The defence and monitoring system of harmful biology will be established for public security.

The above graph and list show that, regarding foresight, the methods used and the problem raised are the same in China than in other countries. Cooperation and mutual understanding⁹² appear highly feasible concerning the future.

The Indian organization has imitated the western democratic system, but the Indian vision of society, with the castes, the religious and philosophical references and the relationship to nature is different, and may be closer to the nature care necessity than the present western exploitation attitude. Teachings of wisdom may be imported from India.

⁹² As shown by the experience of the China European forum, organized by the Charles Leopold Meyer foundation in late 2006. See also “La Chine et la démocratie” by Mireille Delmas-Marty and Pierre Etienne Will.

Therefore, anyone trying to imagine the feasible future world organization should give up the idea of one dominant model, and look deeper into the soul of the different civilizations.

4.1.2 Evolution of religions

In 1993, Samuel Huntington, Science policy professor at Harvard and former secretary of the NSC⁹³ published “the clash of civilizations”. According to his analysis, the former conflicts were between nations and then blocs during the cold war. The conflicts in 21st century will be based on ethnical and religious cleavages. More precisely, the two blocs of the cold war differed in ideology. The Fukuyama thesis describing “the end of history”, a worldwide civilization based on trade and democracy⁹⁴ is, according to Huntington, not realistic. There will be new differentiations and these should be “cultural”. He stresses particularly the tension between United States and the Islamic world, and also between United States and China. As shown by the map below, religion is the main factor of this cultural divide.



The world seen by Huntington (source Wikimedia copy left)

Looking from 1993 to 2008, Huntington’s prediction appears not completely false, but clearly exaggerated. And, as it has inspired military and secret service thinking in US, who supported Islamic movements through ISI⁹⁵ when they were fighting against Russia, it is difficult to share real conflict from manipulated conflict.

Referring to the origins, opposing Islam to commercial values would be a complete misinterpretation. The first wife of the Prophet possessed caravans and was issued from an Arabic great trader family. Anyhow, there is an important common attitude to Jesus and Muhammad: Jesus chased the merchants out of the Temple and Muhammad chased the merchants out of the sacred city Mecca. Both tolerated trade, but not abuse in confidence, exploitation of superstitions and credulity. On that point at least, their teachings as Gilgamesh one, have to be revisited by modern world.

⁹³ National security council, direct advise to the President on military and intelligence affairs.

⁹⁴ The thesis of Fukuyama, “the end of history”

⁹⁵ ISI is the secret service of Pakistan.

Religion foresight must also take into account that all religious positions try to explain the meaning of life and the reasons for survival. Monotheist religions have been accompanied by aggressive behaviour. They were born in Middle East, at a time when city-states were fighting each other under the symbol of their respective gods. Afterwards, even tiny cleavage on doctrinal points, like the ones separating Roman Catholics; Protestants and Orthodox were sufficient to motivate religious wars.

The situation in 21st century looks different. Above national, ethnic or tribal survival appears the question of global survival in relation with ecosystem equilibrium and climate change. No one can escape this question and everyone has something to do with it. The shift from local to global safety has already been understood by some religious authorities. It is likely that one generation will be necessary to place symbiosis with nature in the centre of religious concerns⁹⁶.

Conversely, Internet will give new opportunities to embezzlers, sects, and many other types of abuse, against which the individuals will have to rely on their own alertness. As said formerly, new types of mental illnesses should appear generated by the identification to avatars in virtual universes. Personality may split into different characters weakening or even blurring the distinction between reality and virtual universes⁹⁷. This part of the landscape is, of course, more difficult to predict.

4.2 Conflicts as rule generators

4.2.1 High probability for new wars or new types of wars

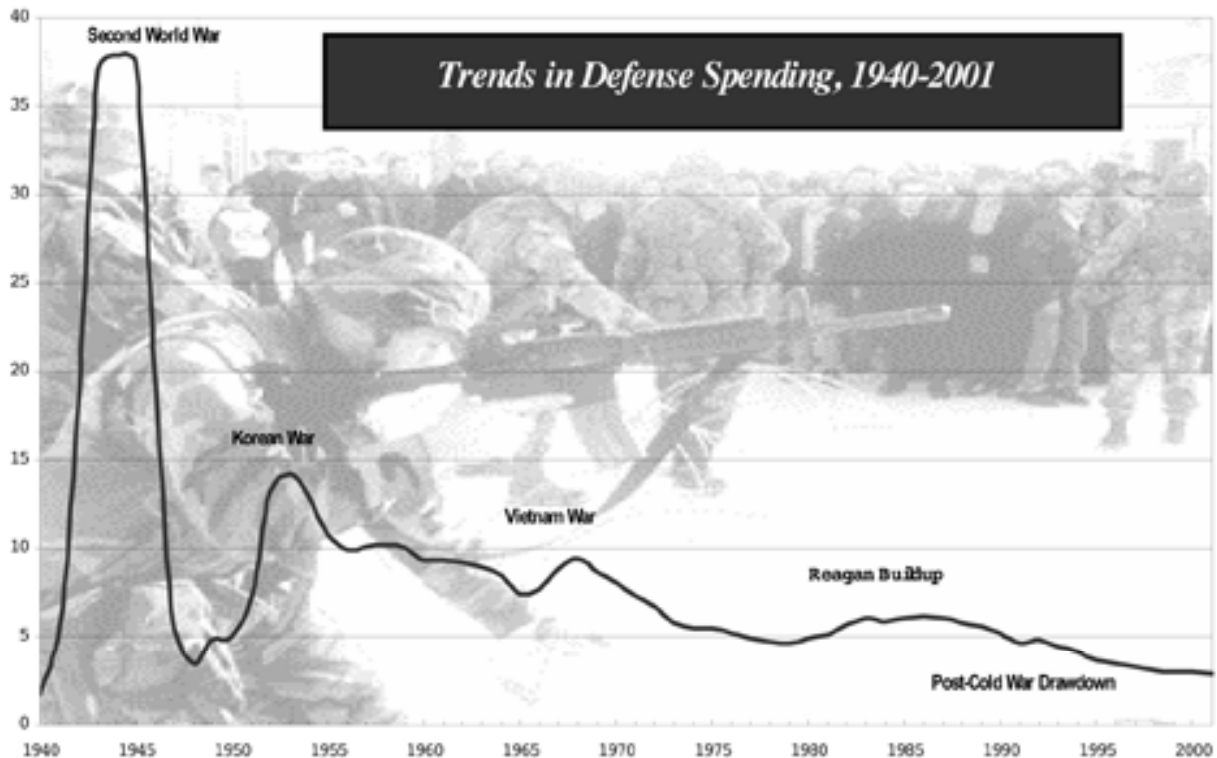
“Anyhow, there are increased risks for open conflicts among nations - or among groups of people - around capacities as arable land, access to fresh water, and settings for production and livelihood not disrupted too much by climate change or changes of other kinds as presence of industrially distributed toxic chemical deposits. The tensions may especially increase around food and energy availability”⁹⁸.

In 2025, the generation of the cold warriors will be retired or dead. Samuel Huntington would be 98 and George H. W. Bush 101, Henry Kissinger 102. The lobbies behind will still be there but with a new generation better informed which may not have the same simplistic views.

⁹⁶ As it was predicted by James Lovelock in “The ages of Gaia”.

⁹⁷ Defence Intelligence Agency on Emerging Cognitive Neuroscience and Related Technologies (2008)

⁹⁸ from Nicole Gnesotto contribution



America's defence spending since WW2

(source "rebuilding America's defence" from the "New American century" group, 2000)

The document "Rebuilding America's defence"⁹⁹, was issued in year 2000 by a group known as "the new American century", belonging to the so called "neo-con's" movement. It gives in the above graph the evolution of the magnitude of the US military spending since WW2. The document says that the role of US is to control the world and, for that purpose its military equipment should be duly upgraded. Follow a list that has been progressively honoured by the conservative administration.

For our scenario building, it is useful to rethink the meaning of the conflicts since the Second World War. Of course, many interpretations are possible, and the complexity of the situation should not be oversimplified¹⁰⁰. Anyhow, let us remind a very simple interpretation, that is not the only possible reading of history, but has the advantage to be based on one simple hypothesis: the actors involved follow their own interests without consideration to other constraints.

"In 1945, US and Soviet Union ended the war with an enormous over-capacity in weapon manufacturing. As these capacities were ruled by the heroes, and had produced on economy a powerful Keynesian revival, it seemed unacceptable to stop their activity. The heroes could not be reduced to unemployment.

The "cold war" has been initiated by the post war lectures given by Churchill in US. He pointed the "iron curtain" separating Eastern and Western Europe and argued that a new enemy of freedom had to be fought. Seen by the weapon manufacturer lobby, the cold war was an invention that could mobilize, on both sides, the taxpayer's money.

⁹⁹ The graph above comes from this report, to which Paul Wolfowitz contributed.

¹⁰⁰ As says Nicole Gnesotto

The nuclear threat was more than necessary to frighten the public and obtain the votes of the politicians. It had another advantage: nobody really wanted to use nuclear weapons, because it was too dangerous¹⁰¹.

As a consequence, a lot of money could be spent, and that was the real goal of the game, without even using the weapons. It may have saved a lot of human lives in the developed world. Anyhow, the tension had to be maintained in order to demonstrate the “credibility of the finger”. Korea, Viet Nam, which suffered important losses, and Cuba served this purpose. Even lost by US armies, these wars were sufficient to prove US determination in case of a broader conflict.

During the 60’s and 70’s, the technology of the so-called “satellite countries” governance through secret services management was implemented on a large scale, first by Soviet Union in Eastern Europe, then by United States in South America (Chile, Argentina..) and even in Greece.

The game ended after Reagan’s “Star war”, when Andropov, followed by Gorbachev, started to dismantle the soviet system, probably because they found it too costly and weighed down by gerontocracy. But, on the American side, the symmetrical move was out of scope. Eisenhower, when leaving the presidency, had warned the risks of the growing influence of the weapon lobby. He was right, but his warning had been useless: at the beginning of the 90’s, under father Bush, former CIA director, US were governed by lobbies.

Anyhow, as shown by the above graph, the Clinton administration succeeded in lowering to some 40 billion \$ the annual defence procurements, compared to 150 under Reagan administration. But the lobbies came back in 2000. The total US military budget in 2007 is at a level of 439 billion \$ half of the total world military spending, plus an extra budgetary supplement of 170 billion to cover the expenses in Iraq and Afghanistan.

Through the financing of elections, lobbies can influence any government decision. At the beginning of the 90’s, their basic concern was, as ever, to continue their activities in production and research, and, for that, they had to find another enemy. Huntington theory could help: Islamic terrorism to which twin towers collapse was immediately charged. The destiny had provided the “Pearl Harbour” event that was, according to this “rebuilding America’s defence” report, necessary to obtain the vote of the necessary procurements by the Senate.

But it may be not sufficient to feed the enormous needs of the high tech lobby of weapon manufacturers.¹⁰²

Until 2025, conflict foresight has to take into account the global movement of privatization of the military concerns. Not only weapon manufacturing went private, and started to disseminate its supplies in different countries, but also troops, managed by companies like Halliburton or Blackwater. And weapon international trade tends to work as ordinary business, stimulating its market through the different available persuasion channels. The European and the Russian products were not out of the game, particularly for small size weapons (AK 47 is the best known¹⁰³). The Russian ones have been distributed by well-known intermediates, like Viktor Bout¹⁰⁴ who brought the unused supplies of the Russian side cold war to African dictators.

What may be the landscape from now until 2025, staying on the track of the continuation of the lobbocratic trend?

¹⁰¹ Unfortunately, it may not be the case anymore for the “mini nukes” developed by US. These are by far much more worrying than the “massive destruction weapons” that Americans pretended to look for in Irak.

¹⁰² This part of the report has been put between “” because it cannot be endorsed by all the members of the expert group. Anyhow, as quoted before, it represents a particular simplified view of the situation.

¹⁰³ Under the name of the general who invented it Kalachnikov.

¹⁰⁴ Whose story has inspired a film, the “Lord of war”

In December 2000, the US National Intelligence Council could publish his “global trends 2015”¹⁰⁵. It stated that “US global economic, technological, military and diplomatic influence will be unparalleled among nations as well as regional and international organizations in 2015.” This statement is now to be revised. Most experts predict a “**multipolar world**” in which the domination of US will belong to the past and suffer the reminding of its many abuses. Not only Russia, but also China, India, Europe Japan and some countries in Middle East will recover their military sovereignty.

The resulting complex situation may inspire some countries to push NATO, presently under American control, under the authority of United Nations. Anyhow, understanding the situation needs first to analyse the possible behaviour of the lobbies.

To measure the power of the US weapon lobby, one should remind that the procurements at his benefit represent more than 360 billion \$ per year, an amount comparable to half the US external trade deficit ¹⁰⁶(~750).

When the weapons are manufactured, tested and operational, the remaining question is “will they be used, and if yes how, where and when?” In spite of the massive diffusion of war games in the public, there remains little enthusiasm for using weapons in the real battlefield. The US army recruits painfully and, even in places where it is not facing organised and equipped forces, like Iraq, it looks rather unsuccessful.

Anyhow, it would not fit the lobby’s interests to leave these armaments unused. In 2008, the weapon export of United States increased by 45%. A conflicting multipolar world is now under preparation. Sophisticated scenarios and gesticulations may be necessary to invent, with the help of some Hollywood movie directors. The old well-known Russian partner may also be involved in the game. First signs appear during summer 2008. To sum it up, before 2025 we might be surprised.

The heaviest consequence of lobby’s influence is that **any scenario which would forget to feed the lobbies with sufficient procurements is to be considered as unrealistic**. It can only be imagined to **shift their productions** from weapons to something else, under one condition: maintain the margins at the level they are. But they will probably resist and try to continue selling the equipments that they are used to manufacture.

But what else could be ordered with the taxpayer’s money, using the high tech qualification of these companies? If the use of public money shifts from local or tribal safety to global planetary safety, the answer is clear. High tech resources can obviously be used at the service of common global good, and there is enough work in that field to give occupation to the workforce concerned. More **science** is needed, using new or reinforced measurements of the planet evolution. A world **space** program, aimed at planet ecosystem warning and analysis would be a first example. Ground intervention is also necessary, on land as well as at sea: an international force, **protecting** the oceans and the biodiversity from business predation is another example.

4.2.2 The way rules emerge from conflicts

In 1938, the Dutch philosopher and historian Johann Huizinga published his masterpiece, “Homo ludens”. His central idea is that humans are always playing games.

¹⁰⁵ Global trends 2015, published by the national intelligence council of United States, an organ of the CIA, after consultation of non government experts, mostly academic.

¹⁰⁶ A fact that some disrespectful European citizens translated as: if US military effort is paid by the rest of the world, their troops should be under international legitimate control.

They play roles in their family, in their job, with their friends... Later, the same idea has been developed by the psychoanalyst Eric Berne, founder of the “transactional analysis” in his book “Games people play” (1973).

This game playing interpretation gives the opportunity to imagine outcomes to conflicting lobbyocracy, but raises another question: how are the rules established? Huizinga answers through an example: in middle ages, the practice of tournaments, bordered by precise rules of conduct, served as substitutes for battles. The clash of the champions was accepted as definition of the issue, and this appeared to Huizinga as a progress in civilization, because it saved human lives.

Apart from this particular “fight of the champion” rule, the noticeable point is that rules emerge from practice. In that case, the battle is turned into a symbolic battle, the champions representing their clan. Many other examples of such ways to peace may be found. The Olympic Games are symbolic battles. Following the intention of their founder, they highly contribute to create a peaceful climate between nations.

Economic competition may also be viewed as a derivative for human aggressiveness. In trade also, conflicts inevitably appear. And the reliability of transactions, and consequently the intensity of the commercial activity, is depending on the reliability and efficiency of the conflict settlement process.

Viewed through Huizinga’s game approach, **the market is one of the games invented to match heterogeneous interests**. But the other basic game should not be forgotten: **arbitration and courts**. This one cannot be avoided, because it is the place where investigations are presented and where the respect of the rules, including the rules of the market, is verified.

Therefore, the most interesting case, regarding foresight, is the settlement of **judicial** processes. Here is for instance, a sentence out the Hammurabi code, which was written in a market environment, the one of the future Silk Road, in order to help solving merchant contests:

“If any one lose an article, and find it in the possession of another: if the person in whose possession the thing is found say "A merchant sold it to me, I paid for it before witnesses," and if the owner of the thing say, "I will bring witnesses who know my property," then shall the purchaser bring the merchant who sold it to him, and the witnesses before whom he bought it, and the owner shall bring witnesses who can identify his property. The judge shall examine their testimony—both of the witnesses before whom the price was paid, and of the witnesses who identify the lost article on oath. The merchant is then proved to be a thief and shall be put to death. The owner of the lost article receives his property, and he who bought it receives the money he paid from the estate of the merchant.”

When Kuwait was invaded by Iraq, in 1991, some experts claimed the case should be brought to the International court of justice, which is designed to arbitrate litigations between nations. But, at that time, the world was not mature enough; it still lived under the primitive idea of the “law of the strongest” and nor the International court, nor the United Nations were consulted.

4.2.3 What kind of rules could be foreseen?

Most experts¹⁰⁷ agree on the idea that 2025 will be a “multi-polar world”, in contrast with the 1990-2005 periods where the United States appeared dominant, some say hegemonic, on military, economics and politics fields.

At least China and India should first balance American power and maybe some sovereign funds from Middle East.

¹⁰⁷ At least in the working group who prepared the present work.

Europe, Japan, Russia and Brazil should be present too, with their independent voices. A multi-polar world may be highly conflicting¹⁰⁸. The present circumstances: increase of weapon exports, dissemination of weapon manufacturing, and privatization of operators, are pushing that way. Even terrible events like the genocides¹⁰⁹ of 20th century may occur. But, if we follow Huizinga's logic, in a second stage rules of the game are settled, there is no more the "law of the strongest" because even the strongest¹¹⁰ has written his law in the shape of rules. The settlement of conflicts needs the progressive and pragmatic building of something looking like a state of law.

The general framework of the rules of arbitration is well known. Judges have to be independent (not nominated by any executive power), investigations have to be operated as scientifically as possible, testimonies have to be balanced and objective, the rights of defence respected etc...

And the executive force has to be at the service of the legal decisions.

4.3 Mafias, organised crime and terrorism

To complete the historical game building vision of Huizinga, one must quote the permanent tendency pushing the opposite way. In any place where rule enforcement weakens appears transgression behaviours, like entropy in physics, outlaw that, in case of conflict, move to refer to the law of the strongest.

Mafias are built out of this logic. They substitute absent legal power. During the last 50 years, nations got weaker, except some superpowers that did not escape the temptation to manipulate national governments through their secret services, often for business purposes. Some companies became stronger than nations and after a while, even the greatest countries fell under the influence of lobbies. We named that evolution the transition from democracy to lobbyocracy.

At the same time, the illegal activities proliferated: drug traffic, human traffic, corruption, blackmail and so on. Mafia incomes went up to several hundred billion \$, and it took different shapes: Camorra in Naples, Cartel in Colombia, Triads in China, Yakuza in Japan, Organizatsiya in Russia, Milieu in France and the Italian name Mafia in United States.

Michel Levine, a former agent of the DEA (US Drug Enforcement Administration), writes: "In 1971, when President Nixon declared the war to drugs, there were less than half a million drug addicted in United States. At that time, the anti-drug budget did not go over a hundred million \$. Thirty years and a thousand billion \$ later, the number of addicted is over 5 million and the war against drugs costs 20 billion \$ per year"¹¹¹

Terrorism uses similar methods like blackmail or drug traffic. The difference lies in its political or religious claim, which challenges the official powers. Therefore, it is treated as an enemy by governments and made visible by the media. Anyhow, some analysts, familiar with game theory, add to this naive political interpretation another aspect. Providing a visible enemy renders a service to the vested powers. Like in Orwell's novel 1984, it generates in the imaginary of the public a remake of the eternal story of the struggle between the Good and the Evil out of which vast budget allocations can be claimed and decided.

¹⁰⁸ As quoted by Nicole Gnesotto.

¹⁰⁹ An analysis of the inclination of human species to perpetrate genocides has been presented by Jared Diamond in his book *The third Chimpanzee*.

¹¹⁰ As Hammurabi did, see 6.4.2

¹¹¹ Quoted by Eva Joly.

4.3.1 Mafiosi behaviour in business

Legal companies started to use mafia intermediates to solve some touchy local problems. The obscure part of business increased while “the law of the strongest” slowly and silently grew in the business community.

The process building rules out of practice is universal. It works even in mafias. This question is an important one regarding the period under our scope, from 2008 to 2025, because of this recent development of “mafia capitalism”. The IMF estimates the income of criminal activities between 700 and 1000 billion \$ per year worldwide (World GDP is 54000 billion\$). The amount introduced in the stock markets by these criminal organisations has been estimated around one billion \$ per day.

Seen from a distance, the present world looks like a state of anarchy¹¹² contrasting with the magnitude of the global problems it has to solve. But the consciousness of that situation cannot be avoided, and is carried everywhere by Internet. A scenario where the mighty ones, like in the “cupola”¹¹³, meet to find rules and solutions may occur, but will not be sufficient to convince the public.

4.3.2 Weakness and corruption in the nation states

Since 1993, a new NGO, called “transparency international”, created to “bring people together in a powerful worldwide coalition to end the devastating impact of corruption on men, women and children around the world. Transparency International's mission is to create change towards a world free of corruption”. This organization, based in Berlin, publishes each year a “corruption perception index”



Corruption perception index 2007 from Transparency International

Regarding the so-called “transparency” concept, this ranking reflects **visible** corruption, which is probably by far not the most important in volume. For instance, the influence of tax shelters does not appear, though these are involved in most high-level corruptions.

¹¹² See for instance Jean Ziegler, *Les Seigneurs du crime : les nouvelles mafias contre la démocratie*, Seuil, 1998.

¹¹³ Or at the trilateral, or in Davos...

Reminding the cases that have been published because they went to courts of justice, some activities like weapon trading, crude oil exploitation or great real estate operations seem to consider international corruption as an ordinary part of their job. This part uses tax shelters and stays undetectable. But it moves billions of \$.

A rough analysis has been published by Eva Joly, a judge¹¹⁴ specialized in corruption affairs. Corruption is as old as civilization, but it increased recently. She thinks that the first oil shock in the 70's has been the starting point of new financial circuits, due to the necessity for western countries to recycle the petrodollars. The order of magnitude of the sums concerned was enormous and confidential behaviour was made easier by the concentration of responsibilities in a very small number of hands.

The number of persons involved in this "high level" corruption stays low (she estimates around 2 per million), but the amounts have grown. In each case under examination, the accounting unit is the billion \$¹¹⁵. If you include the commissions in weapon delivery, which would reach in average around 20% of the contracts (compared to 6% for oil), the total amount of black money circulating would reach several percent of world GDP. But the accumulation of it through well known banks operating in tax shelters may reach the order of magnitude of the GDP of a great country. Even macro-economics should not neglect this fact, generating new types of fluctuations.

The word **transparency** at a first and naive glance may appear as an indisputable characteristic of the emerging cognitive civilization. But it should stay under careful examination. Worldwide communication is also used for non-transparent practices by non-transparent organizations. And this is made easier through the Internet.

Regarding this "**state of outlaw**", most governments define their policies with blind theoretical views, forgetting the practical necessity to implement their laws and regulations.

To illustrate this point do remind that the **dark side** of the Internet should not be forgotten. It includes many criminal activities, violations of human rights that are still staying out of control because of the weakness of most nations.

Even the simplest use of the Internet, the mail, is corrupted. It has been estimated that amongst the trillions of mails circulating on the net, around 85% are spam. The spam is a forbidden activity, but no nation state is **technically able to enforce** this interdiction. Only private development of anti spam software has been able to contain it. But the spam technology is also progressing. It looks like an endless technological war to exploit human credulity.

To conclude, the difficulty of the new type of governance needed in the cognitive society appears **highly underestimated**. It raises problems concerning police (Interpol) but also military questions, like for instance in Colombia, in the "golden triangle" or in some African countries.

Corruption is not a new phenomenon. But it has been boosted during the last decades to unprecedented levels. Its enormous increase is due to the concentration of flows of money in a small number of hands and also to the facilities given by information technologies to transfer secretly assets anywhere at any time¹¹⁶.

¹¹⁴ She is Norwegian, presently serving the Norway government, but her experience comes widely from France, where she had to lead the investigations concerning the oil company ELF during the 90's.

¹¹⁵ 4 to 10 billion for Mobutu (Congo), 4 for Abacha (Nigeria), 5 for Ferdinand Marcos (Philippines), 40 for Suharto (Indonesia), 5 to 10 for Saddam Hussein (Iraq), according to Eva Joly's book.

¹¹⁶ Regulations have been implemented to observe and control financial flow but at world level many places escape.

What is new is the order of magnitude of the non-visible financial flows, now big enough to destabilize medium size economies¹¹⁷. The assets handled by illegal means are also big enough to buy sophisticated weapons that may create some strategic surprises.

The perception of this “state of outlaw” is probably a major factor motivating the present distrust of the public¹¹⁸ that will force politicians to implement radical changes.

5-Some scenario building

A first attempt to build scenarios was made on 2008 June 2 and 3. A rather confuse debate between the experts produced a first choice of scenario definition. According to a global feeling that the key factors should be the rules of information handling, suggestions were made around the words transparency and regulation. Two groups were designed to imagine four scenarios.

- 1-Transparency without regulation
- 2-Transparency with regulation
- 3-No transparency without regulation
- 4-No transparency with regulation

Then, difficulties appeared about transparency. Some participants quoted that scenario 4, no transparency plus regulation lead to unbearable dictatorships. The scenario 3 found no time to be developed (despite the fact that “no transparency without regulation” looks like present international capitalist system).

Finally, only 2 scenarios were developed, both with transparency: regulation and no regulation¹¹⁹.

5.1 Transparency without regulation

1-The scenario “**transparency without regulation**” describes a world of permanent move, competition and multiplied choices. E-commerce, e-administration, new forms of democracy, collaborative work, are developed. Processes of governance without government appear with e-participation to collective decisions. It leads to better environment control, but also to dissemination of false fears. It is a world of free access, but also of social control and suspicion. There may be a risk of fragmentation of society in micro, self selected communities leading to segregation. The dissemination of weapons may occur also. Finally power may move towards non-transparent organisations like mafias. This proves that maintaining transparency needs regulation.

¹¹⁷ The speculation that took place before the settlement of the € and also the ones before on the £ do show how powerful are these flows, which are still growing fast.

¹¹⁸ “The perception that governments are not responsive to the popular will appears to be contributing to the low levels of confidence in government found around the world,” comments Steven Kull, director of WorldPublicOpinion.org. Kull adds: “Most see their governments as primarily serving big interests rather than the people as a whole.” The poll of 17,525 respondents was conducted between January 10 and March 20, 2008 http://worldpublicopinion.org/pipa/articles/governance_bt/482.php?lb=btgov&pnt=482&nid=&id=

The three votes refusing the European constitutional treaty, in France, Holland and Ireland, according to public opinion analysis, express more the general and international distrust in the ruling class than a distrust towards Europe. It seems that the ruling class, focused on its internal intrigues, has not paid enough attention to this evolution. In spite of a global pro-european feeling in the public, this ruling class has not been able to propose the simple, short and generous constitutional statements the citizens are waiting for.

¹¹⁹ The reports by Uno Svedin and Jacques Theys are in annex.

5.2 Transparency with regulation

2-The scenario “**transparency with regulation**” opened by the remark that a difficult choice is to be made in between too much regulation and too little regulation. This choice has to be solved in “transforming regulation”. When looking at more precise topics, the working group rapidly focused on interesting proposals. On environment the idea of a **WEO (World environmental organisation)** appeared by analogy with the WTO (World Trade Organisation, which would need redefinition). The **Intellectual property** rights appears also as a topic for re-regulation¹²⁰, particularly for drugs, software, culture and nuclear. Of course, calls for reform of **financial regulations** (tax heavens, Basel 2 or 3...) were not omitted. Regulatory bodies are drastically reformed. Finally, (meeting Huizinga’s approach), the situation appears by no means static. The interplay between regulation and transparency changes in time. Sometimes one factor is dominant, sometimes the other.

5.3 Three more scenarios

In a second stage, looking at the result of these two attempts for scenario building, the expert group felt unsatisfied. Another hypothesis was then put forward:

- **Regulation/deregulation**
- **Consensus/conflict**
- **Sustainability/growth**

Which provides 8 scenarios out of which only 3 were worked on September 9, 2008. The detailed forms filled to describe the scenarios on are given in annex 9. Before that, Gijs Beets had named the scenarios and tried a first demographic elaboration after 3 June 2008, given in annex 10:

5.3.1 *World Green Party Type*

The basic assumption of that scenario is that green regulation to sustainability is enforced but the resistance of the vested interests and the worldwide diversity of the situations generates a conflicting world. The basic hypothesis are:

More (global) regulation – Sustainable development – Conflicting world

Developed countries and large NGO’s impose environmental and climate regulations to the others, therefore conflicts. Environment and climate improve, sober access to fossil fuels due to the increase in prices. Conflicts also appear over land use, due to agro fuels demand competing with food demand, and also water scarcity.

Technically, this scenario assumes radical changes in the production and consumption systems. Environmental care is massively introduced in education. Better access to information through Internet facilitates the shift towards sustainable technologies and sustainable behaviour of the citizen.

New missions are designed for the military forces: protect environment, stop deforestation, rescue to environment refugees. New earth observation system using satellites allow an increased control of urban circulation, sustainability behaviours, climate devastating events and nature protection.

There is a significant increase in migrations. As a result, demographic heterogeneity is slowing down generating more convergence. The fertility rates diminish.

¹²⁰ Ref coalition for patent fairness <http://www.patentfairness.org>

The times are difficult for economy. It is hard to finance innovation, because of low economic growth. Global economic crises like the 1929 one is possible and collapse of mega cities too.

5.3.2 *Laissez-faire*

This scenario is to be considered as the “business as usual” one. The regulations stay as they are, the economic development is no more sustainable as it is. The world solves its problems through negotiation rather than conflict.

No further (global) regulation – Conventional growth – Consensus approach

In the presentation published by Shell in 2008, this scenario is named “scramble”. It says: “National governments, the principal actors in **Scramble**, focus their energy policies on supply levers because curbing the growth of energy demand – and hence economic growth – is simply too unpopular for politicians to undertake. A lack of international cooperation means that individual countries are unwilling to act unilaterally in a way that will damage their own economic growth. The result is a relatively uncoordinated range of national mandates and incentives for developing indigenous energy supplies where available, including coal, heavy oils, bio-fuels, and other renewables, which leads to a patchwork of local standards and technologies.”

Climate change is speeding up and damages to ecosystem too. Migration increases and urbanization too. But sociology stays heterogenous. Everyone goes back to his own corners of civilization. People adapt themselves to fluctuations in the oil prices. Market forces are dominant. Most public services are privatized or sub-contracted to the private sector. Large multinational companies dominate the world. Economic governance is implemented at the world level. The two countries that benefit most from globalisation, USA and China are reinforced.

5.3.3 *Shell Blueprint Scenario*

The “blue print” name given by Shell to its second scenario presented in 2008 as a contrast with “laissez-faire” illustrates the idea that, if dominant forces are in the hands of conscious leaders, they will negotiate a reasonable and peaceful path to sustainability.

More (global) regulation – Sustainable development – Consensus approach

This scenario looked as a stimulating challenge to the group of experts, more stimulating than the other 7 possibilities offered combining the 3 factors with 2 possibilities for each.

The world, in this scenario, escapes recession implementing a Marshall plan for global environment, including huge public works and housing regeneration to improve the energy efficiency in the cities and the quality of life. Important education programs are launched, particularly in Africa in order to stimulate local development and limit emigration.

Decentralized economic policies favour the development of networks of middle size cities at regional scale. Urban sprawl is under control. Following the objectives of the millennium, the proportion of poor people at world level is reduced by 30%. The world population is expected to stabilize around 8 billion by 2050.

The Marshall plan has curbed the increase in temperature. A new techno-economic paradigm emerges. Research attracts talented young people. Solar energy and energy saving are the two new pillars. After several climate damages, hurricanes, floods and droughts, most countries accept to reduce by factor 2 their GHG emissions. The Marshall plan is funded by an international tax. It saves the recession through huge coherent investments.

There is a slight reduction in international trade, but increased employment in the energy sector, including energy saving technology. The present measurement of growth is abandoned. A new frame is set up to account the “real” GDP, including self-production and services rendered by nature. The analysis of saturations and compulsory expenses is also developed in order to offer a better evaluation of the citizen’s freedom. A new type of Internet is settled: open access for an open society.

Role of WTO and IMF increases. The roles of the different institutions are enlarged and redefined. Europe becomes a major actor on the international scene.

6-The challenges

In this last part of our report, we focus on the challenges that we feel the world will have to take up during the next 17 years. According to the data we presented in the first part, a “business as usual” scenario would appear both unrealistic and dangerous, leaving consciousness asleep when future disruptions are ahead and must be anticipated.

As quoted by Ann Florini: “The world of the early twenty-first century is obviously quite different from the one of the twenty's century... An option, much favoured in some circles, would have us rely on the "invisible hand" of the market. The invisible hand is needed a powerful force-but only under certain conditions. Not everything that is desirable has a market, that is, people able and willing to pay. Even when a group of people share a desire for a good or service, such as a well-educated populace or protection from attack, individual members of the group may not find it rational to pay for that good or service, no matter how much they each want it...

Early in the century, conventional thinking saw the purpose of global governance as "to facilitate free trade, freedom of capital movements and unrestricted access by multinational firms to markets around the globe". Such thinking confused means with ends. It forgot that those steps are merely instruments toward what should be the purposes of governance: solving dilemmas of collective action in just and legitimate ways... **This intense focus on economic efficiency ignores the reality that efficiency is not a goal.** It is a means of enabling societies to use resources productively in the pursuit of goals. And some of those goals-long-term social justice and environmental sustainability- may conflict with shorter maximization of economic efficiency. It is now necessary **to deal with problems of collective goods...** The need for major reform of the systems of global governance is clear.”¹²¹

The first challenge is taken up by the disequilibrium between mankind and nature and all the planetary problems it creates. A shift from an exploitation attitude to a **planetary gardening** attitude appears as the most obvious response to this challenge. As most official representations of society are focused on **economics**, reshaping the intellectual and measurement instruments used in that discipline appears as a second challenge. Then comes the security question, up to now analysed through classical nation state strategy concepts that may enlarge up to a **global security** concept. Finally, it would be impossible to respond to these major challenges in absence of an international **state of law**, as the one Europe is trying to build for its internal needs.

¹²¹ Ann Florini, The Coming Democracy: new rules for running a new world.

6.1 Planetary gardening¹²²

6.1.1 Gardening as a production, as a cure and as a pleasure

The usual presentation of the planet care is highly pessimistic. It says that if mankind does not moderate its consumption of natural resources and its emissions of greenhouse gases, many species on earth will disappear and probably mankind will disappear too. Planet care therefore is shown as imperative. It is a duty. Implicitly, the pleasure is supposed to lie in consumption, and the duty would be to lower our excessive consumption of energy and other natural resources.

Shown that way, the people who have not reached western level of consumption will inevitably disagree and interpret such discourse as a new trick invented to maintain inequalities, cut their development and perpetuate the dominance of the developed economies. Inside the developed world, the same distrust will emerge between rich and poor classes.

Even the ones who are living in comfort would feel this duty reluctantly. All these psychological factors are converging to pursue, and even amplify for developing economies like China and India, the present state of consumption that can only be refrained by unpopular prices increase or taxation.

Fortunately, a positive image of a new civilization is emerging. In a first stage, the Bruntland report used the expression “sustainable development”, which appears as being acceptable both by defenders of development and defenders of nature. But the positive definition does not present any more economic development as a goal (other remarks will be made later on that question). It states planetary gardening as the core mission of humans.

A gardener is a guard of nature. She/he is not running away, leaving the weed invading the garden. She/he accepts the responsibility of modelling nature. She/he is on duty to care for nature, but also, this is the important point, she/he takes pleasure and accomplishment as an artist, because, ultimately, gardening is an art.

6.1.2 New huge infrastructures

This philosophical point being settled, the magnitude of the foreseeable work has to be kept in mind. If the analysis presented in the first part of this report is correct, the task ahead is as big and may be bigger than it was in the second part of 19th century:

It includes reshaping of the cities, isolation, common transportation, floating structures to cope with the rise of the level of the oceans, enormous water supply public works, greening the roofs and/or covering them with solar cells.

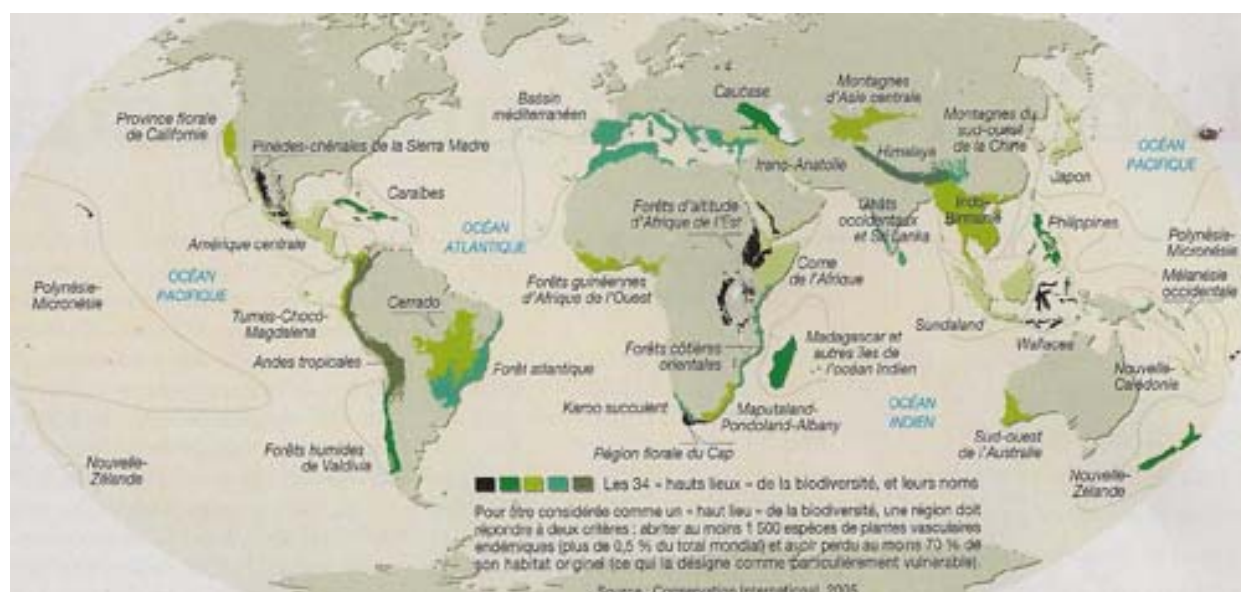
It includes also reshaping of agriculture and fisheries. The industrialization phase is over. It has brought productivity, but also destruction and unfair competition to local activities. Planetary garden should probably return to smaller units, without refusing the inputs of science. The so-called “biological agriculture” is now growing and may represent, at least in Europe, the majority of the surface.

6.1.3 The amount of accessible information needed

The planetary garden approach is definitely knowledge intensive. Industrialization has reduced the number of cultivated species, keeping only the most productive ones. Sustainable natural equilibrium needs diversity. The number of different species necessary to build a sustainable ecosystem is not known. Up to now, the question did not worry.

¹²² See Uno Svedin contribution

But the present reduction of biodiversity, and also the project to build space colonies appeal for more precise and detailed knowledge about the approximately 14 million species of the earth ecosystem, out of which only 1.7 million are presently referenced.



The “high places” of biodiversity. Source: conservation international 2005

6.2 Re-accounting and reshaping economics¹²³

As most technological answers to the situation described are well known, as shown earlier in the first part of this report, we are sent back to governance questions, namely social sciences and particularly economics. Many criticisms have been expressed against the standard economic way of thinking but up to now, the rules of the game stay as they are and the GDP is still considered as describing the “wealth of nations”.

The standard way of thinking is often characterised by a focus on trade, although trade does not reflect always wealth but using an econometric model it can be said that "Concerning trade: the difference in growth rates will lead to significant changes in world trade distribution. China, already considered as the workshop of the world, should take an even greater share in international trade, from 7.7% to 15.1% of world exports. Comparatively to Europe, USA should lose less export shares. This is mainly linked to the fact that they have relatively more relations with fast growing regions. For the European Union, intra-EU trade represents more than five eighth of all EU exports. The weak economic dynamism of the EU should not stimulate intra-EU trade, and EU trade share will probably fall, even if they trade a lot more with other partners.

The pattern of world imports (not represented here) is very similar, except that the USA imports slightly more goods than China in 2025."¹²⁴

¹²³ See also Luc Fontanié and Samir Amin contributions

¹²⁴ CEPII Mirage exercise

6.2.1 *Wealth illusions*

Anyone knows that a road accident, an epidemic, a hurricane are increasing the GDP through the mobilization they provoke. A war also increases the GDP. More generally, all sorts of vulnerabilities appeal for a GDP increase, including cognitive vulnerabilities, which are increasingly exploited in our civilization. In a sound evaluation of the wealth of nations, should these catastrophic expenses be accounted positively as they are now or negatively?

Another aspect of modern life should influence accounting: saturation. Every biological evolution follows an S curve. The first part of this curve looks exponential: it is a “growth” curve, an expansion without boundaries. There are always boundaries, but they are far enough and have no influence on the speed of development. In the second part, at the approach of the boundaries, the expansion is slowed down and other logics operate.

A typical image of this situation is given by traffic jams. Imagine a great city, like were the Chinese ones in the 80’s, with few automobiles. Circulation is fluid. In a second stage, the number of cars grows, but the city stays more or less as it was. The same transportation service would cost more time, more fuel and generate more stress. Obviously, the quality of life would decrease though the GNP would increase. The only escape would rely on public decision rebuilding the infrastructure: a metro for instance.

In modern life, as mentioned before¹²⁵, compulsory expenses (including compulsory transportation to go to work) represent an important part of household¹²⁶ budgets (some 40% in developed countries). If, as stated by Amartya Sen, wellbeing relies on the freedom of choice of the economic actors, these compulsory expenses should be deduced of the GDP.

Finally, the services the prosumer¹²⁷ renders to himself or his environment, which are not included in the GDP accounting may represent an order of magnitude comparable to the GDP. The free services rendered by nature also according to the accountings mentioned above¹²⁸.

All these factors are not small approximations. Taking them into account would probably change completely the estimations of real wealth and the ranking of nations. Before 2025, the GDP growth question may leave the place to another more fundamental question: **how should be accounted a realistic wealth indicator?**

A first attempt has been made by United Nations with its “Human development index”. In 2007 according to this new measurement, the ten top countries are: 1-Iceland; 2-Norway; 3-Australia; 4-Canada; 5-Ireland; 6-Sweden; 7-Switzerland; 8-Japan; 9-Nederland; 10-France. United States is ranked 12, United Kingdom 17 and Germany 22.

¹²⁵ in the “future of poverty” part

¹²⁶ CEPPII Mirage exercise: “Global consumption: between 2007 and 2025, global consumption (in volume) should increase by 84%. But it will not be evenly distributed between sectors. In rich countries, food consumption does not augment any more with income, but only with population. Consequently, all new income should be spent in manufacture goods and, above all, in services. It is not yet the case in poor countries. Their consumption of food should rise with income, even if not as fast as for manufacture and services. Regarding the ratio of sectoral world consumption and aggregated world consumption, for each sector a value above unity designates a consumption increase larger than the average consumption growth.

As expected, the **consumption of food products** increases more slowly than for other goods. It is also observed for fishing and forestry products that are represented in the model with limited stocks. Indeed, we assume in the present exercise fixed use of renewable resources, forestry and fishing. This implies that, **with wealth and population growing, demand will grow but supply will remain inelastic.**”

¹²⁷ according to Toffler’s expression, the “prosumer” is at the same time a producer and a consumer in do-it-yourself occupations.

¹²⁸ In the “biodiversity” part 2.1.3

Other attempts have been made. One is the GNH (Gross National Happiness), based on Buddhist values and promoted, since 1972, by the king of Bhutan. The four pillars of GNH are the promotion of equitable and sustainable socio-economic development, preservation and promotion of cultural values, conservation of the natural environment, and establishment of good governance.

6.2.2 Collapse of the Washington consensus

The World Bank and the International Monetary Fund anyhow, during the 90's continued to define their policies in a classical liberal way of thinking. Their doctrine, now considered by the World Bank itself as obsolete, is known as the Washington consensus. As expressed by Williamson in 1989, it was made of ten broad recommendations addressed to the Nation States:

- 1-Fiscal policy discipline;
- 2-Redirection of public spending from subsidies ("especially indiscriminate subsidies") toward broad-based provision of key pro-growth, pro-poor services like primary education, primary health care and infrastructure investment;
- 3-Tax reform – broadening the tax base and adopting moderate marginal tax rates;
- 4-Interest rates that are market determined and positive (but moderate) in real terms;
- 5-Competitive exchange rates;
- 6-Trade liberalization – liberalization of imports, with particular emphasis on elimination of quantitative restrictions (licensing, etc.); any trade protection to be provided by low and relatively uniform tariffs;
- 7-Liberalization of inward foreign direct investment;
- 8-Privatization of state enterprises;
- 9-Deregulation – abolition of regulations that impede market entry or restrict competition, except for those justified on safety, environmental and consumer protection grounds, and prudent oversight of financial institutions;
- 10- Legal security for property rights.

During 15 years, and in spite of the protests of some highly qualified economists¹²⁹, these recommendations have inspired most policies often imposed to “less developed” countries by the IMF and the WB. Of course, if you read them from the point of view of United States interests, it appears as recommendations that, through these organizations, US impose to other countries without imposing them to themselves, and the meaning appears clearly: open you economy to our multinationals and our capital, with low taxes and no regulation that would hamper their settlement. It looks like a scene in a western film: Throw your rifle through the window; I keep mine on hand and push the door.

The only point that could have been really effective imitating the so-called liberal countries, namely an **anti-trust** legislation and enforcement, was absent of this “consensus”. It would have closed the way to the capture of some profitable markets by US companies. Why anti-trust? Because, looking at economic history, it can be estimated that anti-trust has played a key role in American prosperity. If it had not been voted at the end of 19th century, United States would probably have followed the scenario imagined by Marx: an excessive concentration of economic power generating revolutionary conditions.

¹²⁹ Joseph Stiglitz, Nobel Prize and former Vice President of the World Bank, Paul Krugman, professor at Princeton University, Susan George, author of *Hijacking America*, 2008.

Anyhow, the effect of the resulting policy on South American countries has not been totally negative. The penetration of US firms induced a learning process, gave ideas to new entrepreneurs and, when US domination weakened at the beginning of 21st century, a new generation was able to take the floor. And public opinion, in these countries, became more hostile to North American “gringos”.

In its 2008 World development report, the World Bank, denying the Washington consensus, focused on agriculture as a poverty reduction factor, pointed the necessity of increasing the assets of poor households¹³⁰ and referred the **Millennium development goals** sustainability imperative. Such an ideological shift has to be quoted. It means that some 10000 professionals from nearly every country in the world, appointed by the Bank, will go all over the planet during the next decade advocating for new programs and orientating the loans according to both environmental and humanitarian goals, instead of helping the penetration of US capital. And this will inevitably generate a shift in national policies.

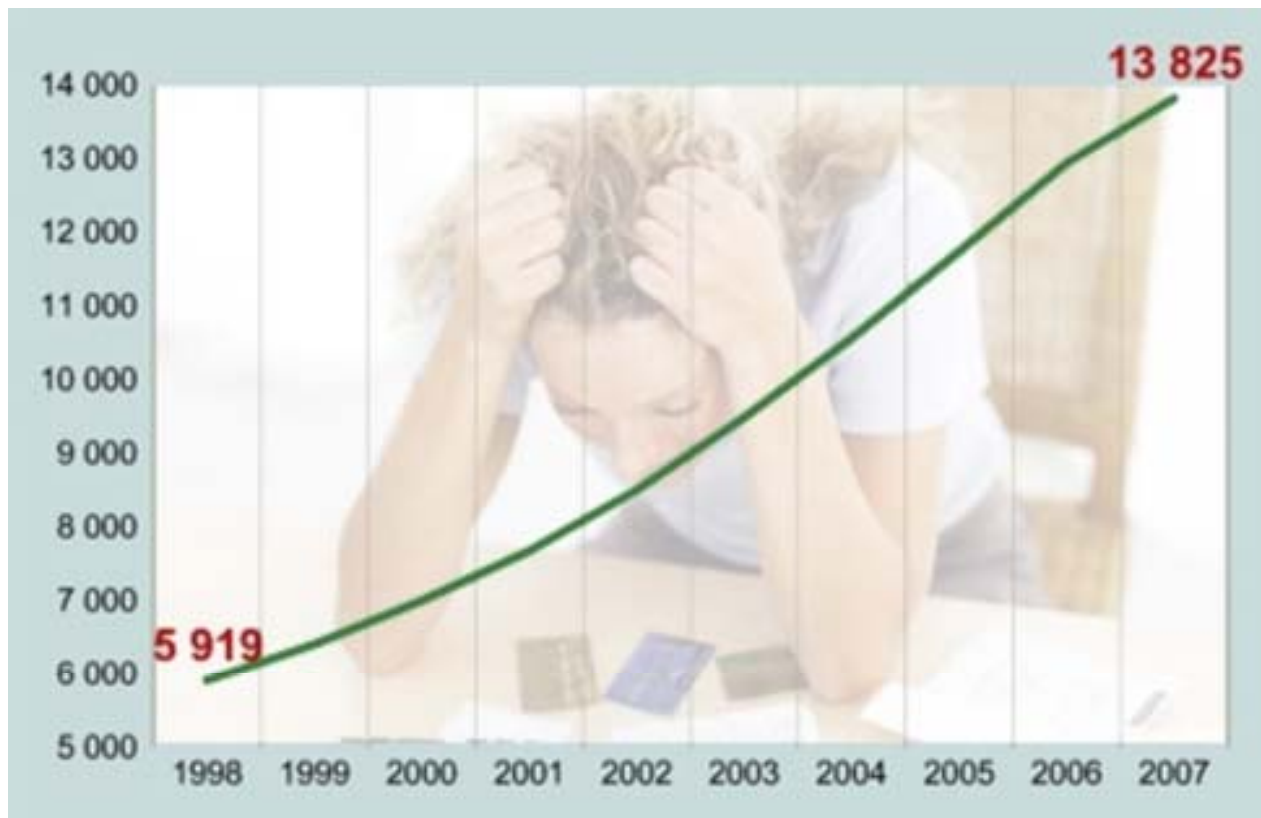
The capital is still there, but it takes another shape. Cognitive capitalism, exploiting the cognitive weaknesses of the public, will take progressively the place of the original production capitalist system. Symptoms associated to virtual universes may look, for instance, like schizophrenia, and will inevitably be exploited by economic forces to increase the dependency of both the consumer and the producer. But the consumer, helped by Internet access can thwart the guiles of the merchants better than in the past, and also reach the necessary information to operate his prosumer's projects.

6.2.3 Financial governance, towards a new monetary order

The sub-prime crisis that started mid 2007 and will last some years reveals clearly a failure in the governance of the financial system. This failure lies in insufficient control of money creation through bank loans, relying on assets whose value was under speculative growth. The event mobilized the heaviest world central banks to act jointly and the consequences were contained enough to postpone the risk of a crash. The important point concerning the future is the fact the central banks acted jointly.

World GDP 2007 is estimated approximately 54500 Billion \$, in which EU counts for 16600 and US for 13800. Here is the recent evolution of the debt of the American households in Billion \$:

¹³⁰ Probably inspired by Nobel Prize Mohammed Yunus and his Grameen Bank.



Evolution of US households debt (Billion \$) Source: Federal reserve

It has reached, in 2007 the level of one year total US GDP¹³¹. And it is going over, as the present GDP growth has decreased to 2.5% a year. If you add to this figure the debt of the firms (bank and insurance excluded), namely 31200 Billion \$ and the debt of the state 9200 Billion \$, the total makes 54200, approximately the amount of the World GDP (54500)! One year of world value added would be necessary to reimburse US debts.

Such a disequilibrium is made possible because the \$ is still considered as the international monetary standard. Oil and most international trade is paid in \$, and the countries like China and Japan who have a positive balance of payments have accumulated hundreds of Billion \$ and do not want its collapse, in spite the attractiveness of the €. Anyhow, the situation may be instable, because the first one to convert his assets to € will gain over the last one.

The recent evolution may lead to the conclusion that, having slowly shifted from a democratic system to a lobbycratic one, United States became unable to control their debts, their money and the behaviour of their banking system.

Regarding the banks, an international negotiation, known as Basel2¹³² and 3 is going on. It is progressing but faces the difficulty of the access to data related to the diversity of the software and standards used in this highly computerised profession. Cognitive overload is one of the obsessing problems of the cognitive civilization.

¹³¹ The same occurred in Great Britain

¹³² See Identity and access management, new challenges for banks, Bull Evidian paper, 2004.

Regarding the money standard, any logical human being would be tempted to think that if US became unable to control the \$, the \$ should be put under international control. Such a simple solution would probably face too strong nationalistic resistance to be feasible. But the example of the € shows how fierce nations can reach an agreement to build a common currency. It could be imitated by other countries, particularly in the East. Negotiations are difficult between China and Japan. They may be easier between China and India. And, reducing the diversity of big currencies would make easier collective management by an informal council of central bank executives.

The important point that could accelerate the process is **the necessity to launch huge public investments**, including city restructuring and common transportation, water supply infrastructure, energy saving and energy production free of greenhouse gases, protection of biodiversity. We are in a time where money is clearly controlled by mankind, up to now under rather poor nationalistic governance. But money injection is necessary to produce a Keynesian effect on the economy and also to build the infrastructures needed to face the problems mentioned in the first part of this report.

Final remark: this converging process of the great currencies is likely to intensify during the next decade, though its speed cannot be predicted. Symmetrically, the multiplication of small local money (LETS¹³³), the diffusion of which should be made easier through Internet, is to be expected, as it would accompany the revival of small units in agriculture, fisheries, craftsmanship, local trade and services.

6.3 The global security concept¹³⁴

6.3.1 The old and the new threats

For the elder generations, inspired by the souvenirs of 2nd world war and cold war, the dangers came first from human attacks. The media still follow this view, giving priority to terrorist actions, which causes few casualties compared, for instance, to road accidents.

For younger generations, safety means a safe employment, a safe food, a safe environment and a safe survival for the next generations, threatened by global warming and species extinction.

To this potential trend has to be added another shift, increased since 2000: privatization of military forces. Not only Halliburton and Blackwater, to which performances in Iraq have given fame if not glory, but various types of mercenaries, from the paramilitary forces in South America to the ordinary security guard of the supermarket. These private companies are hired by states and also by firms, particularly multinationals facing risks of riots or sabotage in the countries they operate. As many nations are too weak to maintain safety, such evolution appear unavoidable to the firms concerned.

6.3.2 Increase of natural diseases rescue tasks

But some of these firms, pursuing their search of profitable opportunities, happen to threaten environment and biodiversity, for instance by destroying tropical rainforests or exhausting fish species.

¹³³ Local Exchange Trade System. See for instance the works of Bernard Lietaer.

¹³⁴ See also Nicole Gnesotto and Loukas Tsoukalis contributions

Presently, quite few forces have the mission to protect nature, in spite of its necessity for human survival. It is likely that, before 2025, protection of nature against human and company predations will become a global military concern.

Some of these predators have the capacity to spend billions of €. Nowadays, they only find in front of them disarmed NGO's having as the only weapon a microphone and a camera. Thus, comparable forces will have to be built and managed to defend the common interest of humanity and the protection of the planet. It may be discussed as a new role for United Nations, or a new type of international force. If not, the NGO's will have to build their own military forces.

“Interconnection between threats and risks: one of the effects of globalisation, by the permeability of borders, by immediacy of information which characterises it, by the multiplicity of flows allowed illegally as much as legally, is to scramble the traditional categories of international security: terrorism is fed by economic and social inequalities and by the non resolution of regional conflicts, mafias proliferate on the decomposition of states, refugees flows make difficult the "containment" of the crises in only one territory etc.

6.3.3 The same technology for different missions

Security and defence think themselves in continuum, both in the origin of crises and in the means necessary for their solution, or their prevention. This strategic jamming also affects the traditional distinction between internal safety and external safety, via terrorism, energy disruptions, computer vulnerability, but also pandemic risks or natural disasters, or even migration flows

“Increase of the non military overall threats, whether from natural disasters related to the climate change, or from more rapid dissemination of pandemics, or from the overall repercussions of a financial or stock exchange crisis.¹³⁵”

The tools necessary to rescue victims of a natural disease, like an earthquake or a volcanic eruption are similar to the ones used for military rescue. Also, private troops are now currently in operation. The **barrier between civilian and military should progressively vanish**, both serving a global security concept. According the danger, which concerns the whole mankind, resulting from the exhaustion of natural resources, renewable or not, and the dramatic decrease of biodiversity, **protection of Nature may become a military concern**.

6.4 One power or the three powers: justice emerging.

6.4.1 Executive, legislative, judicial powers worldwide

According to the analysis made in the middle of 18th century¹³⁶, power bears three different functions that should be handled separately:

The **executive** is a top down movement, using its strength to impose its will to the public. Executive is often considered as “the” power, as being the expression of a “natural” law, the law of the strongest.

Anyhow, modern biology and ecology teaches that Nature is not only a “struggle for life” system, but also a place where sophisticated cooperative behaviours are generated. The term symbiosis, originally “living together”, illustrated by most ecosystems, including the human driven ones, named gardens, show that something else than pure power is operating.

¹³⁵ Nicole Gnesotto

¹³⁶ by Montesquieu, “L’esprit des Lois”, Geneva, 1758.

So what else? The time has come to answer clearly this question. Symbiosis needs mutual understanding, recognition and acknowledgement. It needs also rules of behaviour. According to Montesquieu, there lies the second function of power: elaborating behavioural rules based on understanding of mutual needs. For that reason, many consider that this “**legislative**” function should be devoted to elected assemblies, representative of the citizens will. In practice, things are more complex and depend on the local usages and civilizations.

The main difficulty lies when going to practice. Real situations are complex, unpredictable and do not fit in predetermined conceptual schemes. Therefore, interpretation of reality, when interests are in conflict, needs a peculiar type of work aimed at elaborating a judgement. As it was already the case in ancient Mesopotamia, judgements serve also to the interpretation of future cases, and therefore contribute to the building of the rule of law. Therefore, the **judicial** function bears an essential role: interpretation of the law and also its contribution to the building of law.

Recent times of globalization are facing great legal difficulties. Since the Westphalia treaty (Oct 24 1648), laws are supposed to be defined inside national areas, and only Nation States are subjects of international law. Fortunately, human behaviours are able to adapt and find ways to overcome this restriction. Progressively new subjects of international law are accepted:

Individuals are now in a position to bring to court Nation States, at least in the 46 countries (including Russia) that signed the treaty creating the Strasbourg European court of human rights.

Firms are also able to bring some Nation States to Luxemburg court for not respecting European rules or to WTO for restricting freedom of trade or investment agreements.

The case of the NGO's appears even more remarkable. Though not being officially recognized as legal actors, they have already had a strong influence in the ongoing building of an international state of law. Let us remind, for instance, amongst many others, the actions of the Red Cross, Amnesty International, Greenpeace and WWF.

Finally, we must quote that the so-called “scientific community”, though not having any legal status, appears clearly as the driving force in defining the future economic social and ecological policy, at least through IPCC, responding to a demand of United Nations.

It can therefore be foreseen that, during the following decades, the acknowledgement of the many stakeholders involved in human rights, environment protection and economic activities should inevitably progress, offering a complex landscape in which the Nation States will be only one of the various actors involved. And, as the formulation of the international law may still suffer of the absence of a world legislator, a key role should be devoted to the judicial power, by extension of the existing international courts.

6.4.2 Executive has been predominant. Is judicial the next one?

After a period of autarky of the Neolithic village civilization, between –8000 and –3000, domestication of the camel and the horse around -3000 allowed an increased circulation of goods. Between –3000 and –500, the end of autarky generated the development of cities as market places, the practice of writing, accounting and also the first courts and legal codes (the Hammurabbi code (-1730) is the best known¹³⁷) to solve conflicts.

But at that time also looting, conquest and many forms of resources appropriation by strength and constraint developed. Executive power was, and is still nowadays in many parts of the world, **the** power. Others proceed by delegation. And the implementation of their decisions needs the ways and means of the executive. Hammurabbi code said it explicitly:

¹³⁷ If not the oldest: Urukagina (- 2350), Ur-Nammu (- 2100), Eshnunna (- 1800).

“I, glorious king, have been ordered by the gods to set up justice in order to avoid the weakest to be oppressed by the strongest”. In that scheme, which is still operating nowadays, society has 3 levels: the weak, the strong and the “super-strong” who protects the weak ones against the abuses of the strong ones.

Anyhow, in modern times, many places in the world live “outlaw”, with no reference to codes and courts. When it happens, in the absence of legal reference, society generates spontaneously a substitute by taking as a reference the opinion of the strongest. It is the case, for instance, of the mafia organisation and in many parts of big business and politics.

More generally, the difference with the old times is that appearance stays in many cases, legal, and the dominance does not depend any more on physical strength, but on tricks and traps. But the relationship is not a free agreement between offer and demand as taught in economic courses. It looks rather like the sentence of the “godfather”: “I will present him an offer he can’t refuse”.

6.4.3 The media power emergence

Medias are often quoted as the fourth power, the new one bearing influence on the three old ones, executive, legislative and judicial. Clearly, they contribute to the evolution of mentalities, particularly when they help building a global planetary consciousness. But it happens also that, under the influence of lobbies, they present to the public an image of reality generating damaging behaviours. It is the case, for instance, when financed through advertisement, they encourage excessive consumption.

In the world emerging during the following decades, dominance relations will be embedded in the so-called “**cognitive capitalism**”. The “rapport de force” has been primarily based on exploitation of physical weakness, then, at the time of Marx, on economic weakness, and is now evolving towards exploitation of **psychical weaknesses**. The mind of the public is the new territory offered to the conquest of economic forces. Anyhow, regarding the common good at planetary level, the regulation of media and Internet is difficult to operate, both for technical and legal reasons, in spite of the effort of some operators.

Therefore, the basic Hammurabbi goal, “to protect the weak against the oppression of the strong” is not yet fulfilled. In modern world, the observation made by the British philosophers¹³⁸ should be added: the oppression of the weak may come not only from a person, but also from an institution, for instance a religious organization, a government or a private company.

The building an international “state of law”, in which Europe appears as the world most sophisticated and experienced laboratory¹³⁹ respecting local traditions is motivated by the desire to approach that goal.

6.4.4 Why judicial influence should increase, in spite of heavy procedures.

Obviously, a unique planetary legal frame would be unacceptable¹⁴⁰. The laws must respect and take into account the different usages of the different civilizations. Diversity is a part of life, and obviously should not be reduced unless under a common necessity.

Anyhow, facing the major challenges of 21st century, the question of **governance** is often raised. This word, which has not been clearly defined, is used to point the complexity of modern decision making processes and the absence of any authority able to impose solutions.

¹³⁸ Particularly John Locke in his “letter on tolerance” (1689) and David Hume (1711-1776).

¹³⁹ Mireille Delmas Marty, *Les forces imaginantes du droit* (3 vol), Seuil 2003-2007).

¹⁴⁰ As stated by the German philosopher Emmanuel Kant.

Nowadays, it must be taken into account that the “cognitive civilization” processes decentralizes information and builds imaginary entities, as does a nervous system. Therefore, Montesquieu statement that the three powers should be separated appears as a first step, illustrating a basic idea that will probably inspire most 21st century reorganizations: Avoid **conflicts of interest**.

For instance, a market where the buyer falls under the influence of the seller is no more a market; a government manipulated by lobbies is no more a legitimate government. A justice depending on the good will of the executive power is no more a justice. All for the same cause: conflict of interest.

Some countries, in Scandinavia for instance, are particularly alert in separating responsibilities in order to avoid conflict of interest. It is not the case in many other countries. At the international level, the influence of some big firms or organized lobbies may dominate the decision making of a number of small and medium size nation states. The expression “banana republic” has been invented to describe such a situation that refers to a much wider scope than banana producing states. Even the biggest nations have defended the interests of some of their dominant lobbies prior to the interest of their own population.

Anyhow, staying faithful to the protection of the weak against the strong, we must take into consideration the slow but continuous progress during the last half-century of human rights for individuals and of anti-trust regulations for economic entrepreneurship.

Stay the weakest: the non-humans and particularly the natural ecosystems.

Awareness that nature and natural resources protection are becoming a global necessity has slowly progressed from the first club of Rome warning in the 70’s to the growing concern of the IPCC reports. In a first stage, discussions went around the concept of common heritage. They faced some resistance from developing countries, like Brazil, who refused interference in the management of their internal domains, more precisely Amazonia.

Nowadays, and this should stay during the following decades, the negotiations are dealing with the concept of **common goods**, or “commons”. According to climate change and resources scarcity, nation states have to accept that they have something in common. After the times when declarations of independence were proclaimed, the time has come for declarations of **interdependence**¹⁴¹, supported at least by a minimal legal frame.

Therefore, as a consequence of the growing interdependent complexity and in spite the waste of time and energy in trials, it is clear that the judicial power is the growing power of 21st century and the most international one. The most spectacular, if not the only one, sign of its growing influence is the ability of the ICC¹⁴² to censure national leaders¹⁴³.

It must be quoted also that its internationalization will be made easier by using Internet and other modern information technologies.

Europe, because of its experience being ahead worldwide as a state of law area respecting the different cultures involved, should aspire to become the world leader in building the future international judicial system.

7-Conclusion: governance and consciousness

The word “governance” has been promoted during the last decade as an alternative concept to overcome the difficulties emerging around the words “government” and “power”. It implicitly

¹⁴¹ As suggested by Mireille Delmas Marty. See also Tsoukalis “International institutions should acquire instruments to deal effectively with the level of global interdependence reached”

¹⁴² International criminal court.

¹⁴³ Case Omar el Béchir, president of Sudan, for the Darfur genocide.

refers to systemic analysis and tries to put decision-making processes under close examination. It refers also both to legitimacy and efficiency. The state of governance is poorly considered when decisions are slow and formalities heavy. But it also pays attention to legitimacy. Dictatorship, in spite of its fast decisions may not be considered as ideal governance. To make it short, governance relates to the rules of the game, their clarity and acceptability. But it bears also the idea that collective decision-making is feasible. Anyhow governance assessment is not yet established as a discipline in social sciences.

7.1 The transition from industrial to cognitive world¹⁴⁴

Our investigation leads to a vision of the period between 2010 and 2025 as a time for disruptions. Local, economic, social, technological disruptions that will all result of a major change: the transition between

1-the **industrial civilization**, which started during the 18th century, using the nation state divide established in 17th century, and giving birth to the present so-called “democratic” forms of governance, and

2-the **cognitive civilization**, which started at the end of 20th century. In this new civilization, the dominant activity is no more production. It is nature care and information handling. The communication network crosses the former institutional frontiers and renders progressively obsolete the former divides, including the nation state one.

The word “cognitive” is here preferred to the classical “knowledge based economy” mantra because it bears the assumption that, as quoted first by Alvin Toffler, hyperchoice and cognitive saturation appear as a specific problem in that civilization, facing the industrialization of the persuasion activities.

This transition, because of its magnitude, will take several generations and probably transform the societies in shapes that are now difficult to foresee. Regarding the next 17 years, what should be expected is a shift in the consciousness, occurring amongst **both conflict and cooperation** processes.

This difficult shift in consciousness, we call it the **challenge to reason**. It is a challenge involving a change in the representation of life. Most political views of the late centuries were inspired by the Darwin-Spencer idea of the “struggle for life”. It was interpreted in terms of revolution by the late Marxist ideology and as economic competition by the free market ideology.

Modern biology looks at life differently. If the primitive bacteria that lived 3.5 billion years ago were still struggling for life, we would not be here. Because every one of us is built of 60 thousand billion cells that cooperate. Struggle undoubtedly exists. But complex beings, as we are, emerge when struggle leaves place to cooperation. And, obviously, this cooperation is based on information exchange, from the cellular level to the planetary level. Therefore, the challenge to reason lies in assuming the transition from conflict to cooperation, not only inside mankind, but also with other species.

Regarding this challenge, the rules of competition, the property rights, the relation to natural resources, the legitimacy of institutions will face two visions: the old one, often consolidated in laws, and the new one, claiming for more freedom and rationality¹⁴⁵.

¹⁴⁴ See João Caraça contribution

All civilizations have had their defenders of the past and their advocates of the future. In this fast transition period, it is important to be on the side of the future.

7.2 Tragedy as a challenge

As said in the introduction, the Greek tragedy describes the case where the hero, unable to escape a scenario of the past deeply rooted in its identity, follows the trajectory of his tragic destiny, often ended in violent death.

The industrial age gave the illusion that mankind could master the world without mastering itself. Pursuing such an attitude would lead to tragedy, because the laws of physics and biology are the insuperable limits to its greed.

7.3 The planet as a new actor

The planet is finite, and there is the limit¹⁴⁶.

And the biosphere needs to be cared. This leads to the “**planetary gardening** attitude”.

Looking more precisely in **economic** terms, we find that economic accounting and measurements should be redesigned to take into account the realities that do not pass through the market or get irrelevant evaluation by a market.

We find also that **huge public initiatives**¹⁴⁷ should be prepared: reshaping the cities, protecting natural reserves of biodiversity, water supplying, facing the rise of the level of the oceans, stimulating the use of sober technologies with low greenhouse gas emissions... These should bear also positive Keynesian effects on the economy.

The concept of security, during the industrial age, was essentially a military concern. The limits of the planet may transform it into a **global security concept** where all sorts of rescues to hurricanes, floods and droughts and accidents will merge with classical security goals and be placed under unified command¹⁴⁸, using the same technologies.

Finally, we insist on the building of a world “**state of law**”. To cope with planetary limits, more regulations will be needed. They will have to be internationally accepted and enforced. In case of malpractice, international courts will be needed. **Europe** is the most diversified and active laboratory in the field. It is the region most able to promote this future world state of law.

8-Annex 1: the 2 first scenarios detailed

8.1 Scenario 1: Transparency without regulation¹⁴⁹

8.1.1 General content

Transparency is defined as free and open access to information knowledge or innovation, and as a regime of governance in which everybody is given access to democratic discussion and decision-making.

¹⁴⁵ The case of intellectual property rights, agriculture and fisheries regulations, nation state authorities can illustrate this general statement.

¹⁴⁶ Until the time, if there is any, when mankind will be able to live, grow and multiply in space.

¹⁴⁷ Mostly executed by private contractors

¹⁴⁸ It is already the case in some countries for the navy, assuming both civilian and military security.

¹⁴⁹ Rapporteur: Jacques Theys

It is a combination of highly performing information technologies and of an « open and participative society » (Popper, Fukuyama, Giddens, Rousseau) in which there is no more secrecy, no more patents, no more corruption, no more privacy...The counterpart of such an open access to information is the general development of individual and institutional accountability or responsibility.

The main feature of such a transparent world may be described as follows:

A knowledge and information society

This « transparent world » is driven by the development and the worldwide dissemination of a new generation of pervasive information technologies (NFID, GPS, mobile phones, Web.3...) expanding the influence of the « knowledge and information sector » (cognitive economy, experts, electronic media, information brokers, non-governmental information).

The relationships between companies, research institutions, universities, NGO's and media become crucial.

A world of choice, competition and opportunities

New opportunities are emerging:

For consumers: to get the best prices, « the best value for money »

For inhabitants: to be able to choose the best places to live in and avoid risky situations or territories

For citizens: to choose the best politicians and have some influence on their decisions

For institutions: to benchmark the most performing solutions and have access to the best practices

For companies: to have access to the stock of innovations and ideas, get the best loans, and select the most profitable markets and the most productive workers

For students: to get the best teachers and teaching material...

A world of move, high mobility and ubiquity

As localized information about everything (products, individuals, territories, institutions, objects...) is accessible worldwide, and as competition and benchmarking is expanding, the mobility of people and goods is also increasing sharply.

There is a strong complementarity between the ubiquity existing in the virtual world and the continuous development of mobility and migration in the physical world. The key word is accessibility¹⁵⁰.

“Governance” without “government”

New regimes of « good governance through information » are replacing the old systems of power within the companies and the states by increasing the roles of shareholders, stakeholders, non governmental organizations, internet, media (blogs) and the civil society. Government meetings are open to the media and the public (access to the agenda and background documents), budgets and financial statements may be reviewed by everyone, laws, rules and decisions are opened to discussion, politicians are under public and media pressure, corruption is reduced, transparency fosters daily participation in the political processes. Whether this expanding « dialogic democracy » will lead to more individual involvement in politics or to a worldwide « populism » is a controversial issue.

¹⁵⁰ With a limit set by oil prices

Societies under permanent social control (panoptic systems)

Transparency means the development of auditing, measuring, controlling, watching, benchmarking, controlling... systems.

Privacy is no longer protected; everybody is accountable, under the control of the others. Sensors, chips, satellites and indicators are everywhere. Self control is also rapidly expanding for health, learning, environmental impacts: modern reflexivity is giving everybody, the capability to do the best choices in a « risk society » (U Beck).

We assume, in this scenario, that these new technologies of social control are not used to implement more sophisticated governmental regulation (taxes,...).

A world of suspicion and an increasing feeling of insecurity

Transparency goes with a general feeling of insecurity:

Personal insecurity develops as full transparency on income, identity, genetic risks and diseases increases.

Increasing suspicious within families and the communities lead to their permanent fragility.

Insecurity increases also within the companies as they are under continuous scrutiny of shareholders, consumers, NGO's... (Boycotts, affirmative action, stock markets...)

The feeling of insecurity is also pervasive among the workers submitted to a continuous assessment of their individual achievements, or for policy makers, under continuous pressure of the media and the public opinion...

8.1.2 Impacts

Geopolitics and political systems

Free access to information and technologies increases the risk of dissemination of nuclear and chemical weapons, and the vulnerability to terrorism.

In spite of the development of controlling technologies, legal and illegal migrations accelerate, increasing competition between countries, territories and cities, and generating high mobility.

Secrecy remains the rule for military affairs, but manipulation of information is used to increase political instability within some countries, and as a strategic weapon.

The fragmentation of the world accelerates with the expansion of the existing nation states.

Democracy expands, as corruption is reduced, but new mafias or powers appear, taking advantage of asymmetrical systems of information and parallel networks or informal markets.

Political power is moving to media, experts, non-governmental organizations, international lobbies, information brokers.

Economy

The “cognitive economy” becomes the driving mover of the world economy with a huge development of e-commerce, e-services, e-administration, collaborative work, experts systems, control technologies, teaching activities ...

Competition between companies, economic sectors and territories is increasing, keeping a continuous pressure on prices, costs and fiscal policies. But at the same time, trade unions and consumers organizations are in a better position to get higher standards and wages.

New forms of integration between the « demand side » and « supply side » are emerging. Consumers are involved in the development of new products and consumer organizations or web networks become major economic players.

Environment

Polluting countries and companies are under permanent pressures of environmental movements, worldwide NGOs, media, experts, and auditing bodies. Environmental reporting becomes the rule.

Self-regulated systems of control are expanding (« regulation through information », « voluntary agreements », pollution trading systems). Their efficiency is questionable.

Open access to information and the increasing role of the « precautionary principle » lead to the development of local conflicts and scientific controversy.

Participating management of environmental problems is not able to put this trend under proper control.

Over information is also contributing to two different risks: the dissemination of false fears and the attractiveness of protected areas, leading to their potential destruction. But these two risks are balanced by the worldwide dissemination of an ecological culture, mostly related to a new « consumerism » and to more « cosmopolitan » values.

Social and societal dimensions

« Panoptic » systems of social control are expanding simultaneously the feelings of security and insecurity. Security and safety become prominent values.

Benchmarking has also contradictory impacts, being at the same time a powerful incentive for social innovation (spreading of « best practices »...) and a major factor of individual frustration, envy and social conflict.

Transparency and open access to information increases the fragmentation in micro, self-organized and « self-selected » communities, and social segregation.

A last potential negative impact of transparency is a possible crisis of insurance systems as a consequence of adverse risk selections. In that field also, a move toward more fragmented systems (dual systems...) is highly foreseeable.

It's a controversial issue to forecast whether transparency is leading to more « confident societies » or not, and to « cosmopolitan » values or not (U Beck).

8.1.3 Two concluding remarks

In a « transparent world », the power will move toward non-transparent organizations and networks (new mafias, « black boxes », military powers).

Transparency cannot function without regulators, so the main question in this scenario is: who will regulate the “transparency” within the next twenty years (for instance, who will control the Internet, who will control the main auditing bodies, etc)?

8.2 Scenario 2: Transparency with regulation¹⁵¹

8.2.1 Concepts elaboration

The discussions started around what is meant by

REGULATION:

By this it was meant that it was related to decision management in orderly forms. This was conducted at multi-levels from global to local. Here in this exercise we focus on the global level.

¹⁵¹ Rapporteur: Uno Svedin

Regulation also stands in a tension field between public- private with a stronger emphasis on the public sphere actions.

In addition we have the tension between formal and informal regulation to consider.

TRANSPARENCY deals

with an open access to information, but also to processes. It also has a democratic flavour and provides the conditions for the checks-and balances needed for a “fair” process as seen from a civil society point of view.

The Combination of Regulation and Transparency is thus an interesting scenario condition:

It has on the one side the flavour of top-down and hierarchy

But it is sobered by the openness and conditions for “fair outcomes” that is provided by the transparency component - also providing a citizen flavour to the overall mix.

One line of discussion thus dealt with the question about the possible “achievable levels” of transparency/regulation as they in a way balance each other. One way to rephrase this may be that the transparency sets some sort of limit to what could be regulated, but also that regulation provides an orderly frame for what could be regarded as reasonable degrees of transparency. Regulation thus regulates and adjusts also the degree of transparency.

This in turn opened for the discussion on “Failures of regulation” in all its forms:

- * More regulation (overburdened)

- * Less regulation (too thinly)

Aiming at:

Transformed regulation

8.2.2 Domains of application

Having settled the conditions for the discussion a few domains of application were chosen:

Environment

Here the institutional frame of a WEO (World Environmental Organisation) with strong overriding powers was seen to be an expression of the regulative frame in this scenario. The entry could thus be top-down, but very interestingly the discussion dwelt on what erodes this initial position when time goes by? Also the WEO early warning capacity was highlighted, as well as the need to develop a disaster management central facility.

The transparency aspect in this scenario points at: “everybody has to be involved” as a centre of strength. If massive monsoon rains are hitting South East Asia it will be known by everybody and everybody is involved in a transparency setting. But if it is combined in the scenario frame with regulation there is a strong body that can exert immediate power under such severe strain. But would the transparency conditions open up for more of self regulating mechanisms also in this case? And who will provide the means.

Intellectual property rights (IPO)

Here the issues dwelt around various case domains of IPO – in software development, in pharmaceuticals and in the nuclear field.

Would this mean that under this scenario new (global) institutions would emerge? Not necessarily. Maybe the transparency aspect would drive more self-regulating behaviours. The scrutinising functions may be run by “private” regulators as a bridge into a time switched over to open source access. Maybe there will be new forms of patents – patents you cannot sell!

In the software domain the interesting concept of “cognition saturation” was launched as a reflection of the Transparency aspect of the scenario. Here the quality of information in open access also came out as an interesting aspect. The central actors would here be NGOs and the key services would be the “mid wife” functions.

The pharmaceutical field is an in between case between the software and the nuclear case domains. Here the tension between a public and private domain regulation is of interest. The interplay from domains of ethics in what could be done and what not is evident – and it has to do with how regulation is interpreted.

The nuclear field is characterised by its “special risk features”. But just here in a scenario coloured by “transparency” as part of the frame it would be interpreted as “all have the NUKES!” - A very shaky situation indeed, if not “regulation” in one form or another may sober the setting. Hopefully forms of multilateralism would be mobilised here. This case calls for creative new forms of “wise regulation”. Problems of “patch wise” regulation may not be sufficient in this case.

Migration

The transparency feature would immediately get rid of the hidden aspects of illegal migration. But the story would not end there.

The combination of Regulation and Transparency will promote a move towards increased migration – but legally! The illegal part will be suppressed. Transparency globally would also drive the knowledge everywhere about (legal and true) opportunities wherever they may emerge. Would global warming in Siberia draw such attention to new possibilities?

Maybe we will see new types of migration. People would not only know the opportunities but also the (transparent) rules.

Trade

The scenario calls for a profound reform of WTO in the institutional realm (how it works, how it frames its decisions etc). The current consensus style will be changed (one country one vote).

The transparency will drive the line “open the green rooms!”. There will be changes of rules, but also development of compensating mechanisms.

The relation between WTO and WEO will be a very interesting balancing act in the future institutional landscape.

Transparency would also mean propagation of market knowledge; including its value basis (“Europeans don’t like to eat meat with hormones!”). So the basis for restraints would not only be the government/politicians voice of “danger”, but also the wide popular perception of the nature of things. This would also drive the standard setting work of ISO type. Connected to this would be the increased importance of testing.

Finance

A world fully transparent would provide a complex set for finance. My own possibility for investing – would it be served by full or maybe partial transparency? There are arguments and counter-arguments. In the end it may call for new types of actors in the form of “intermediaries”. (In this discussion a recent talk by Mr. Obama was mentioned). The distinction may not be so much between regulation and non-regulation aspects but between good and bad regulation.

Various market issues will strongly emerge. No more Tax Heavens! That is the world of secrecy. Rather it will be the new world of tax competition openly. Maybe regulation will be more stringent in this setting. In any case there will be calls for reforms of the regulating bodies. Maybe the connotation of what is meant by top-down will have to be re-evaluated.

Conflict handling

The multi-syndrome world will expand with many earlier separated phenomena and dangers appearing at once. The time development will be important. Here the regulatory bodies at global level will have to be drastically reformed. Prevention issues are at the heart. But it may not be so easy for the old institutions to reform from inside.

The central word in the institutional setting will be transformation. But the time development of the change may also be important. Something may start strongly in the regulative part and then move under the influence of the transparent aspect. The semi-open fields between institutions may be enhanced in importance. After some time, clustering of institutions may take place. And the role of the UN also will change in this world scenario – not diminished perhaps, but transformed.

8.2.3 General observations

The interplay between the factors of Regulation and Transparency in terms of relative strength may change over time. In certain periods one of the two factors may have a stronghold, but as time goes by it may erode under the influence of the other factor. The situation is by no means static. The dynamic feature may even be driven by the very nature of the two main characters of the scenario frame.

The multi syndrome character of many of the challenges emerging in this world may call for exceptionally vigorous – but potentially successful – transformation of institutions, or groups of institutions. Here the hierarchical nature of the values driving these institutions will emerge as very important. (Which institution has the overarching responsibility: WEO or the reformed WTO?)

In an intricate way one argument that starts the sequence of an analytical chain of thought may shift its character under way. Let us take the example of the transparency in the nuclear field that would state that everyone wanting to know how nuclear devices are done will have the knowledge on the web! So transparency will drive the nuclear proliferation? Yes, but only to a certain extent and in the beginning. Later the transparency will alert a world community of unacceptable risks (knowing which countries do have capacities etc.). This will drive the call for certain countermeasures in terms of regulation. So transparency has at its core both opening up and restraining features. Which of these competing lines would emerge will be a question of context. And the context will be fluent and changing. Thus there will be strong aspects of path dependence!

9- Annex 2: Bibliography

1. Ocde Mesurer la mondialisation
2. EU ERA expert group
3. Perspectives territoriales dans le monde espace européen à l'horizon 2029
4. Long term strategic guidelines Japan

5. Marc Abeles
6. DCDC global strategic trends program >2036
7. Strategic report on the renewed Lisbon strategy
8. Managing tomorrows people, culture of work 2020
9. Latin America scenarios 2020
10. Foresight 2020 economic industry and corporate trends The Economist
- 11. Global trends 2015 CIA**
12. Challenging Europe research FR
13. Scenarios for the future of US/China relations
14. 2006/2016 map of Education
- 15. Russia 2017**
16. Cellule de prospective 2010
17. Group BEPA
18. Scenario 2020 Chambre d'Agric normandie
19. Canal Académie votre assiette en 2030
20. The wokplace in 2020 Patricia Gallagnan
21. 21st century organisation global bus network
22. Tertiary education in 21st century
23. Biotech scenarios Scenarios for the poorest 2030 Outsights
- 24. Foresight future 2020 DTI**
25. Futurable la pauvreté en Europe 3 scénarios
26. Scénarios pour la démocratie locale en Europe 2020
27. Developping new modes of governance
28. Perspectives on europe's role in the future Villenius
- 29. Scenario europe 2010**
30. 6 scenarios for the middle east
- 31. The future of financial services IBM**

32. World health statistics WHO
33. Projection on global mortality >2030
34. Rethinking diseases of affluence
35. Lionel Fontagné choc de libéralisation de l'économie mondiale
36. Towards a global labour market Kath Rüdiger
37. Du bien être des nations OCDE
38. Chronic diseases and economic perspectives oxford health alliance
- 39. Refaire le monde**
40. The time of transformation
- 41. The future of internet II Janah QUITney anderson**
- 42. The 2029 project inst for alternative futures**
43. Deciding the future worle energy council 2007
44. Rapport sur la santé dans le monde 007
45. L'eau et l'alimentation 2025 IFRI
46. Les 10 défis du monde 2025 La croix
47. 6 scénarios pour l'avenir 2925 OCDE
48. Jancovici qu'y y a t'il dans le rapport
49. Scenarios 2950 WEC Gerald Doucet
50. Horizons 2020 étude allemande pour Siemens
51. Coal ressources and future production Energy watch group 2007
52. Underground coal gazification
53. Scenarios shell
54. Johannesburg summit
- 55. Well to wheel automotive fuels**
- 56. Résoudre les pbs mondiaux**
57. IPCC Emission scenarios
58. Ageing and urbanisation

59. Contribution papers from the following experts :

Thierry GAUDIN (Ingénieur général des Mines, President Prospective 2100, France)
Josephine GREEN, (Foresight and design, Philips, Netherlands)
Geoff MULGAN, (Director Young Foundation, former director Forward Unit and Strategy Unit of the prime minister Great Britain)
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Gijs BEETS (Démographe, Netherlands)
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Joao CARACA (Science foresight, Gulbenkian foundation, Portugal),
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Giovanni GREVI (EU Institute for Security Studies, Italy),
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Samir AMIN (Forum of Dakar director, Egypt),
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TOWARDS THE GARDENING OF THE PLANET IN THE PERIOD OF THE ANTHROPOCENE:

THE WORLD AS SOCIO-BIO-SPACE (SBS) - future options and challenges

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THE WORLD AS SOCIO-BIO-SPACE (SBS)

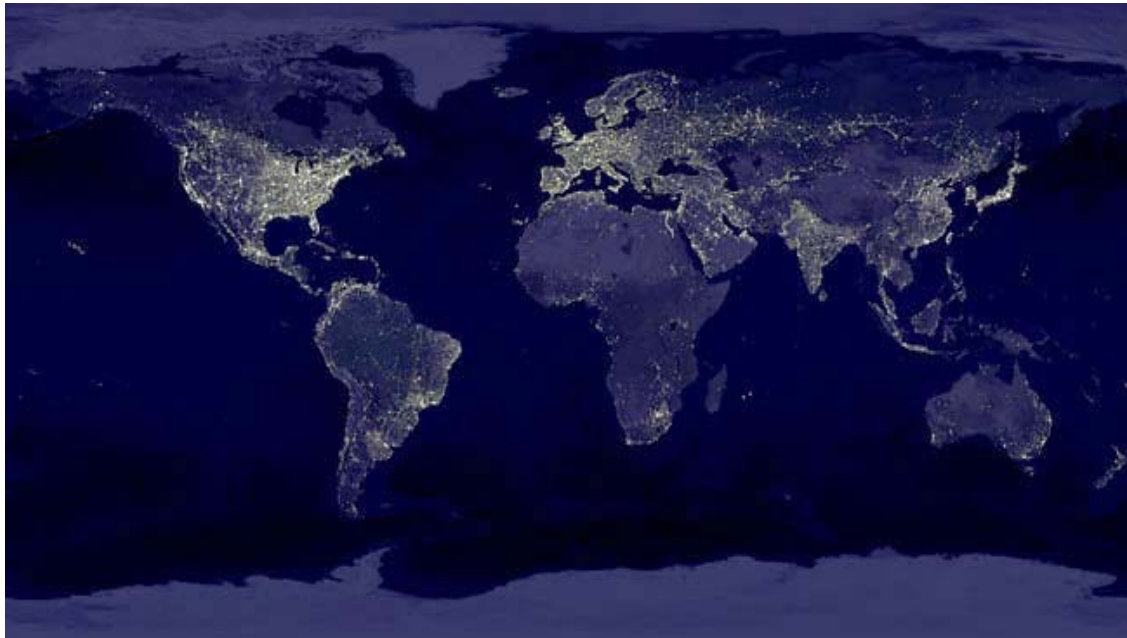
- future options and challenges

(by Professor Uno Svedin, Formas and the Resilience Center, Stockholm University, Sweden)

1. THE GENERAL SITUATION

The global connectedness and the challenges

The increasing importance of the environmental constraints at world level, including the phenomena that are related to climate change, is one of the central characteristics of the challenges for the next decades to come for the world – and for Europe. The (reconstructed) image from space (NASA) of the human presence, as indicated by the lights at night, provides an image of the globalness of the issue – especially expressing the visible presence of the more energy and resource use intensive part of humanity.



In a grand “managerial sense” the renewable part of the natural resources spectrum is an important line for world development – and the European part of it. It relates to the production of food, feed, fibre and also increasingly fuel (the four F’s). At the same time as the bio-space increasingly will be used for the material substrate for a broad range of support to human life, the increased pressures on these resources also opens up for stronger conflicts rooted in these resources. However, in a broader sense the problems and the opportunities come hand in hand. Thus many of the future possibilities for development of our societies (including our economies) are related to the clever “gardening” use of this “space” with great potential.

This global management of resources has to be performed at increasingly higher levels of global cooperation at the same time as the competitive field of tension over the resource basis increase. One example is the increased long term competition around resources in many parts of the world - through new strategic alliances and patterns of investment.

This relates both to fossil fuel resources and other types of resources e.g. the increased competition around forest resources in many places of the world, especially for world market use. Still another case of such increased competition is related to the resources of the oceans – both with regard to biological resources as fish or new development in algae use, but also fossil fuel hunt from the ocean floors.

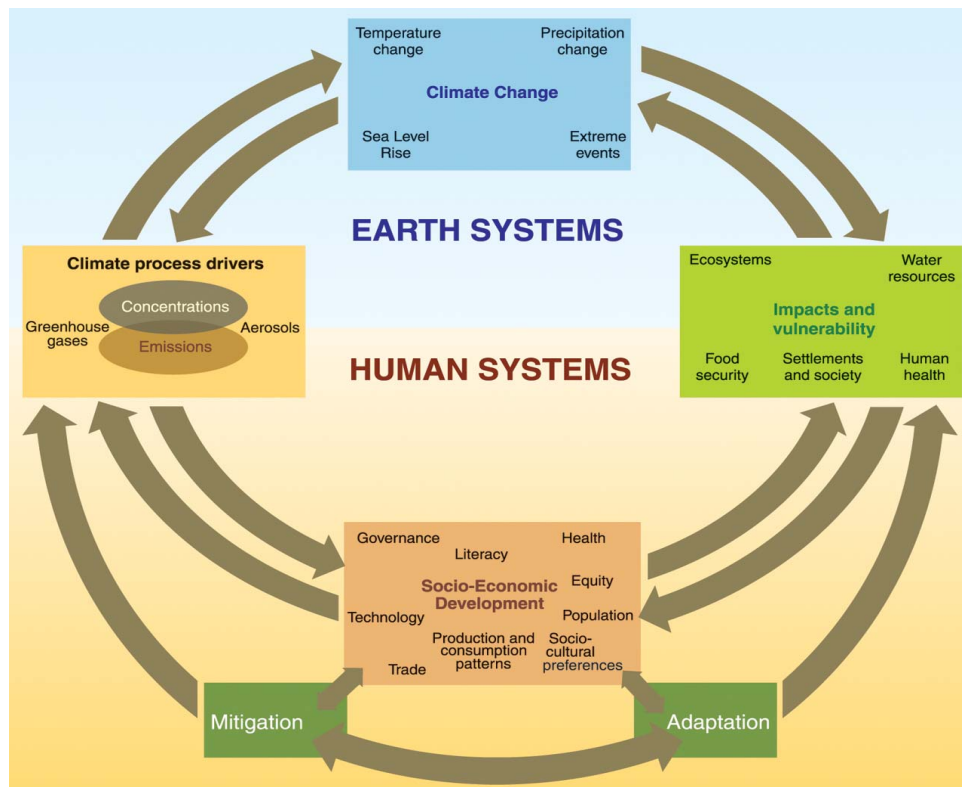
This in turn may open for increased risks for open conflicts among nations - or among groups of people - around capacities as arable land, access to fresh water, with conditions for production and livelihood not disrupted too much by climate change or changes of other kinds as presence of industrially distributed toxic chemical deposits. The tensions may especially increase around food and energy availability. As these are core commodities for survival the overriding tensions around resources access may grow and further enhance the differentiation between the “haves” and the “have-nots”. This tendency could also be enhanced through the growing strong need for large long term investments of such an order that only a limited number of actors can cope in order to secure future access - maybe in new forms - and associated not the least with the development of new technological innovation at a scale not earlier envisaged.

2. THE ERA OF THE PLANETARY ANTHROPOCENE

The natural processes that build the “bio-space” are now more and more interwoven in a broad set of processes of human origin. All these phenomena are driving deep changes in the total bio-social system. The most obvious example of this is today of course climate change and issues associated with that web of dynamic interactions - as those affecting water and food availability and other concerns.

The IPCC (Intergovernmental Panel of Climate Change) has in its 2007 report provided an overall image dealing with the interplay between the “Earth” i.e. the natural system – and the “Human Systems”. The important point is that both of these spheres interact and provide feedbacks and feed forwards to each other. This provides the strategic basis for choices of mitigation or adaptation approaches. (Fig 1)

Fig 1. The IPCC global systemic outlook



Many of the phenomena of natural or semi-natural origins are triggered by still other factors that could both be very natural in essence (e.g. climate change appearing as caused by dust particles from volcanic activity) or they could be humanly driven in a causal sense, as land use changes - e.g. deforestation - feeds climate change. Such transformations in society may e.g. trigger changed patterns of nutrient cycles including the release from the soil surface of green house gases in new ratios and forms than before. And this in turn may change the conditions in the atmosphere and thus change the climate patterns with still new feedbacks on the land use. Thus this interlinked causal web nature of the situation is an important characteristic of the Socio-Bio-Space dynamics.

We are thus simultaneously facing many different phenomena both with regard to:

- the *natural world* - including the spatial characteristics of these phenomena. (Sometimes we are referring to some of the associated bio resources - as those related to agriculture or forestry - to be “area” based). But in general terms at the “bio-side” of the natural world we have to be careful not to erode the ecosystem performances and services, both to humans and other life forms.
- those pertaining to the *societal and human connotations* e.g. in terms of economy, cultural preferences/values and societal risk, energy use and land use management

For these interwoven facets in a more and more combined overall planetary system we have to further expand and quickly develop our understanding of the dynamics for the next few decades.

Especially the systems connections between these two spheres have to be probed in terms of vulnerabilities, resilience capacities and thresholds for sudden and surprising disruptions for the total system of the connected natural world and the societal one.

What is here suggested as a major ongoing strong – but sometimes not sufficiently recognised - deep structural trend is that the planet very quickly is moving into a new historical era that some scholars already have given a name – the period of the “Anthropocene”. This is a label provided among others by the Nobel Prize winner Paul Crutzen (one of the three Laureates who got the Prize for the investigations on the processes in the atmosphere related to the ozone layer changes). What is then meant by this label for the period we are quickly moving into?

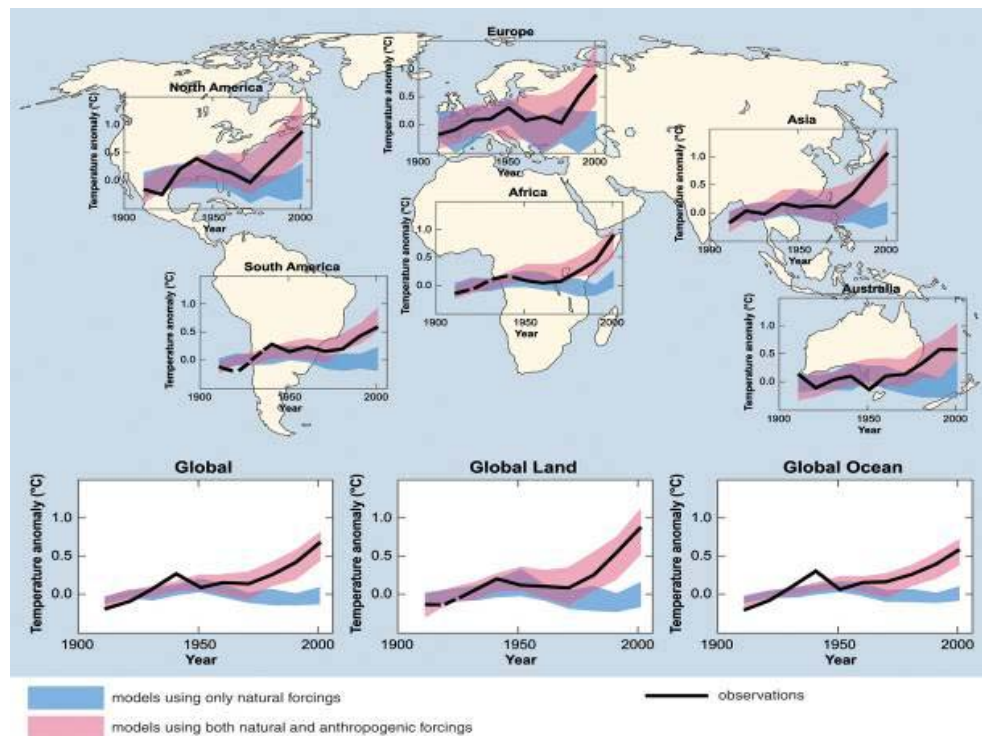
- the planet is more and more acting as a connected natural system with regard to the natural phenomena
- but the human presence – or interference – has now reached such a level that no natural cycles are untouched by humans. In many cases these cycles are so connected to and impacted by human endeavours that they definitely not could be regarded as independent of the human sphere. Thus humans act at the planetary level as a collective causal force setting strongly the stage for most processes.

The best and earliest case is of course the climate change challenge, as we raised above. The IPCC (The Intergovernmental Panel on Climate Change) which started its work in the end of the 1980ies has step by step given an assessment of the degree to which the Panel has considered the human interference to be of distinct and visible character. This has been very important as an input to the political discussion if and how society should interfere by taking major actions in terms of mitigation and adaptation measures. This societal choice of action has earlier been dependent on and waiting for a sufficient degree of consensus about the question if the human factor is dominant enough with regard to the identified empirical climate change indications. If the human element is sufficiently strong in the explanations then that would call for action with regard to the green house gas emissions as these causes then in principle would be in the hands of humanity.

The latest IPCC assessment in 2007 (The fourth assessment) clearly showed that this is the case. (Fig 2). In the picture from IPCC we see in the upper part the world map with the major regions of the world analysed part by part. In the lower part there are three aggregates provided of the time development of the temperature anomaly (counted in centigrade). The time period is from 1900 to 2000. If we look at the lower left figure it provides the global average. The core interest for us right now is to reflect on how two model approaches tries to provide a description of the empirical curve. The lower band is based on models only taking natural forcings into account. The upper bent curve (nicely corresponding to the empirical curve) has also included the anthropogenic forcings in the model system. It is clearly visible that this is the second combined approach that provides the reasonable fit to the data. The same pattern holds true for all the partial analysis of the regions of the world as well, as is seen in the upper part of the picture.

What it all tells is that the antropogenic aspect not only has to be taken into account in principle, but that from at least 1950 the strength is building up of the antropogenic component without which no reasonable fit to the curves any longer is possible. This indeed is an expression of the emergence of the historical era of the “Anthopocene”.

Fig. 2 The IPCC 2007 analysis of factors influencing possible explanation of global temperature increase 1900-2000.



Already in 1997 this position was advocated in a Science article (Vitousek, Mooney, Lubchenko and Melillo, 1997)) under the label of “Human Domination of Earth’s Ecosystems”. The authors expressed this in their summary as follows:

“Human alteration of Earth is substantial and growing. Between one-third and one-half of the land surface has been transformed by human action; the carbon dioxide concentration in the atmosphere has increased by nearly 30 percent since the beginning of the Industrial Revolution; more nitrogen is fixed by humanity than by all natural terrestrial sources combined; more than half of all accessible surface fresh water is put to use by humanity; and about one-quarter of the bird species on Earth have been driven to extinction. By these and other standards, it is clear that we live on a human-dominated planet”.

In a more recent article by Will Steffen, Paul J. Crutzen and John R. Mc Neill (Ambio vol 36, no 8 p. 614, 2007) the same theme is developed, but now put in a stronger historical perspective emphasising the dynamics of the processes. Especially the qualitative changes in the human conditions that now are bringing about an evolution in human history of our societies of unprecedented degree - and in our generation only – implying the human species to have become a major and formidable geophysical

force. Especially the phase of the “Great Acceleration” around 1950 is highlighted. In the worlds of the authors:

“Atmospheric CO₂ concentration has risen from 310 to 380 ppm since 1950, with about half of the total rise since the preindustrial era occurring in just the last 30 years. The Great Acceleration is reaching criticality. Whatever unfolds, the next few decades will surely be a tipping point in the evolution of the Anthropocene.”

A strong didactical expression of this dynamics is given by the authors through a set of time developments of chosen indicators using the information about these almost all exponential expansions that mirrors “The change in the human enterprise from 1750 to 2000” (with reference to the book by Will Steffen et al, “Global Change and the Earth System. A Planet Under pressure”, Springer-Verlag, 2004)

The need for strong action by the global society in handling this situation should not any longer be in doubt. For any scenario of 2025 it should be seen to be absolutely essential to take this into account. We are quickly driving into the period of the Anthropocene. The causes in all their force started really to build up more than half a century ago – although we did not see it at first. Now the changes are clearly visible and they are taking up speed. In still one or two decades major effects will probably be seen in all parts of the world.

These emergent phenomena actualize a sequence of serious responsibility issues, calling for forceful action that is needed now. Indeed these considerations are not only of theoretical interest, but link drastically to “down to earth” pragmatic issues connected to human survival.

Europe is not a separate island in all this. On the contrary. An appropriate approach of a responsible political posture in Europe would call for simultaneous action at the global level and at the European more “sub-regional” level in terms of counter measures and pre-adjustment – if possible – to the quickly changing global conditions.

These observations drawn from the global discussions the last few years (or maybe a decade) are the first really to demonstrate the systems connectedness at planetary level to be of key importance for any scenario writing concerned with the next few decades. The key focus is on the strong human role in all these changes. Indeed we are not only facing the gate to the new period of the Anthropocene. We have already passed the first part of the court yard of that era. This is the time when humans have to step forward and not only observe the processes, but also to take the responsibility at planetary level for the phenomena emerging as a result of the systems connectedness that have grown over long time – in fact already since the period of industrialization started in the 18th century.

It does not only call for analytical improvements concerning different aspects of the quickly changing conditions, but also for changes in overall perspectives about what is at stake and what could be perceived to be the time structure of this development.

It consequently calls for new forms of normative considerations related to what is needed to be done and also connected solidarity aspects at world level between those

who have more capacities and those who have less capacities to respond to the changing conditions. This in turn calls for new types of global institutions.

All this may seem to be “global” rather than “European”. But the point is that this change in the global setting is an urgent European affair – in terms of Europe being a global actor and trend setter to some extent (“leadership role”), but also is challenged to be a provider of technical and social reasonable responses in the service of the people living in the European space by 2025.

The interwoven character of the total complex system provides new types of phenomena just because of the intricate and intertwined aspects. This is especially related to non linear phenomena emerging from the various feedback loops in the total system. These complex system facets include new types of phenomena as abrupt and surprising changes in the system. These are not at all probed sufficiently in an analytical sense. When we now go into the new period of the Anthropocene we have to investigate these phenomena more thoroughly – especially with regards to the “robustness” features, or “vulnerabilities” - of these systems. We have to probe the features of resilience: how it can be enhanced and what factors we can start deliberately to influence. We are indeed moving quickly into a new setting with regard to risk taking and risk handling at global level.

Some of the systemic considerations that are important in this situation are:

- that micro events potentially are highly important much beyond their local impacts. Under certain conditions, which often are unknown – their triggering effects could be substantial (“the butterfly effect”).
The micro events thus do play out their repertoire of phenomena mostly in a local or regional setting. But sometimes their impacts “ripple up” to the macro frame – often of global nature today – and contributes to the setting of the overriding and changed context
- the vertical links across scale has thus strong importance in understanding the complex interactions and the dynamics. Thus any attempt to improve the governance structures in addressing these phenomena must also be heavily designed to respond to multi-layered aspects – or these governance attempts will fail.

The time aspects

Given that we – as has been outlined above - quickly are moving into a human period with new characteristics (and even already are in the beginning of this period without sufficient knowledge and experience about it), the question is where we are in terms of the time development of this situation. We could also speak about the time aspects of the actions needed, i.e. the timing qualities of our potential operations. That is why the considerations by the Stern-report last year in the climate change economics domain are important, as the report emphasises the time distribution of action – and its economic features – into the next few decades. This position can be generalised also outside the climate domain.

The efforts needed relate to the development of the knowledge base, the technological implementation, the investment and build up of the material capital (e.g. dams, technological

facilities etc). But it also pertain to the reform of the societal setting in terms of the normative frame, the structure of responsibility, the conflict resolution mechanisms, the institutional machineries to serve the “gardening” Anthropocene period.

The suspicion is that we now have to move fast and that the next few decades may be absolutely critical. One didactic example comes from the current discussion about the climate change strategy. The need is strong to find drastic measures in order not to pass the +2 degrees centigrade global warming (hopefully possible to achieve if strong measures soon are taken globally and with a sense of urgent joint responsibility) because the temperature territory beyond is potentially in a systemic danger zone in terms of thresholds and possible flip-flops. Any application of a precautionary principle speaks for such a posture of quick and deliberate efforts. This means that we have to push our present societies to find strong measures already now. It has thus been comforting to see the Stern report providing arguments for this not only from a planetary management perspective but also from an economic investment and efficiency point of view.

What does this all mean in terms of timing constraints?

- it means that within the current systems causality web – and with climate as a core factor - distinct changes will happen already within the time window up to 2025. In the wider climate change domain and its more associated connections to other close by domains of enquiry primary changes distinctly to consider are:
 - shifts of vegetation zones due to regional temperature and precipitation pattern changes
 - the shift of precipitation patterns also change the risk panorama for peak events as flooding, storms and hurricanes
 - shifts of temperature and moisture dependent pest panoramas
 - gradual sea level rise (still unsettled with regard to the speed and extent)
 - impacts on biodiversity patterns
- secondary effects will also with high probability show up within the period to 2025 with regard to e.g. the :
 - changed capacities for agriculture and forestry
 - changed vulnerabilities for sickness patterns in humans and animals
 - potential migration patterns of humans
- in addition other effects due to other causes than climate change may emerge as an out flow of globalization (as the over use of marine living resources including deep sea fishing “mining” tendencies under the pressure of the ongoing drastic erosion of fish stocks for human consumption. The negative impacts in the marine ecosystems on the high level ecosystemic “control” functions in the marine food webs are here also very worrying as exemplified by the case of the collapsing Canadian cod stock during the last decade. The cod stock was believed to come back when the fishing pressure was alleviated, but the return of the cod has not so far materialised. Also indications of changed structure of the genetic compositions of the stocks remaining have been argued for).

Most of these changes seems likely and could already be seen as “trends” in their partial domains of appearance. The key question thus seems less to be IF these phenomena will occur but HOW i.e. in terms of:

- speed
- force
- size of impact
- patterns of occurrence
- other side effects, as sudden eruptions from trickle down effects in the causality chains/webs

If the occurrence of these effects could be assembled in clusters of “syndromes” (packages of emerging effects) the next level of issues have to do with the societal conditioning with regard to:

- the capacity to resist – or at least reduce the speed of the changes (mitigation)
- the capacity to adapt

The last few years in the climate domain have seen examples of action portfolios develop in both these domains and with a special emerging interest in the growth of the adaptation measure postures – but still mostly insufficient in the implementation force so far.

New knowledge and the knowledge production system

The investments in various actions also relate to the knowledge production sector. This holds true for a long sequence of actions in the fields of

- general development of understanding (sometimes referred to as basic science)
- early technological advances
- innovation system design capacities
- investment in full scale testing facilities
- knowledge production system infrastructure build up

Also here the timing issue is a key factor. This holds true especially with regard to the path dependence of the development of major blocks of technology (as a total system for renewable resources based energy supply, hydrogen energy technology systems etc). A more skilful way of interference in the global carbon cycle systems has to be designed quickly. This is a very important field in this regard.

3. THE BIO ASPECTS

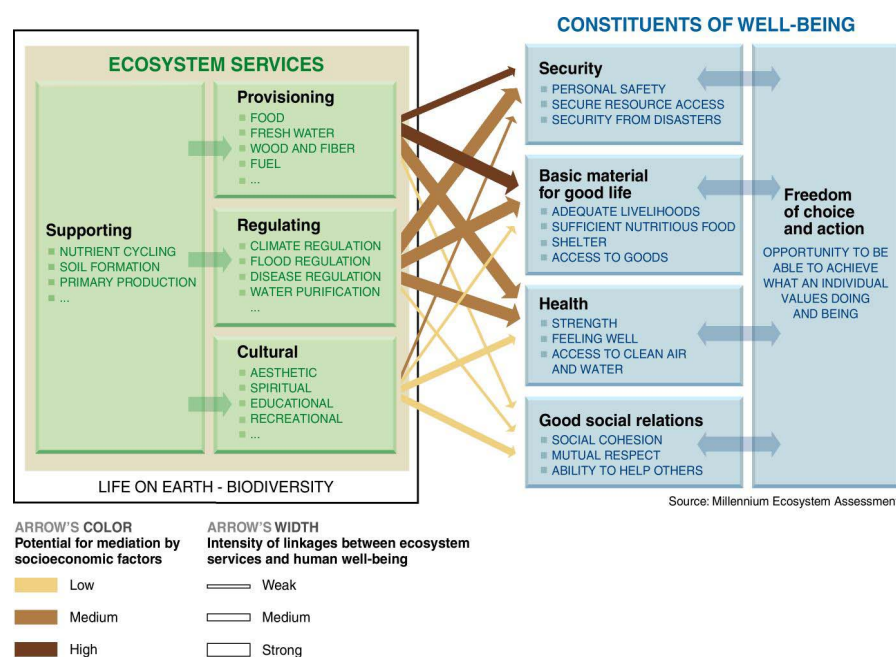
What has been spoken of so far has been dealing with the system characteristics at large. The need to more specifically focus on the “biospheric” aspects of the total system is due to the pressure to increase the use of the bio-systems when fossile energy will gradually have to be withdrawn as the key carrier of energy supply – at least if no major break through in technology secures a drastically reduced leakage of carbon into the atmosphere. This is major factor to address.

Another is the increased pressure on renewable recourses for non-energy uses e.g. for food, feed and fibre and other functions. The drivers for the increased pressure is population related. Still for several decades - it seems - the global population will increase (although envisioned

to saturate in roughly half a century or so. See e.g. IIASA scenarios for global demographic changes). What is more important is the per capita consumption going drastically up in countries in economic transition as those in Asia. The need for more food is a key factor, but especially the changed food habits that put new demands on the food webs, as demand for more meat in the diet increase the pressure on those eco systems that has and will have to provide more of these recourses for human use.

These pressures emerging in the interface between the eco-systemic parts and the socio-economic parts points at the problematic interrelatedness between “ecosystem services” and “various aspects of human well-being”. The Millennium Ecosystem Assessment has provided an outline of these interconnections in the chart given in Fig.3. It points at the dependence for most aspects of “well-being” for humans of the “ecosystem services” provided by the planetary Bio-space”

Fig. 3. The relationship between Ecosystem Services and Constituents of well-being” (according to The Millennium Ecosystem Assessment)



In the summary of the analysis the Millennium Ecosystem Assessment provided a position in terms of a “bottom line” that was provided. It goes as follows:

*We are spending Earth’s natural capital, putting such strain on the natural functions of Earth that the ability of the planet’s ecosystems to sustain future generations can no longer be taken for granted.
At the same time, the assessment shows that the future really is in our hands.
We can reverse the degradation of many ecosystem services over the next 50 years, but the changes in policy and practice required are substantial and not currently underway.*

Source: Millennium Ecosystem Assessment 2005

There are many specific sub aspects that come into light in this connection, especially considering the dramatic need and in overall terms to move towards more sustainable solutions. What has to be considered among other things are:

- the way how the bio factors interpenetrate and what it means for the development at world level, e.g. in terms of restrictions and possibilities
- how the development of bio oriented technology counteracts disrupting features in this web of systems - or generates new types of threats related to the Socio- Bio-Space. It is in this balancing act of scrutiny that the new urge for global “geo-engineering” should be analysed, and not only to be contemplated in terms of relatively “easy” solutions to grave problems.
- how the different “classical sectors” of “resources use” with bio reference (i.e. agriculture and forestry etc) can be related to these challenges, especially facing the tension between the bio-based part of the system and the non-bio-based one.
- how new facets as the further promotion of ICT may interplay with the bio based economy features: boosting its capacities or providing destabilisation components.
- how institutional traditional borderlines match the dynamics of the new systems boundaries from the emerging bio-part of the total space (the issue of fit between the societal structure boundaries of legal, administrative character and that of more “nature” oriented aspects of the combined system).
- how the potentially matching knowledge system with bio reference provides sufficient understanding in relation to the needs to act within relevant time windows.

These considerations have to be played out at a global level, but should also be spelled out in terms of what it means for Europe.

4. EUROPE AND THE USE OF BIO SPACE - *THE CASE OF AGRICULTURE, LAND USE AND MARINE RESOURCES USE.*

What has been said above about the world system of coerce also directly relates to the European situation. Europe has to face these challenges at world level as an innovator, initiator of solutions – both technological but also social - and as a global partner. But European actors also have to consider what all this means for Europe itself and for its need to invest in forceful action of transformation of its capacities. This relates not the least to the economic and social sectors that have their basis in the bio-space functions, be it the production capacities (as used in terrestrial applications of agriculture and forestry or in marine functions), absorption and transformation functions of waste (especially as seen as part of the functions related to the transformations done within the flow cycles in nature), and in the specific features connected with the spatial character of bio-space (in terms of land use for rural or urban purposes).

In many considerations about the future it is taken for granted that there is a continuous smooth path from now into future states. Contrary to this “business as usual” oriented approach quite some alertness should be devoted to disruption scenarios and potentialities of flip-flops in this regard. This should especially be done against the frame of the expanding features of the Anthropocene era that has been outlined above. And this is especially relevant for the Bio-space part of the system which so strongly is the basis of e.g. the “Agricultural sector”.

When looking at current debates on sustainable development, it is important to note that the discussion is not totally new but the language and the way how the bits and pieces today are made to connect may show important new traits. Especially the period after the UN Rio conference in 1992 demonstrated a growing understanding of the expanding challenges at world level, but also gave ample examples of deficits in needed implementation. In the current situation, it is the issue of innovative implementation that is at the heart of the situation and not the scope of the philosophies involved. However internal contradictions in the overriding policies may have contributed to some of the problems. Perhaps some of the hindrances that are seen now could be related to the emergence of a total global agenda that still seeks ways to address the partial problems and thus risk again to fall into the sectorisation trap. This should strongly be taken note of in e.g. the Agricultural sector which will have to play out its activities within a much grander set of causality relations than ever before. This holds true for the number of factors involved as well as their scalar presence from local to global. European agriculture thus has to be considered for the time frame of 2025 in a very broad set of dimensions, as well as being considered from both the angle of e.g. a new global food security perspective, in parallel with sub-regional considerations within Europe about ways to live and at the same time promoting the functions of bio-space at local and sub-regional levels in all its diversity e.g. in terms of the emerging interest in “rural development”.

Especially the way how the knowledge production system has evolved during the last few decades up till now is important to encounter facing the next two decades. This includes the role of the system, but also with regard to the perceived future thematic focus and institutional design of the knowledge production system. In this way the design of this system of knowledge generation moves up the ranks to become a key strategic factor in the shaping a very important aspects of the era of the Anthropocene.

EU foresight on the future of European agriculture

It was with exactly these types of consideration that SCAR (The EU body for strategic reflections about agriculture research in Europe – The Standing Committee for Agricultural Research) started to discuss the need for a foresight activity – and later a mechanism - about European Agriculture Research in a longer perspective than a few budgetary years. The time frame chosen to be considered was 10-20 years (roughly corresponding to the aims to dwell on Europe 2025). It was conceived to both bring in the global perspectives as the more regional European considerations. In the major event in 2007 when the preliminary results were discussed in a Conference in Brussels in June the EU Director General for DG Research José Manuel Silva Rodriguez said in the inauguration session:

(see www.ec.europa.eu/research/conferences/2007/scar/index_en.htm)

With the complexity of the challenges that European agriculture has to cope with –increasing globalisation, climate change, and unsustainable consumption of natural resources – we think that an appropriate measure is needed for developing a good and coherent European research agenda.

This is the first time ever that a discussion on such a crucial issue has been supported by a wide preparatory Foresight exercise initiated by the Standing Committee on Agricultural Research.

The political frame of these challenges was set by two EU Commissioners one with regard to research challenges and one with regard to agricultural sector and rural development challenges.

Janez Potočnik – Commissioner for Science and Research said with regard to the challenges for research

The European bio-economy, which includes agriculture, forestry, fisheries, aquaculture, bio-based handling of resources and rural development, has an estimated annual turnover of more than 1500 billion euro and employs over 22 million people. Research can support and strengthen this European knowledge-based bio-economy.

Research can not only improve Europe's economic and employment growth, it can also provide innovation, new applications and products in areas such as novel food, biodegradable plastics, new agricultural products and practices, and sustainable environmentally-friendly bio-fuels.

The new Seventh Framework Programme offers funding of almost 55 billion euro for the next seven years and its research results will have a direct bearing on the agricultural area. For example, it has a food, agriculture and fisheries bio-technology theme which will receive almost 2 billion euro in research funding. FP7 also has the energy theme, which will aim to improve the environmental and energy production of bio-fuels, make them more cost-competitive, and develop the concept of bio-refinery. There are many more opportunities for funding and support for agricultural research in the new Framework Programme.

"We have to think carefully about who and what is affected by our agricultural research and whether it is sustainable!"

Mariann Fischer-Boel – Commissioner for Agriculture and Rural Development – elaborated on the future challenges of agriculture in Europe. She said:

People want to know about climate change; they want to know what it will do to the world. They also want to know about the possible impact of bio-energy and bio-fuels. People want to know whether energy crops will really be a tool for progress or whether they will create new problems. They want to know about the implications of the expansion of global trade.

The European Union is a strong advocate of a more liberal trading system and we have been strongly defending it in the Doha Round. However, the public has questions about what this would mean for the prices of our different agricultural commodities. These are all big topics and, along with many others, need to be broken down and analysed piece by piece.

The Standing Committee for Agricultural Research Foresight process has made a very strong contribution to this work.

We have to ensure that the fruits of research are transferred as effectively and efficiently as possible in future and that our research efforts into socio-economic issues as a component to work on technology questions. We have a very strong and diverse base in Europe, so let us make sure that this remains a useful servant to our farmers and policymakers. We will need to ensure that the

decisions we may take in our ongoing reform process in agriculture are founded on solid ground.

"What I find exciting at this moment is that these issues – and others related to farming, food, and the way we use the land – are actually breaking through into the general public awareness much more powerfully than we have been used to seeing "

Expressing the views from Germany, a major EU member State (and at that time in 2007 holding the EU Presidency) Gert Lindemann – Secretary of State, Federal Ministry of Food, Agriculture and Consumer Protection, Germany - provided some visions for German agriculture in the European context

Agriculture in Germany and throughout Europe will be facing enormous challenges over the next ten to fifteen years. What can agriculture in Germany do to assist agriculture throughout Europe to face up to these challenges?

The national agricultural research system in a new and interdisciplinary structure will give us a secure broad basis for decisions to enable us to pave the way for a future-orientated agricultural sector and to properly develop our rural areas over the next 20 years. However, agricultural research in Germany must also face up to new world challenges, and this applies in particular to university academic research. Major cross-border problems, such as climate change or animal epidemics, require us to work beyond our borders and EU research programmes offer the possibility to cooperate with our European neighbours and other third countries.

We need more research that looks into the future, recognises changes, responds flexibly to the new challenges and involves ancillary discipline so as to be able to come up with wide-ranging responses. Only then can we in the European agricultural and food sector manage production in a sustainable manner, resist international competition and fully exploit any new opportunities.

Modern agriculture requires a modern interdisciplinary type of research which is able to work together with other disciplines and other partners.

General reflections of the EU SCAR Foresight exercise

The above political statements could be seen as an outlook frame looking towards the future – and maybe even into 2025 – but as seen from 2007. How was the way to approach the foresight mission?

In terms of the chosen causal factors – or “drivers” – eight of a reasonably diverse and encompassing nature were selected. They dealt with rural economies, economy and trade, demographic and societal changes, agriculture and environment relationships, climate change, science, technology and innovation drivers, energy and food issues. This rather broad and varied net of outlooks were cast over the future potential landscape by a special group of experts first dealing with these individual drivers and later combining issues into a set of cross going scenarios.

The chairman of the Foresight Expert group Professor Thierry Gaudin gave a further exposition on how the work had been pursued in the group:

SCAR asked the Foresight Group of experts to define 5 disruptive 'what if' scenarios to reflect the potential effects under 8 main driving forces identified by SCAR.

Our expert group prioritized four major drivers of agri-futures, namely climate change, energy, social and knowledge. The magnitude and implications of change we have foreseen, is enormous and requires urgent action. From our point of view, the current system is moving too slowly and cannot respond. With regard to the need for transfer of knowledge emerging from research to farmers, land managers and their advisors, the systemic failures in knowledge-transfer have to be repaired.

We have to say that Europe does have a strategic role to play at the international level in spearheading the transition to the bio-economy and bio-society. The key concept here is knowledge-sharing. Generally, farmers are trained to be reactive to incentives. However, they need take the initiatives and behave like entrepreneurs to face the challenges ahead.

The main recommendation, we have set up in the conclusion of this report is to go from a subsidy-driven agro-food system to a knowledge-driven agro-food system. We have to build a knowledge-transfer system that can reach all decision-makers – from global warming to global warning.

We have the tools to develop an ecosystem revolution – satellite, image-processing, maritime and ground measurements – but we have not organised this to reach the needs of the basic decision-makers in farming and agro-food systems. If we do that, we should make it freely accessible through Internet as it is a public service.

The challenge is the effective evolution of the practice of 50 million farmers in Europe.

The future is really in our hands. We can reverse the degradation of many ecosystem services over the next 50 years, but the changes in policy and practice required are substantial.

As a general comment from the overall foresight outlook activity the following could be said:

- The world is quickly changing. Thus there is a need to have a broad view, to be sensitive to changes in context and to globality
- There is a strong need of reform of the agri-system
(defined as the combination of Agriculture – Agro-business and Bio-economy)
- There is a strong need to quickly broaden the perspectives.
It has to do with globalisation, but also with the soft values related to a new ethics regarding these challenges

- The biology mind set has to be brought more in focus and to be put in the service of humankind
- There is a need for a further elaboration of what a European vision could be of a future civilisation

On a more “operational level” the following issues could be stressed:

- The connections that exist between the policy domains of:
 - * food and non food sectors
 - * agro- energy- industry- health
- The micro-macro economics connections (which also has to do with the issue of “European global competitiveness”)
- The potential shift in relative terms of emphasis e.g. between a terrestrial and a marine focus

With regard to research and innovation issues of keen interest are:

- the institutional organisation of research
- various balance issues in the knowledge production system
- timing issues
- financing issues
- the development of the human capital and the promotion of the next generation
- trust issues related to actors presence and also the public perceptions
- the RTD and innovation link to policy and education

5. SURPRISING FUTURES

Having taken note of the very dynamic phase in time of our civilisation we are right now going through, especially considering the specific challenges “our” globalisation situation provides in comparison to that of earlier historical eras, a few questions arise:

- *in which way are our challenges specific?*

Sometimes it has been said – and maybe rightly so – that the last few generations have had to face an extremely dynamic and quickly changing situation during the industrial revolution. It is sufficient to think only one or two generations back i.e. at the turn between the 19th and the 20th century with its huge break through in terms of technological changes. Also the drastic structural transformation at the political level that went with it is part of this history - among other things manifested in two world wars within one generation – to see that not so far ago our ancestors could with some assurance state that their times had been extreme exponents of strong change. But maybe our close by “future history” may also provide such a tempo in change and drastic structural adaptations that we even have difficulties to perceive at the present. Maybe the type of change might also be different than the earlier generations had.

It could be that it is the “Great Acceleration” (spoken about above) that may be what will be considered by future historians as the core sign of our times. Or it will be the connected development of the era of the Antropocen – the intervowenness of human and natural systems at planetary scale that will draw

the attention as the phenomenon in the period of the Renaissance with the great geographic explorations by sea binding the continents together, but also providing a wider and outgoing perspective of the world.

- *what is the possible transformation speed?*

It might also be said in the future that the speed of the transformations needed were unprecedented. It might be said that the efforts needed to combine global efforts to combat huge “gardening” challenges for our planet were of the size and kind that there was no early blueprint for it. Thus it may be said that that was the reason it was so problematic to raise to the institutional response to the challenge in time and with the vigour needed in relation to what the need called for.

- *what are the real issues in the current transformation?*

It might be said in the future that it was not fully clear from the beginning that within the needed efforts it was not enough just to develop the technological means and to have them fully implemented in a new innovation system to combat the huge environmental challenges of our time that threatened to spill over to all sorts of survival issues as long term food security or the availability of a sustainable and a supportive energy system not based on the fossil fuel.

It might be said that although it was in principle understood that there would be a strong need to set up new forceful global institutions that should manage the situation, it was still not conceived what a challenge this would entail. It might be said that the depth of the needed transformation of perspective of what all these changes would mean was not fully considered, e.g. in terms of life style transformations and needs to review deeply cultural aspects e.g. about what “development” means, or what the relationship between humans and nature could be.

It might be said that all this was not fully and clearly understood in the beginning and thus provided for a degree of restraint that in the larger picture was problematic when the mobilisation of the forces of change was needed to a degree that was not fully accepted. Maybe this is what historians will say about our times of transition. Maybe they will add that it was just a few pivotal decades in the beginning of the 21st century that really mattered as it was then the stage was set under the pressures to understand the situation and the connected necessity to act. Maybe they will say that due to farsighted visions, political capacities to join forces when it was needed and huge skills in implementations, all this was materialised. Or maybe historians will not be in the position to make such a statement.

These times obviously are times for potential surprises. Some of the surprises may emerge sooner than we think from the interrelated nature of the global systems which provides its non linear feedbacks and feed forwards. This holds true both for the natural systems (e.g. within the climate system) as well as the socio-economic and cultural systems. But to an even higher degree it pertains to the combined systems.

Thus surprises may come as unwanted eruptions of new and unforeseen problems.

But surprises may also come in new capacities to solve problems, whenever the issue has been sufficiently identified. This may come in the research domain, but also in ways to rearrange the social responses at local or regional levels. Also these innovations are highly in need and may emerge through concerted efforts by groups of stakeholders and the public when the challenges are clearly visible. History provides many examples of forceful actions to solve problems whenever the challenges start to be clearly seen.

6. SUMMARY

As a few rounding up comments the following could be said:

- The global system sets the boundary conditions and the understanding of their importance is changing fast.
- The overall strategy for action has to be in the direction of “planetary gardening”.
- In all this a “transformed agriculture”, a global new food production system, new visions about sustainable land use and marine management, a new energy production system, and reformed “mobility solutions” i.e. transport systems; all have key roles to play.
- The systems aspects are increasing, especially those dealing with the bio-space aspects in its combination with the socio-economic-space aspects.
- The role of research and education will increase in importance in a quickly changing world and already has grown in strategic significance.

And finally:

The European outlook for 2025 has to be global. It has to put at its core both a development of values in congruence with the challenges as well as the investment in capacities developed to match the new situation. This should pave the way for the needed transformation of how we may become “gardeners” of this planet.

There are worthy images for European future leadership at world level in these explorations, but they have to be developed and pursued as a common enterprise by all people, especially in the European part of the world, but also jointly with people in the other parts of the world. We are historically well equipped for these coming efforts, but they have to materialise. Only in so doing and with a vision at the grand scale will we serve our important missions at the local level “back home” as well. The aim must be a decent livelihood also for our coming generations.

References to some background material on Sustainable Development as a basis for the reflections on the move towards the Anthropocene

- Agarwal, A. & Narain, S. (1991) Global warming in an unequal world, New Delhi Centre for Science and Development, New Delhi 1991.
- Arrow, K., Bolin, B., Costanza, R., Dasgupta, P., Folke, C., Hollings, C.S. Jansson, B.O., Levin, S., Mäler, K.G., Perrings, C. & Pimentel, D. (1995) Economic growth, Carrying Capacity and the environment, *Science*, 268, pp.520-521.
- Ayensu, E., van Claasen, D.R., Collins, M., Dearing, A., Fresco, L., Gadgil, M., Gltay, H., Glaser, G., Calestous, J.C., Krebs, J., Roberto, L.R., Lubchenco, J., McNeeley, J.A., Mooney, H.A., Pistrup-Andersen, P., Ramos, M., Raven, P., Reid, W.V., Samper, C., Sarikhán, J., Schei, P., Galízia, T.J., Watson, R.T., Xu, G. & Zakri, A.H. (1999) International Ecosystem Assessment, *Science*, 286, pp. 685-686.

- Ayres R.U. & Simonis, U.E. (eds.) (1994) *Industrial metabolism: Restructuring for Sustainable Development*, United Nations University Press, Tokyo.
- Baark, E. & Svedin, U. (eds.) (1988) *Man, Nature & Technology. Essays on the Role of Ideological Perceptions*, Macmillan, London.
- Beck, U. (1992) *The risk society. Towards a new modernity*, Sage, London.
- Berkes, F. & Folke, C. (eds.) (1998) *Linking Social and Ecological Systems. Management Practices and Social Mechanism for Building Resilience*, Cambridge University Press, Cambridge 1998.
- Board on Sustainable Development/National Research Council (1999) *Our Common Journey – a transition toward sustainability*, National Academy Press, Washington DC.
- Burton, I., Kates, R.W. & White, D.F. 1978) *The environment as hazard*, Oxford University Press, New York 1978.
- Carson, R. (1962) *Silent Spring*, Houghton Mifflin, Boston 1962.
- Clark, W.C. & Munn, R.E. (eds.) (1986) *Sustainable development of the biosphere*, Cambridge University Press, Cambridge 1986.
- Costanza, R., D'Arge, X.Y., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naemm, S., O'Neill, R.V., Paruelo, J., Raskin, R.G., Sutton, P., & van den Belt, X.Y. (1997) The value of the world's ecosystem services and natural capital, *Nature*, 1997, no 6630, pp. 253-260.
- Daly, H.E. 1999) *Ecological economics and the ecology of economics: Essays in criticism*, Edward Elgar, Cheltenham, UK 1999.
- Ehlers, E. & Kraft, T. (eds.) (2001) *Understanding the Earth System. Compartments, Processes and Interactions*, Springer, Berlin.
- EU/SCAR. Towards future challenges of agricultural research in Europe. Brussels 26-27 June (2007)
www.ec.europa.eu/research/conferences/2007/scar/index_en.htm
- Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C.S. Walker, B., Bengtsson, J., Berkes, F., Colding, J., Danell, K., Falkenmark, M., Gordon, L., Kaspersen, R., Kautsky, N., Kinzig, A., Levin, S., Mäler, K.G., Moberg, F., Ohlson, L., Ostrom, E., Reid, W., Rockström, J., Savenie, H. & Svedin, U. (2002) *Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations*. Scientific Background Paper commissioned by the Environmental Advisory Council of Swedish Government in preparation for WSSD, ICSU, Paris.
- Gallopín, G. (1994) *Impoverishment and sustainable development: A systems approach*, International Institute for Sustainable Development, Winnipeg.
- Hjort, A. & Svedin, U. (1992) Cultural Variation in Concepts of Nature, *Geo-Journal*, Vol. 26 No. 2.
- Holling, C.S. (eds.) (1978) *Adaptive Environmental Assessment and Management*, Wiley, London.
- Holling, C.S. (2001) Understanding the Complexity of Economic, Ecological and Social Systems, *Ecosystems*, 4, pp. 390-405.
- Hägestrand, T. (1985) *Time-Geography: Focus on the Corporeality of Man, Society and Environment*, in United Nations University, Contributions to the Symposium held at Montpellier, France, 9-11 May, 1984, The United Nations University, Tokyo.
- Jasanoff, S. & Wynne, B. (1998) Science and decision making, in Rayner, S. & Malone S. (eds.), *Human choices and climate change*, Vol. 1, Battelle Press, Columbus, pp. 1-87.
- Jonas, H. (1984) *The imperative of responsibility*, University of Chicago Press, Chicago.
- Kahn, H., Brown, W. & Martel, L. (1976) *The next 200 years. A scenario for America and the world*, Morrow, New York.

- Kaspersen, J.X. & Kaspersen, R.E. (eds.) (2001) *Global Environmental Risk*, the United Nations University Press and Earthscan, London.
- Kates, R.W., Clark, W.C., Corell, R., Hall, J.M., Jaeger, C.C., Lowe, I., McCarthy, J.J., Schellhuber, H.J., Bolin, B., Dickson, N.M., Faucheux, S., Gallopin, G.C., Grubler, A., Huntley, B., Jäger, J., Jodha, N.S., Kaspersen, R.E., Mabogunje, A., Matson, P., Mooney, H., More III, B., O'Riordan, T. & Svedin, U. (2001) *Sustainability Science*, Science, Vol. 292 No. 5517, pp. 641-642.
- Lambin, E.F., Turner II, B.L., Geist, H.J., Agbola, S.B. Angelsen, A., Bruce, J.W., Coomes, O.T., Dirzo, R., Fischer, G., Folke, C., George, P.S., Homewood, K., Inbernon, J., Leemans, R., Li, X., Moran, E.F., Mortimore, M., Ramakrishnan, P.S., Richard, J.F., Skånes, H., Steffen, W., Stone, G.D., Svedin, U. Veldcamp, T.A., Vogel, C. & Xu, J. (2001) Our emerging understanding of the causes of land-use and land-cover change, *Global Environmental Change*, No. 11, pp. 261-269.
- Liljenstrom, H. and Svedin, U. (Eds.)(2005). *Micro-Meso-Macro. Addressing Complex Systems Couplings*. World Scientific, Singapor, London
- Lindahl Kiessling, K. & Landberg, H. (eds.) (1994) *Population Economic Development and the Environment. The making of our common future*, Oxford University Press, New York.
- Linnerooth-Bayer, J., Löfstedt, R.E. & Sjöstedt, G.K. (eds.) (2001) *Transboundary Risk Management*, Earthscan, London.
- Livermann, D. (2001) Vulnerability to global environmental change, in Kaspersen J.X & Kaspersen R.E. (eds.) *Global environmental risk*, United Nations University, Tokyo, (see Kaspersen & Kaspersen, 2001).
- Malthus, T.R. (1798) *An essay on the principle of population as it affects the future improvement of society*, London 1798.
- Meadows, D. et al (1972) *The Limits to Growth: A global Challenge*, Universe Books, New York.
- Meadows, D.H., Meadows, D.L. & Randers, J. (1992) *Beyond the Limits: Confronting Global Collapse, Envisioning a Sustainable Future*, Mills, Chelsea Green 1992.
- Moore III, B. (1999) *International Geosphere-Biosphere Programme*, *Global Change Newsletter*, December 1999, p.1-3.
- Nakicenovic, C., Nordhaus, W.D. Richels, R. & Toth, F.L.(1993) Integrative assessment of mitigation, impacts and adaptation to climate change, *Proceedings of a Workshop held 13-15 October 1993 at IIASA, Laxenburg, Austria, International Institute for Applied Systems Analysis (IIASA), Laxenburg 1993*, pp. 241-288.
- Ostrom, E., Burger, J., Field, C.B. Norgaard, R.B. & Policansky, D. (1999) Revisiting the commons: Local lessons, global challenges, *Science*, 284, pp. 178-282.
- Pearce, D., Markandya, A. & Barbier, E.B. (1989) *Blueprint for a Green Economy*, Earthscan, London.
- Rolén, M., Sjöberg, H. & Svedin, U. (Eds.) (1997) *International Governance on Environmental Issues*, Kluwer, Dordrecht.
- Rosen, R. (1986) On Information and Complexity, in Casti , J.L. and Karlqvist, A. (Eds.), *Complexity, Language and Life: Mathematical Approaches*, Biomathematics, vol. 16, Springer, Berlin, pp. 174-196.
- Shah, M. & Strong, M. (2000) *Food in the 21st century; from Science to Sustainable Agriculture*, The World Bank, Washington 2000.
- Steffen, W. (1999) A study of Global Change some reflections, *Global Change Newsletter*, December 1999, p.5.
- Steffen, W. et al, (2004) "Global Change and the Earth System. A Planet Under pressure", Springer-Verlag.
- Steffen, W., Crutzen P. J. and Mc Neill J. R. (2007) *Ambio*, vol 36, no 8 p. 614

- Svedin, U. (1991) The Contextual Features of the Economy-Ecology Dialogue, in Folke, C. & Kåberg, T. (eds.), *Linking the Natural Environment and the Economy. Essays from the Eco-Eco Group*, Kluwer, Dordrecht.
- Svedin, U. & Aniansson Hägerhäll, B. (eds.) (1992) *Society and the Environment: A Swedish Research Perspective*, Kluwer, Dordrecht 1992.
- Svedin, U. (1995) Christopher Columbus' situation and the challenge of understanding today's global environmental issues, *European Review*, Vol. 3, No. 1, pp. 93-101.
- Svedin, U., O'Riordan, T. & Jordan, A. (2001) Multilevel governance for the Sustainability transition, in O'Riordan, T. (ed.), *Globalism, Localism and Identity*, Earthscan, London, pp. 43-60.
- Svedin, U. and Hagerhall- Aniansson, B. (Eds.)(2002). *Sustainability, Local Democracy and the Future: The Swedish Model*. Kluwer Academic Publishers, Dordrecht
- Turner II, B.L., Clark, W.C., Kates, R.W., Richards, J.F. Mathews, J.T. & Meyer, W.B. (eds.)(1990). *The Earth As Transformed by Human Action. Global and Regional Changes in the Biosphere over the Past 300 Years*, Cambridge.
- van der Leeuw, S. (2000) Land Degradation as a Socionatural Process, in McIntosh, R.J., Tainter, J.A. & McIntosh, S.K. (eds.), *The Way the Wind Blows: Climate, History and Human Action*, Columbia University Press, New York.
- Walker, B.H. (1992) Biological diversity and ecological redundancy, *Conservation Biology*, 6, pp. 18-23.
- Ward, B. & Dubos, R. (1972) *Only one Earth: The care and maintenance of a small planet*, Norton, New York.
- World Commission on Environment and Development (WCED) (1987) *Our Common Future*, Oxford University Press, Oxford.

Le Monde en 2025

LES QUATRE TRANSITIONS

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Les évolutions socio-économiques et géopolitiques auxquelles l'Europe est aujourd'hui confrontée sont très largement le produit *de trois grandes transitions* amorcées simultanément au cours des années 80 : la globalisation sous toutes ses formes (couplée au développement des technologies de l'information et à la libéralisation des marchés), la mise en place d'un nouveau système international se substituant à celui de la « guerre froide », et enfin, l'émergence sur l'agenda politique international de la question climatique¹⁵².

Malgré la crise actuelle, tout laisse penser que ces trois grandes transitions – technico-économique, géopolitique et écologique – vont continuer à être déterminantes dans les décennies à venir.

L'objet de ce texte est d'analyser brièvement, comment ces différentes dynamiques s'articulent avec une *quatrième transition* beaucoup moins visible mais tout aussi centrale, qui est la *transition urbaine*. Il est aussi de s'interroger sur les formes futures d'intégration, de complémentarité ou de « découplage », entre la question climatique et celle des ressources, notamment énergétiques, deux questions qui sont souvent, à tort, confondues.

¹⁵² Il suffit de rappeler la concentration des événements qui se sont produits entre 85 et 89 pour se rendre compte de l'importance de la coupure que représente la fin des années 80 : lancement du premier ordinateur portable (1985), début de la Perestroïka, Protocole de Montréal (1987), Conférence de Reykjavik (1987), Création de l'OMC (1988), Mise en place de l'IPCC (1988), Chute du mur de Berlin (1989)...

I. LES QUATRE TRANSITIONS

Certains ont pu craindre, un moment, que la prospective ne survive pas à l'horizon, symbolique, du deuxième millénaire. Ces craintes se sont révélées a posteriori totalement infondées : jamais, au contraire, autant de travaux n'ont été lancés et publiés par ce qui pourrait être le monde en 2020-2030, voire 2050. A leur lecture se dessine un monde qui semble déjà relativement bien circonscrit pour 2025-2030 : une population augmentée de un milliard et demi d'habitants (essentiellement en raison de la croissance des grandes villes du Sud) ; un PIB mondial multiplié en moyenne par 2 ; une consommation d'énergie accrue de moitié ; une Europe réduite à 8% de la population et environ 20% de la production mondiales et désormais talonnée par l'ensemble CHINE-INDE-ASIE DU SUD; une planète plus fragmentée et moins gouvernable...

D'où vient-il, cependant, que domine un sentiment d'incertitude radicale ?

Sans doute de ce que chacun perçoit que les grandes transformations commencées dans les années 80 sont aujourd'hui, vingt à vingt-cinq ans après, face à un tournant, face à des *bifurcations majeures*. Si bien que l'on est actuellement incapable de définir clairement leur direction future, et encore moins d'anticiper comment toutes les hypothèses d'évolution envisageables vont pouvoir se combiner à l'horizon des deux prochaines décennies.

Pour chacune des quatre transitions évoquées précédemment nous sommes dans une « zone de turbulence » qui rend l'idée même de « scénario tendanciel » à priori caduque.

I.1. La transition économique : retournement, crise ou super cycle ?

Après l'explosion de la bulle INTERNET en 2001, la crise des « subprimes » et du système financier mondial, la multiplication par 3 à 4 du prix de l'énergie et des matières premières, la chute du dollar, le retour de l'inflation et de la récession dans certaines parties du Monde, marquent un point d'inflexion majeur dans la dynamique de mondialisation et de croissance amorcée depuis les années 1980. Associée à la hausse des prix des ressources, l'idée d'un possible *retournement du cycle de longue période* (« cycle KONDRATIEV ») commencé il y a deux décennies est évoquée par certains experts avec la perspective de contraintes beaucoup plus fortes sur les systèmes de financement et de crédit (« crédit crunch »), le retour à des tensions protectionnistes, des risques de longue déflation... et peut-être d'un atterrissage brutal de l'économie chinoise...

Mais cette perspective de ralentissement durable de la croissance mondiale – due à un retournement de « cycle long » – n'est qu'un des scénarios imaginables pour les vingt prochaines années. Car au moins cinq autres hypothèses d'évolution, certaines plus pessimistes encore, d'autres nettement plus optimistes, sont également envisageables ou envisagées – ce qui donne bien la mesure des incertitudes pesant sur la dynamique de mondialisation amorcée depuis vingt-cinq ans :

- du côté des conjectures plus pessimistes, celle d'une grande *crise systémique* n'est plus à écarter ; comme celle d'un fort ralentissement économique due à des contraintes physiques insurmontables sur les ressources (« scénario Malthusien »)
- du côté des hypothèses plus optimistes on peut également imaginer comme le font différents experts, d'abord celle d'une mondialisation élargie et mieux régulée¹⁵³ ;

¹⁵³ Avec par exemple une intégration des Pays Méditerranéens et de l'Afrique, et une meilleure articulation des régulations commerciales, financières, sociales et environnementales

- celle d'une nouvelle vague technologique (« *une quatrième révolution industrielle* ») liées aux énergies alternatives et au « développement durable » ; ou enfin celle d'un « *supercycle de croissance* »¹⁵⁴ tiré par le poids massif des économies asiatiques (CHINE, INDE...) et émergents (BRESIL...) – supercycle qui aurait des effets analogues à ceux qui avaient résulté, à la fin du XX^{ème} siècle de l'intégration des Etats-Unis dans l'économie mondiale. Dans ce dernier cas, la seconde phase de la transition amorcée dans les années 80 conduirait à un basculement encore plus accentué de l'économie mondiale vers les pays asiatiques, comme l'avait anticipé l'IIASA dès le milieu des années 80 à travers son scénario de « *Big Shift* »¹⁵⁵.

La multiplicité des incertitudes concernant aussi bien les impacts de la crise financière actuelle, que les données structurelles de l'économie mondiale (stabilité des monnaies, évolution du système bancaire et de l'épargne en Asie, capacité à refinancer les déficits américains, prix des ressources...) ; ou que même les technologies (maturité et compétitivité des énergies « alternatives », acceptabilité sociale du nucléaire, des biotechnologies et des nanotechnologies, redéploiement ou « épuisement » de la vague des technologies de l'information et de la communication¹⁵⁶) *font que toutes les hypothèses précédentes, aussi extrêmes et opposées soient-elles* (voir *tableau 1*) *doivent être considérées avec une égale attention* – ce qui, naturellement ne facilite pas la prospective dans les autres domaines (géopolitique, écologique...).

¹⁵⁴ Sur cette notion de « Supercycle » on peut se référer aux deux sources suivantes : P. CASHIN et MC. DERMOTT : « The Long-Run Behavior of Commodity Prices : small trends and big variability », IMF Staff papers, vol.49 n°2, 2002, ainsi que M. RADEJZKI, The ANATOMY OF THREE COMMODITY BOOMS, Resources Policy, n°31, 2006

¹⁵⁵ Source : IIASA, Les Futurs de l'Environnement en Europe, 1987

¹⁵⁶ S'il n'y a pas de limites à une économie de la connaissance, certains experts évoquent la possibilité d'un ralentissement très sensible de l'innovation dans les technologies de la communication dès 2015

Tableau I : LA TRANSITION ECONOMIQUE : SIX SCENARIOS
EGALEMENT PROBABLES POUR LES VINGT PROCHAINES ANNEES

<div>Nature des Scénarios</div> <div>Enjeux</div>	SCENARIOS "PESSIMISTES"	SCENARIOS "OPTIMISTES"
	CRISE SYSTEMIQUE MONDIALE ET RETOUR AU PROTECTIONNISME	MONDIALISATION ELARGIE ET MIEUX REGULEE (SCENARIO TENDANCIEL AMELIORE)
REGULATION DES DESEQUILIBRES MONDIAUX		
CYCLE LONG DE CROISSANCE (1985-2035)	RETOURNEMENT DU CYCLE KONDRATIEV (DEFLATION ET CROISSANCE FAIBLE)	SUPERCYCLE DE CROISSANCE TIRE PAR L'ASIE ET BASCULEMENT DE L'ECONOMIE MONDIALE AU PROFIT DES "BRICS" (SCENARIO DE "BIG SHIFT")
RELATION DE LA CROISSANCE SUR RESSOURCES NATURELLES	FORT RALENTISSEMENT DE LA CROISSANCE DU AUX CONTRAINTES SUR LES RESSOURCES (SCENARIO NEO MALTHUSIEN)	NOUVELLE VAGUE TECHNOLOGIQUE ET ECONOMIQUE LIEE AUX NOUVELLES ENERGIES, AU DEVELOPPEMENT DURABLE ET AUX CHANGEMENTS DE MODES DE VIE (IVème REVOLUTION INDUSTRIELLE)

I.2. La transition géopolitique : entre realpolitik et gouvernance introuvable

La même incertitude et le même sentiment d'être en face d'une bifurcation majeure existent dans le domaine géopolitique. L'attentat du 11 Septembre, les difficultés des Etats-Unis en IRAK et de l'OTAN en AFGHANISTAN, le retour des tensions avec la Russie, l'extension des « Etats défaillants » en Afrique ou en Asie Centrale, la crise de l'OMC et du Système des Nations-Unies – sans oublier le refus de la Constitution Européenne – ont fait s'évanouir les espoirs et les illusions, ouverts par la chute du mur de Berlin, d'un nouvel ordre mondial équilibré et démocratique.

Au tournant des années 80-90 avec le traité de REYKJAVIK, le protocole de MONTREAL ou la Conférence de RIO, on a pu un instant penser que l'investissement consenti auparavant par les grandes puissances pour la course aux armements allait se déplacer vers l'organisation « en bien commun » de la planète¹⁵⁷. La constitution ou le renforcement, au même moment, de grands ensembles régionaux (ALENA, MERCOSUR, ASEAN, Traité de MASSTRICHT...) ont pu également laisser croire que ce nouvel ordre international pourrait désormais reposer sur un équilibre entre plusieurs pôles structurés d'importance sensiblement comparable (gouvernance multipolaire).

Aucune de ces deux perspectives ne s'est malheureusement concrétisée. Le Monde est devenu de plus en plus éclaté et divisé ; les conflits identitaires se sont multipliés le plus souvent à l'intérieur des pays¹⁵⁸, seule est restée la superpuissance américaine.

Aujourd'hui, après l'échec de cette régulation « unipolaire » par les Etats-Unis, la situation géopolitique est en phase de reconfiguration profonde – si bien qu'il est possible de parler – comme en économie – d'une seconde phase dans la transition amorcée depuis les années 80, après la guerre froide.

Dans un contexte où vont demeurer la menace terroriste et les tendances à la fragmentation, le choc frontal entre ce qui s'annonce comme un retour aux facteurs traditionnels de la puissance (poids du nombre et de la richesse en ressources naturelles, primauté absolue des intérêts nationaux, revendication d'un accès ouvert aux armes nucléaires...) et l'émergence de préoccupations et de réseaux d'acteurs profondément différents de la période récente (avec probablement, par exemple, une attente désormais beaucoup plus forte de re-régulation internationale...) aura des effets que personne aujourd'hui ne peut réellement anticiper. Ce qui, là encore, laisse ouverte la possibilité de scénarios très différents – et même radicalement opposés.

Pour illustrer ces différences – et donc l'ampleur des incertitudes géopolitiques actuelles – il suffit de rappeler des quatre scénarios les plus souvent évoqués par les experts pour les deux décennies à venir :

- d'abord le *scénario* « cosmopolitique » : une érosion lente des institutions nationales et internationales existantes, compensé par la coopération de réseaux d'acteurs non institutionnels (ONG, entreprises...) engagés dans des formes nouvelles de gouvernance...¹⁵⁹

¹⁵⁷ REYKJAVIK, qui marque un renversement dans la course aux armements, peut être interprétée comme marquant une inflexion dans la notion de « puissance ». « Etre une grande puissance » ce n'est plus nécessairement avoir plus d'armes que les autres (la guerre nucléaire ne peut faire que des vaincus), mais se montrer capable de gérer la planète.

¹⁵⁸ Le nombre des conflits armés n'a cessé de décroître depuis 1989 : une trentaine à cette époque, moitié moins en 2007. En revanche les guerres civiles ou les partitions d'Etats se sont multipliées.

¹⁵⁹ Voir par exemple le livre publié en 2002 par Ulrich BECK : « Pouvoir et Contre-pouvoir à l'ère de la mondialisation » ; SUHRKAMP VERLAG

- puis un *scénario d'explosion des revendications identitaires*, s'accompagnant d'une accélération de la fragmentation et de la décomposition des Etats, d'une intensification des conflits, et d'une recomposition de la richesse autour de grands pôles régionaux, de centres culturels ou religieux ou de villes globales (« *un monde d'archipels* »)
- un scénario de *rerégionalisation* du MONDE *autour de grandes puissances* ou de grandes alliances (OTAN, groupe de SHANGHAI, Coopération SINO-AFRICAINE...), *organisant la compétition pour les ressources* (hypothèse de retour à la « *realpolitik* ») ;
- et enfin un quatrième scénario, plus optimiste, de *coopération* entre grandes régions *régulées* par des mécanismes plus efficaces de gouvernance mondiale et la reconnaissance de l'existence de « *biens communs globaux* ».

Comme en économie, la difficulté est qu'aucun de ces scénarios ne peut être considéré aujourd'hui comme totalement impossible, ce qui veut dire que l'Europe doit pouvoir se situer par rapport à chacun d'entre eux.

I.3. La transition climatique : entre évidence de l'urgence et inanité

Pour le climat également une nouvelle période s'ouvre aujourd'hui ; – après celle amorcée depuis la fin des années 80 – et *l'on sait déjà qu'elle sera décisive*.

Malgré l'adoption – in extremis – du protocole de KYOTO (grâce à la signature de la Russie), les progrès réalisés au cours des vingt dernières années sont en effet restés très en deçà de ce qu'une « transition réussie » supposerait à priori. Les mesures faites par les scientifiques depuis l'an 2000 ont ainsi montré que « les émissions mondiales de dioxyde de carbone croissent désormais plus vite que ne l'envisage le scénario le plus pessimiste de l'IPCC »¹⁶⁰, ce qui rend déjà très problématique une limitation du réchauffement à moins de deux degrés d'ici un siècle. Et il est très probable que les objectifs de KYOTO ne seront pas respectés... Face à ces deux constats, c'est l'évidence de la nécessité d'une rupture qui s'impose ; et l'on sait que cette rupture devra se faire dans des deux prochaines décennies...

La « bonne nouvelle », du point de vue de la transition climatique, est que l'importance historique d'un tel changement majeur s'est – de fait- ouverte depuis 2004-2005 grâce à la multiplication par 4 des prix du pétrole et du gaz. A l'échelle du long terme, cette hausse de prix du pétrole et des énergies est, sans doute, un des événements les plus positifs de ce début du millénaire¹⁶¹, d'autant qu'elle coïncide avec une prise de conscience beaucoup plus large du réchauffement climatique par les médias et l'opinion publique. La possibilité d'articuler la question du climat avec celle du « peak-oil » et des ressources énergétiques crée effectivement les conditions d'une phase nouvelle dans la transition climatique.

Mais elle a, symétriquement, l'inconvénient de rendre les solutions à apporter à l'effet de serre, très dépendantes de ce qui pourra se passer dans le domaine de l'énergie.

Or, comme va le développer la seconde partie de cette note, les deux problématiques ne se confondent pas

– ni en termes d'enjeux, ni en termes de solutions technique, ni en termes d'intérêt et de jeu d'acteurs. Même si les pressions à la hausse sont fortes, rien ne garantit que le prix des

¹⁶⁰ Source : National Academy of Science, M. RAUPACH et alii, Global Carbon Project

¹⁶¹ Ce qui ne veut pas dire qu'elle n'ait pas des conséquences sociales et économiques très dommageables à court terme pour tous ceux qui la subissent.

énergies fossiles restera au niveau qu'il a atteint aujourd'hui¹⁶². A l'incertitude sur les négociations du futur « KYOTO 2 » il faut donc ajouter celles sur l'évolution à moyen terme des marchés de l'énergie. Là encore cela conduit à envisager pour les deux prochaines décennies plusieurs scénarios possibles, dont celui, qu'on ne peut complètement écarter, d'une baisse du prix des énergies fossiles et d'un échec de KYOTO 2. Comme en économie ou en géopolitique cela ne met pas l'Europe à l'abri de surprises majeures possibles.

I.4. Une combinatoire incertaine

Les trois bifurcations - ou changements de phase - qui viennent d'être évoquées ne sont naturellement pas indépendantes les une des autres. La manière dont sera à l'avenir régulé le système financier américain et international aura des répercussions sur les prix futurs de l'énergie - et donc la question climatique. Et beaucoup escomptent que celle-ci, en retour, puisse avoir des effets de levier efficaces sur la réorganisation de la gouvernance mondiale... La prise de conscience profonde de ce que ces trois « transitions » -, économique, géopolitique et énergético- climatique - font système sera un déterminant majeur de la dynamique de mondialisation dans les vingt années à venir. Et, heureusement, c'est une idée qui semble déjà assez largement partagée par une fraction importante des acteurs socio-économiques ou gouvernementaux ...

Que ces trois dimensions fassent système ne dit cependant rien sur leur combinaison possible. Compte tenu de l'ampleur des incertitudes propres à chaque dimension, il est en effet extrêmement difficile de prévoir comment toutes les hypothèses vont s'articuler et donc de définir les tendances ou les scénarios les plus probables.

Reprenant une typologie proposée dès la fin des années 90 par un groupe de réflexion réuni à l'initiative du gouvernement canadien¹⁶³, on peut en effet, *de manière très schématique*, envoyer au moins **quatre grandes configurations de changements à l'échelle mondiale d'ici 2025 -- 2030** :

- d'abord *un scénario de crise prolongée*¹⁶⁴, avec une croissance ralentie au niveau mondial, le retour de la déflation et du protectionnisme, des prix de l'énergie modérés ou à la baisse, l'échec de KYOTO II, de graves crises sociales et alimentaires dans les pays du Nord et du Sud, d'importantes migrations dues à la fois au chômage et aux changements climatiques (c'est le scénario du « TITANIC ») ;
- ensuite *un scénario de montée des conflits*, et en particulier de *conflits sur les ressources*, avec une croissance mondiale à la fois forte et inégale tirée par les « BRICS » et l'ASIE ; des prix de l'énergie et des produits alimentaires élevés ; le retour du nationalisme, des frontières¹⁶⁵, et des identités territoriales ou religieuses ; la dissémination des armes nucléaires (IRAN,...) ; le renforcement des systèmes d'alliance régionaux (y compris militaires)¹⁶⁶ ; des engagements sur le climat limité aux pays européens ; la multiplication des conflits localisés et des événements extrêmes dus au réchauffement climatique (cyclone, sécheresse, inondations...) ; une accentuation globale des inégalités

¹⁶² Il faudrait que le prix du pétrole se maintienne au prix de 70-80 euros par baril pour que les énergies renouvelables de substitution soient économiquement rentables. Fin 2008, on n'en est pas très éloigné de 100 euros par baril.

¹⁶³ Source :

¹⁶⁴ Comme celui qu'a connu le Japon dans les années 90.

¹⁶⁵ Depuis 15 ans 26 000 km supplémentaires de frontières internationales ont été créés.

¹⁶⁶ Avec des interrogations majeures sur le positionnement de la Russie : liens renforcés avec l'Europe, avec l'Asie Centrale (Caucase...), avec la Chine (Groupe de Shangai), avec les pays Artiques...

entre groupes sociaux, villes et campagnes ; une généralisation de la violence urbaine ; et finalement une faillite de la gouvernance mondiale ; ...

- En troisième lieu *un scénario de retour à MALTHUS*, et d'autorégulation du développement en fonction de la disponibilité des ressources, avec une croissance fluctuante mais sur le long terme modérée, des prix de l'énergie élevés (dépassement du « peak-oil... ») ; une prise en charge des problèmes d'environnement et de développement durable par les acteurs « décentralisés » (société civile, consommateurs, communautés, entreprises, ...) ¹⁶⁷ ; des formes très actives de redistribution et de solidarité (notamment Nord - Sud) ; une RE-REGIONALISATION des économies - dues aux coûts élevés des transports et à une moindre différenciation des coûts salariaux ; et finalement une intégration forte des grands ensembles géopolitiques (Europe, Amérique latine, Asie de l'Est, sous-ensemble africains, ...).
- Et enfin *un scénario de coopération internationale dans la perspective d'un développement durable à l'échelle mondiale*, avec une croissance forte tirée par les écotechnologies et les énergies renouvelables (« nouvelle révolution industrielle ») ; des prix de l'énergie stabilisés à un niveau élevé ¹⁶⁸ ; une gouvernance mondiale efficace du réchauffement climatique ; une meilleure intégration de l'Afrique dans la mondialisation ; un meilleur équilibre politique et économique entre grandes régions ; plus de régulation internationale et de mutualisation des risques et des problèmes de sécurité ; des mécanismes plus efficaces de stabilisation des parités monétaires, de l'épargne et des flux financiers ¹⁶⁹ ... ;

Même si les événements récents vont plutôt dans le sens d'une demande accrue de régulation - et donc du quatrième scénario - rien ne permet cependant aujourd'hui d'écarter l'éventualité des trois autres - ce qui veut dire que *la politique européenne future devra nécessairement inclure un volet important de gestion des risques en situation de fortes incertitudes* (constitution de réserves, réduction des vulnérabilités, politiques actives de sécurité et d'adaptation, ...). C'est le complément indispensable de la stratégie plus offensive d'innovation définie à Lisbonne...

I.5. Une transition oubliée, la transition urbaine

Ce n'est pas le lieu, ici, de développer ces scénarios mais plutôt de faire remarquer que leur dynamique future -- leurs critères d'évaluation, leurs impacts,... -- est fortement liée à une quatrième transition, généralement oubliée dans les perspectives économiques, géopolitiques ou climatiques¹⁷⁰, qui est la TRANSITION URBAINE.

Ce n'est pas un hasard si les événements majeurs des grandes transitions dans lesquelles nous sommes symbolisés par quelques grandes villes : SAN FRANCISCO (et la SILICON VALLEY), WASHINGTON¹⁷¹, BERLIN et RIO pour le tournant des années 70 - 80 ; NEW YORK (2001 et 2008), la NOUVELLE-ORLEANS, PEKIN et SHANGAI¹⁷² pour

¹⁶⁷ Dans une logique « d'empowerment » et de transparence.

¹⁶⁸ Grâce à une articulation efficace entre les prix de l'énergie et taxation (interne et externe)

¹⁶⁹ Avec, au-delà de la gestion de la crise actuelle, énormément d'enjeux à moyen terme : Rôle de l'euro et du Yuan a comme monnaie de référence, contrôle des « paradis fiscaux », évolution de l'épargne chinoise et asiatique, réorganisation du FMI... Il faut rappeler, par exemple que la dette américaine par rapport à la Chine dépasse aujourd'hui 500 milliards de dollars !

¹⁷⁰ Il est, par exemple, significatif que le rapport STERN, qui constitue un document de référence sur le changement climatique, n'accorde aux problèmes urbains que quelques pages !

¹⁷¹ Qui a donné son nom au consensus de Washington

¹⁷² Avec en 2008 les Jeux Olympiques et en 2009 l'Exposition Universelle

la bifurcation actuelle... Les villes jouent un rôle déterminant dans la mondialisation en cours, dans l'organisation des échanges, la production de richesses, la consommation d'énergie, l'augmentation des gaz à effet de serre, la circulation des connaissances et des idées, l'intégration des cultures et des populations migrantes,...

C'est d'elles – comme on le sait - que dépendra en grande partie la maîtrise future du réchauffement climatique. Les villes sont aussi des lieux particulièrement vulnérables au risque, aux événements extrêmes, à l'éventuelle montée des océans, au terrorisme, à la violence sociale ... Avec la capacité à elles seules de déstabiliser des pans entiers de l'économie mondiale¹⁷³ ... Dans ces conditions, aucun scénario sur le monde en 2020 - 2030 ne peut faire l'économie d'intégrer la géographie, la dynamique et le rythme spécifique des phénomènes urbains - avec leurs particularités politiques ou économiques et leur *forte inertie*...

■ *Pour les villes également* - comme pour l'économie, la géopolitique ou le climat - les années 70 - 80 ont marqué le début d'une transition, et celles-ci sont aujourd'hui, aussi, face à un tournant. Dans les pays du Nord, et maintenant en Europe, les années 70 marquent l'accélération de l'étalement urbain, après une phase marquée, au contraire, par la densification. C'est aussi la période de « décollage » de l'urbanisation dans le Sud. En 1975, les populations urbaines des pays du Nord et du Sud étaient à peu près équivalentes (700 millions pour les premières, 820 pour les secondes). Trente ans plus tard le rapport est de 1 à 3 (2,7) : la croissance des villes du Nord n'a été que de 30 % en trois décennies au lieu de 400 % pour celles du Sud (voir le tableau II). En 2050, ce rapport sera de 1 à 5,3 : près de 80 % de la population urbaine mondiale sera alors dans les pays du Sud. Plus concrètement, cela veut dire aussi que d'ici à 2025 pratiquement la quasi-totalité de la croissance démographique mondiale se fera au profit des villes du sud [+ 1,3 milliards d'habitants]. Cela montre l'ampleur de la transition urbaine au milieu de laquelle nous sommes aujourd'hui.

Tableau II : UN SIECLE DE CROISSANCE URBAINE

Sources : Nations Unies, WORLD URBANIZATION PROSPECTS, 2007

MILLIARDS D'HABITANTS	1950	1975	2007	2025	2050
POPULATION MONDIALE	2,54	4,08	6,67	8,01	9,19
POPULATION URBAINE MONDIALE	0,74	1,52	3,29	4,58	6,40
POPULATION URBAINE DU NORD (PAYS PLUS DEVELOPPES)	0,43	0,70	0,91	0,99	1,07
POPULATION URBAINE DU SUD (PAYS MOINS DEVELOPPES)	0,31	0,82	2,38	3,59	5,33

■ *Plusieurs signes laissent cependant penser, que cette transition est, elle aussi, face à un tournant majeur.* Pour la première fois depuis des décennies, la croissance de la mobilité dans certaines villes s'est fortement ralentie en raison de la hausse des prix du pétrole. Beaucoup de grandes agglomérations s'interrogent sur les coûts et les limites d'un modèle d'urbanisation fondé sur l'étalement urbain et la fonctionnalisation des zones d'activité. Partout dans le monde les formes de gouvernance et les capacités de financement apparaissent comme totalement inadaptées pour faire face aux programmes gigantesques qui devraient être menés pour réduire les bidonvilles¹⁷⁴, donner accès aux services essentiels (eau, déchets,...), limiter la congestion, changer les systèmes énergétiques ou s'adapter aux risques climatiques...

C'est donc l'ensemble de la problématique urbaine, dans toutes ses dimensions qui est ou va être mise en question au cours des deux décennies à venir. Et cela aura nécessairement des répercussions économiques, géopolitiques, climatiques ou énergétiques considérables. Dans un passé récent la dynamique des villes - à travers les cycles de contraction et le financement du logement - a eu des impacts décisifs sur les évolutions macro-économiques (récession au Japon, crise asiatique, crise des « subprimes », ralentissement en Espagne et en Grande-Bretagne,...). Demain les villes seront au cœur des questions de sécurité, d'attractivité économique, d'énergie et de changements climatiques. Une prospective à l'horizon 2025 - 2030 ne peut s'en désintéresser, surtout si elle prend sérieusement en compte l'enjeu du développement durable - auquel la partie suivante va maintenant être consacrée.

II. ENERGIE, CLIMAT, RESSOURCES, ENVIRONNEMENT : VRAI OU FAUSSES CONVERGENCES ?

Dans l'analyse des quatre transitions qui vient esquissée, les questions de l'énergie, du climat, des ressources et de l'environnement occupent une place complètement transversale - avec des implications aussi bien économiques que géopolitiques, écologiques ou territoriales. Même si aujourd'hui les préoccupations se déploient légitimement vers les conséquences de la crise financière, il est peu probable que l'importance structurelle de ces enjeux « physiques » soit radicalement remise en cause dans les années à venir. D'autant que des échéances cruciales vont rapidement se présenter qui auront des répercussions bien au-delà de l'horizon 2025. Dans quelles conditions les décisions nécessaires seront ou devront être prises ? Beaucoup dépendra de l'efficacité avec laquelle ces différentes questions - énergie, climat, environnement,... - pourront être articulées.

II.1. L'espoir d'un « triple dividende » : Energie - climat – environnement¹⁷⁵

Aussi bien pour l'énergie que pour le climat, les années qui viennent vont être – comme on l'a déjà dit – décisives ; mais les choix à faire vont devoir l'être dans un contexte

¹⁷³ Comme l'a fait l'attentat du 11 septembre ou le ferait un tremblement de terre majeur à TOKYO ou SAN FRANCISCO. Rappelons que le « PIB » de TOKYO est égal à celui de la France et à peine inférieur à celui de la CHINE (en 2003).

¹⁷⁴ Un milliard d'habitants continuent d'habiter dans des logements précaires.

¹⁷⁵ Quadruple si on ajoute l'économie et l'emploi.

malheureusement peu favorable. Dans le domaine de *l'énergie* des investissements massifs (22 trillions de dollars en 25 ans selon l'AIE) vont devoir être engagés sans grande visibilité sur les prix, la maturité des technologies alternatives, la sécurité des approvisionnements ou la stabilité des contrats entre entreprises exploitants et états propriétaires - ce qui constitue autant d'obstacles importants. Dans l'idéal, il faudrait que le prix du pétrole (et donc du gaz) se situe à un niveau suffisant pour favoriser les énergies alternatives sans peser sur les consommateurs (soit environ 70 -- 80 \$). Mais, sauf mécanisme spécifique de régulation, la stabilisation à un tel niveau d'équilibre est improbable.

En matière de climat, des négociations cruciales se sont déjà engagées sur les suites de KYOTO (post 2012), mais, là encore les chances de succès sont très incertaines, compte tenu des divergences entre groupes de pays :

- le JAPON a annoncé qu'il ne ratifierait le « post 2012 » que si les États-Unis et la Chine faisaient de même ;
- les ÉTATS-UNIS n'accepteront d'engagement chiffré que si les autres grandes économies sont prêtes à en faire autant et, comme le Japon, soutiennent des approches sectorielles ;
- l'INDE considère que la priorité d'un futur accord reste la fixation d'objectifs contraignants pour les pays du « Nord » et souhaite qu'on ne fasse pas dépendre la négociation en cours d'un accord global avec le « Sud » (ce qui laisse la place à des engagements « indépendants » par pays) ;
- la CHINE refuse l'approche sectorielle préconisée par le Japon et réclame que les États-Unis s'engagent d'abord à réduire leurs émissions d'au moins 25 à 40 % d'ici 2005 avec des sanctions en cas de non-respect des obligations ;
- seule finalement l'EUROPE est prête à prendre des engagements chiffrés contraignants, même de manière unilatérale (20 % de réduction des émissions d'ici 2020 et 30 % en cas d'accord mondial) et propose des objectifs de long terme ambitieux¹⁷⁶.

Ces positions de départ très éloignées, rendent un accord mondial sur des objectifs chiffrés improbables - ou, en tout cas, très aléatoire - ce qui veut dire que les actions menées dans le domaine du changement climatique vont continuer à dépendre fortement des convergences existantes avec l'économie et la sécurité des ressources énergétiques, leur disponibilité, leur prix, leurs avantages compétitifs,...

Cette convergence attendue est à la fois une opportunité considérable et un risque.

II.2. Une convergence entre questions énergétiques, climatiques et environnementales qui n'est que partielle

Même s'il est de plus en plus fréquent de les englober sous le vocable de «*développement durable* », il n'est pas inutile de rappeler que les convergences (ou recouvrements) entre questions énergétiques, climatiques et environnementales ne sont que partielles - et dissymétriques.

Globalement les politiques de lutte contre le changement climatique ont un impact positif sur la sécurité énergétique : l'Agence Internationale de l'Energie estime que la moitié des mesures envisageables améliore cette sécurité (mesures d'efficacité énergétique, utilisation d'énergies renouvelables, recours au nucléaire,...) et que près de 40 % sont neutres (importation de biocarburants, agriculture durable, protection des forêts,...)¹⁷⁷. Mais on sait

¹⁷⁶ Une réduction globale de 50 % des émissions en 2050 et de 60 à 80 % pour les pays les plus développés.

¹⁷⁷ Les 3 % restants correspondent à la substitution du charbon par du gaz.

que cette convergence est beaucoup plus faible dans le cas inverse : *la sécurité énergétique n'est pas nécessairement bonne pour le changement climatique*. Dans les scénarios tendanciels de l'Agence Internationale de l'Energie, il est prévu que *d'ici 2030* la consommation de charbon, notamment pour les centrales électriques, augmente de plus de 50 %¹⁷⁸.

Dans l'hypothèse d'une raréfaction accélérée du pétrole et du gaz, avec des prix beaucoup plus élevés, l'augmentation ne pourra être que plus forte - et, avec elle, le recours à d'autre énergie présentant des risques ou « ayant peu d'intérêt » pour le climat : les schistes bitumineux, le charbon liquéfié, les biocarburants de première génération, le bois de feu issu de la déforestation,... Même si beaucoup d'espoir est mis dans les techniques de capture du CO₂, il n'est donc pas évident qu'une stratégie globale centrée exclusivement sur la sécurité énergétique ait des impacts positifs sur la lutte contre le réchauffement.

Les convergences entre les problématiques énergie - climat et celle de l'environnement sont, elles aussi, discutables. Les énergies de substitution au pétrole, au gaz ou au charbon ont toutes un impact important sur l'environnement comme c'est le cas pour le nucléaire, l'hydraulique, les biocarburants de première génération mais aussi l'éolien ou même, à un degré beaucoup moindre, le solaire.

Mais surtout il y a le risque que la polarisation de l'attention publique et de l'action politique sur les seules questions climatiques et énergétiques - par ailleurs essentielles¹⁷⁹ - ne marginalise une grande partie des autres enjeux liés à l'environnement, et notamment les enjeux émergeant propres à la période 2010-2030. L'effet de serre, la protection de la biodiversité à l'échelle mondiale,... correspondent à une seconde génération de la problématique de l'environnement apparue sur l'agenda politique au cours des années 80¹⁸⁰. Or, *nous allons aussi devoir faire face dans les 20-30 années à venir à une nouvelle génération de risques, une nouvelle configuration de problèmes environnementaux qu'il faudra aussi prendre en charge* : les impacts des biotechnologies et des nanotechnologies, les effets synergiques des contaminants en trace, les nouvelles maladies ou nouveaux virus, le terrorisme environnemental, les conflits pour les ressources, la protection contre les « événements extrêmes »,... (voir le tableau page suivante)... Il est important d'accorder *aussi* une certaine place dans les agendas politiques à venir à cette nouvelle génération en émergence.

¹⁷⁸ Rappelons que dans ce scénario tendanciel la part des énergies carbonées devrait rester très largement majoritaire en 2030 : 33 % pour le pétrole, 28 % pour le charbon, 29 % pour le gaz ; les énergies renouvelables « modernes » (éolien, solaire, biocarburants,...) ne représentant encore que 3 % de l'énergie primaire contre 1 aujourd'hui.

¹⁷⁹ Et fortement connectées à d'autres questions écologiques comme la gestion de l'eau ou la lutte contre la déforestation.

¹⁸⁰ Notamment après la publication du rapport GLOBAL 2000 réalisé sous l'administration CARTER.

**Vers une nouvelle configuration de problèmes environnementaux
au XXI^e siècle**



Schéma 1 :
UNE NOUVELLE CONFIGURATION DES PROBLEMES
ENVIRONNEMENTAUX AU XXIème SIECLE (source : J. THEYS)

■ Le constat du caractère partiel des synergies entre questions climatiques, énergétiques et environnementales conduit naturellement à plaider pour des efforts spécifiques d'articulation entre les trois politiques correspondantes - articulation, qui, comme on vient de le voir, ne va absolument pas de soi. Il débouche ainsi sur des scénarios différents de « couplage » ou de « découplage » pour les années à venir.

II.3. Quatre scénarios contrastés d'articulation entre sécurité énergétique et politique climatique

Compte tenu de ce qui vient d'être dit, il n'est pas indifférent de savoir si les dynamiques d'évolution future dans le couple énergie-climat vont être déterminées par le premier ou le second facteur. Les formes possibles d'articulation vont évidemment dépendre du contexte (impact de la crise financière, ralentissement ou pas de l'économie mondiale, événement géopolitique, accidents climatiques¹⁸¹,...) ; mais aussi et surtout de la perception par les différents pays de l'importance respective du réchauffement climatique, d'une part, et de la raréfaction ou du coût d'accès aux énergies fossiles, de l'autre¹⁸².

De manière extrêmement schématique, on peut, en effet distinguer quatre groupes de pays répartis selon la priorité qu'ils accordent soit à la sécurité énergétique (risque de déséquilibre entre besoins et ressources), soit à celle de l'effet de serre.

C'est ce qui apparaît dans le tableau III suivant :

¹⁸¹ Soit en représentant la liste faite par le *Tyndall Institute* : le premier Eté sans banquise au Pôle Nord, l'endommagement irréversible de la barrière de corail, un épisode de sécheresse/canicule persistant, une épidémie majeure, une succession de typhons ou cyclones de type « Katrina »...

¹⁸² Perception qui intègre les disponibilités de chaque pays en ressources, le coût d'accès à des ressources importées mais aussi l'anticipation de la date du Peak Oil ou du Peak Gas.

**Tableau III : PERCEPTIONS RESPECTIVES DE L'URGENCE DES QUESTIONS CLIMATIQUES ET ENERGETIQUES
(PROBLEME D'APPROVISIONNEMENT A UN COUT RAISONNABLE)**

EXEMPLES DE PAYS		PROBLEME SEVERE DE RECHAUFFEMENT CLIMATIQUE	
		OUI	NON
PROBLEME SEVERE D'APPROVISIONNEMENT EN ENERGIE FOSSILES (HORS CHARBON)	OUI	<ul style="list-style-type: none"> • EUROPE • JAPON • COREE DU SUD • ... 	<ul style="list-style-type: none"> • ETATS-UNIS • CHINE • INDE • ASIE DU SUD EST • AFRIQUE (HORS PAYS PETROLIERS) • ...
		<ul style="list-style-type: none"> • PAYS INSULAIRES • NORVEGE • ... 	<ul style="list-style-type: none"> • MOYEN ORIENT • RUSSIE • ASIE CENTRALE • VENEZUELA • PAYS PETROLIERS D'AFRIQUE ET D'AMERIQUE LATINE • ...

- CANADA
 - AUSTRALIE
 - BRESIL
 - ...

En termes de poids économique et de contribution aux émissions de gaz à effet de serre le groupe de pays composé des États-Unis, de la Chine, l'Inde, des pays de l'Asie du Sud-Est et de la majorité des pays Africains ou d'Amérique Latine est sensiblement plus important que les autres (plus de 45 % du PIB mondial et plus de la moitié des émissions). Donnant la priorité à la question des ressources, comportant beaucoup de pays riche en charbon, il est aussi la clé d'une solution efficace à la question climatique.

■ C'est à partir des intérêts de cet ensemble que peut se concevoir un *premier scénario* centré sur le souci d'apporter une réponse crédible *aux risques de raréfaction ou de hausse de prix du pétrole et du gaz*¹⁸³.

L'enjeu majeur de ce premier scénario est la *sécurité d'approvisionnement*. Chaque pays se replie sur ses intérêts nationaux ; les alliances « locales » autour des réseaux ou des contrats producteurs - consommateurs sont privilégiées ; la gouvernance mondiale est affaiblie. Le charbon se substitue progressivement et de manière irréversible au pétrole et au gaz, malgré une hausse homothétique du prix de toutes les énergies fossiles. Les énergies renouvelables se développent mais leur croissance est freinée par leur coût, et la volonté d'éviter toute rupture dans l'organisation des villes et des transports. Tous les grands pays affichent des engagements sur l'effet de serre et les émissions de CO₂, mais ces engagements restent volontaires et réduits à ce qu'il est possible de faire technologiquement : il s'agit de «faire des économies d'énergie » et non de « réduire les émissions de CO₂ », ce qui permet au maximum de diviser celles-ci par deux. Ces progrès ne sont pas négligeables mais ils sont compensés par la création d'irréversibilités ingérables à plus long terme (centrales à charbon, étalement urbain,...), et par l'accroissement de tensions internationales.

■ Les deux autres scénarios mettent, au contraire, en première ligne la question du *changement climatique* et imposent que les pays préoccupés par ce problème - c'est-à-dire d'abord l'Europe - parviennent à prolonger et accélérer la dynamique amorcée par le protocole de KYOTO. La logique de ces scénarios est celle qui est au cœur de ce protocole : une perspective à long terme de limitation du réchauffement à deux degrés ; des objectifs quantitatifs de réduction des émissions ; des pénalités en cas de non-respect ; des instruments de flexibilité, - dont la mise en place d'un marché des permis d'émission, - et donc un prix international du CO₂ - ; des transferts technologiques et financiers « Nord » - « Sud »,...

A partir de ce cœur, et en fonction des résultats de la négociation en cours sur le « KYOTO 2 » (post 2012), deux hypothèses sont envisageables¹⁸⁴ :

- la première hypothèse (scénario 2) est celle d'un « KYOTO 2 » limité à un groupe de pays acceptant des contraintes fortes. Implicitement cela revient pour ces pays (Europe, Japon,...) à accepter des prix du carbone élevés (supérieurs à 50 euros par tonne de CO₂), ce qui n'est économiquement acceptable qu'en introduisant des taxes compensatoires fondés sur la quantité de CO₂ incluse dans les biens importants.

Comme le remarque Paul CASEAU¹⁸⁵ « l'hypothèse est conditionnée par un accord improbable de l'Organisation Mondiale du Commerce, arbitre du protocole » ;

¹⁸³ Voir, sur ce scénario, le rapport de la commission américaine sur la politique de l'énergie publié en décembre 2004.

¹⁸⁴ Voir sur ces scénarios l'article publié dans le numéro 114 de la revue commentaire par Paul CASEAU : «Energie, un essai de prévision globale 2006 - 2050 ».

¹⁸⁵ Article précédemment cité.

- la seconde possibilité (scénario 3) moins improbable, est celle d'un *KYOTO 2* généralisé à tous les pays mais beaucoup moins contraignant : des objectifs purement indicatifs, une vision minimaliste des systèmes de quotas - permis, un plafond pour le prix du CO₂, une forte extension des mécanismes de flexibilité, des transferts de technologie massifs, des aides au développement compensatrices en forte augmentation,... Comme pour le premier scénario, cela conduit à privilégier des politiques d'économie d'énergie plus que de réduction du CO₂, même si dans cette hypothèse le prix du pétrole n'est plus la référence absolue et les utilisations de charbon moindres.

■ Enfin, il ne faut pas négliger la possibilité d'un *quatrième et dernier scénario* qui est celui d'*évolutions chaotiques* avec une très grande volatilité des prix des énergies fossiles et l'échec des négociations futures sur le climat. La succession de périodes de baisse puis de hausse brutales du prix de ces énergies (200 - 300 \$ par baril de pétrole...) empêche toute politique continue d'innovation et de prise en compte réelle du risque lié à l'effet de serre et rend l'économie mondiale vulnérable à un accident climatique majeur ou à la survenue plus précoce du « peak -- oil ». C'est une hypothèse de **prise de risque maximum**.

Même s'il est vraisemblable que l'on ira vers une combinaison du premier et du troisième scénario, aucun d'entre eux ne peut être à priori écarté – y compris celui de fluctuations, erratiques et brutales des prix de l'énergie.

■ Cela appelle finalement les *deux conclusions* suivantes :

① *Les convergences entre la question énergétique et celle du climat ne seront pas données à priori, et devront donc être politiquement construites*¹⁸⁶. Il faudra notamment éviter les conséquences irréversibles d'un recours massif au charbon, tout particulièrement en INDE, en CHINE et aux Etats-Unis ; mais aussi tenter d'*articuler intelligemment prix du pétrole et taxe carbone* – de façon à stabiliser sur le long terme les coûts d'accès aux énergies fossiles... et la rentabilité des innovations dans les énergies alternatives ;

② *Sans rupture dans les modes d'organisation de la gouvernance mondiale, les négociations actuelles sur le climat (KYOTO II) conduiront très probablement à des solutions insuffisantes pour limiter le réchauffement à l'objectif affiché de 2 degrés.*

Cela fait de cette réforme de la gouvernance mondiale un enjeu futur absolument décisif.

¹⁸⁶ Comme l'Europe cherche, de son côté, à le faire à travers l'objectif des « *trois vingt* » (20% de réduction du CO₂, 20% d'énergies renouvelables et 20% d'efficacité énergétique)

III. INVESTIR DANS LES VILLES

Evoquée à propos de l'environnement et du climat, la crise de la gouvernance mondiale pourrait l'être tout autant à propos du système financier, de la sécurité internationale, des déséquilibres alimentaires, ou de l'instabilité des monnaies. Nous sommes dans une période où l'imbrication entre les différents « sous-systèmes » du Monde apparaît plus que jamais étroite. L'intégration systémique, qui n'était qu'une représentation commode au moment du Club de Rome est désormais une évidence dramatique. C'est ce qui a justifié, qu'à propos du changement climatique, la question de la transition soit abordée ici sous toutes ses formes – économique, géopolitique, écologique et urbaine... en mettant l'accent sur les interrelations.

De cette analyse croisée, il est possible finalement, de tirer deux conclusions comme on l'a vu, contradictoires sur les évolutions à attendre dans ces deux prochaines décennies :

- **les vingt ans à venir ne seront que le deuxième moment d'une transition déjà engagée depuis vingt-cinq - trente ans ;**
- **mais, malgré cette continuité, toute les hypothèses pour le futur, tous les scénarios, restent aujourd'hui ouverts.** Ce qui veut dire que *nous entrons aussi dans une période instable où aucune rupture n'est à priori à exclure.*

Face à cette perspective d'instabilité structurelle, l'un des enjeux d'action majeur pour la prochaine décennie sera de tenter de trouver des solutions aux situations d'urgences tout en évitant de créer des impasses ou des irréversibilités ingérables pour les générations futures. C'est le type d'arbitrage qui devra tout particulièrement être fait pour *la gestion des villes*, clef de la transition vers des sociétés post-carbone.

III.1. Entre instabilité, irréversibilité et opportunités : la révolution de la société post carbone

Même si le thème de la régulation fait un retour remarqué dans l'actualité, c'est bien *l'instabilité* qui va rester la tendance structurelle dominante pour les années à venir, avec la conjonction, comme on l'a vu, d'une multiplicité d'incertitudes dans tous les domaines ; un système international « immature », sans gouvernance claire ; des conséquences imprévisibles du séisme économique et financier actuel ; un éclatement et un affaiblissement des Etats ; des controverses sur les nouvelles technologies ; des conflits sur l'accès aux ressources, une violence croissante et une exacerbation des identités, un déficit global de confiance... L'extrême ouverture des scénarios envisagés dans la première partie de ce document ne fait que traduire ce sentiment d'instabilité et d'incertitudes radicales.

Dans un tel contexte il va être absolument essentiel de réussir à faire le partage entre la gestion à moyen terme des déséquilibres et l'anticipation d'irréversibilités inacceptables dans le long terme. Et c'est l'ampleur de ces irréversibilités qui justifie qu'en dépit de toutes les difficultés économiques, une part importante des ressources mondiales soit désormais consacrée, dans les deux décennies à venir, à un basculement aussi rapide que possible vers des sociétés post carbone. Car dans vingt ans, il sera trop tard ¹⁸⁷!

De toutes les transitions précédemment évoquées celle vers cette « société post-carbone » sera sans doute la plus difficile à réussir, avec des conséquences géopolitiques,

¹⁸⁷ D'ores et déjà la hausse des températures liée aux gaz à effet de serre accumulés dans le passé sera au moins de 1,6 degrés (0,8 degrés déjà constatés auxquels s'ajoutent 0,8 à venir, liés aux stocks du passé). La limite de deux degrés sera donc très difficile à respecter.

économiques, sociales ou territoriales considérables (probablement sous estimées par le rapport STERN), et des inerties à surmonter dont personne n'a pris encore la pleine mesure. Même si le contexte est très différent d'il y a deux siècles, *il s'agit d'une révolution d'une importance comparable à ce que fut la première révolution industrielle.*

Il s'agit aussi, comme le récent rapport du PNUE et de l'OIT (WLO) l'a montré, d'une opportunité majeure pour le système économique mondial, et sans doute pour l'Europe –en termes d'emploi, d'innovation et de création d'activités¹⁸⁸. Presque tous les secteurs économiques seront concernés : l'immobilier, les transports, l'agriculture, la chimie, les technologies de l'information... et naturellement le secteur de l'énergie... Les équilibres nationaux, les systèmes d'échanges et de commerce, les flux migratoires, l'accès aux ressources, les modes de peuplement... seront, eux aussi, complètement transformés. Ce qui veut dire que les effets en retour sur la transition économique et géopolitique seront également considérables.

Le risque et l'opportunité d'une telle mutation seront-ils pris dans un contexte d'instabilité et d'incertitudes structurels : c'est une des questions centrales pour les années à venir...

III.2. Investir dans les villes

La transition vers une société post carbone devrait être aussi l'occasion de renouveler en profondeur la question de l'investissement dans les villes. On peut en effet déjà faire l'hypothèse que *sans un investissement massif dans les villes les questions liées à l'effet de serre et à la transition énergétique ne pourront trouver qu'une solution transitoire et tout à fait partielle.*

L'impact des villes sur l'effet de serre et la consommation finale d'énergie va en effet très au-delà de ce qu'on peut inclure habituellement à travers les transports urbains, l'éclairage ou le chauffage des logements et des lieux de travail. Il faut aussi intégrer les matériaux de construction, le développement des infrastructures, la mobilité liée au commerce ou aux loisirs, les activités logistiques ou d'approvisionnement, et une partie des consommations liées à la spécificité des modes de vie urbains.

Les travaux publiés dès les années 90¹⁸⁹ ont ainsi montré que, globalement, le niveau d'urbanisation était un déterminant aussi important que le PNB par tête ou la structure des activités pour expliquer les émissions de gaz à effet de serre dans chaque pays.

Dans un contexte d'augmentation massive de la population urbaine mondiale (+ 1,3 milliards d'ici 2025), ni l'adaptation des comportements à la hausse prévisible des prix de l'énergie, ni les changements attendus dans les modes de transport ne suffiront à réduire sensiblement cet impact¹⁹⁰. On peut s'attendre, en revanche, à ce que les conséquences sociales d'une telle hausse des prix soit, comme celle des produits alimentaires, très difficilement acceptées, notamment dans les villes du Sud...

Pour parvenir à des résultats à la hauteur des enjeux futurs, seules les politiques volontaristes de maîtrise de l'aménagement urbain et d'investissement massif dans les infrastructures, la rénovation énergétique des logements, la protection contre les inondations... pourront être efficaces. **Cela suppose d'accepter de consacrer dans les**

¹⁸⁸ Publié en 2008 ce rapport estime, par exemple, que 20 millions d'emplois pourraient être créés d'ici vingt ans dans le domaine des énergies renouvelables (source : PNUE, OIT : Emplois verts ; pour un travail décent dans un monde durable)

¹⁸⁹ Source : JYOTI PARRIKH et VIBHOOTI SHUKLA : Urbanisation, energy use and greenhouse effects in economic development. GLOBAL ENVIRONMENTAL CHANGE, MAY 1995

¹⁹⁰ Source : Jacques Theys : « Repenser les villes dans la société post-carbone », Communication au colloque organisé par la Commission Européenne sur « La société post carbone », Novembre 2007

quelques décennies à venir à cet objet près de 15 à 20% des investissements à faire dans les infrastructures (logement compris) – soit à l’échelle mondiale entre 20 et 30 Trillions de dollars d’ici 2030¹⁹¹. C’est bien évidemment un chiffre considérable, surtout dans un contexte qui s’annonce difficile pour le financement des investissements publics ou privés. Mais, outre les bénéfices directs en terme énergétique ou climatique, on peut en attendre tout un ensemble d’impacts indirects en terme de réduction de l’habitat précaire (un milliard de personnes vivent dans des bidonvilles), de qualité de vie urbaine et finalement de développement économique... Ce qui justifie d’en faire, aux niveaux européen et mondial, un enjeu prioritaire pour les années à venir.

III.3. Vers une gouvernance mondiale multiéchelle

Tout cela n’est pas indépendant des réflexions qui sont menées aujourd’hui sur la nécessité d’une gouvernance mondiale plus efficace. Compte tenu du caractère décisif de l’enjeu urbain, il faut en effet envisager l’hypothèse d’une forme moderne de gouvernance qui intégrerait les grandes villes mondiales. Dans la perspective d’une meilleure articulation entre les quatre grandes transitions évoquées dans ce document on pourrait imaginer une *organisation multiéchelle de cette gouvernance mondiale* qui prendrait en compte à la fois les Etats, les grandes régions économiques (Europe, Amérique latine, Asie de l’Est...) et les grandes villes ou régions urbaines. Au moment où se fait sentir, à tous les niveaux, le besoin de restructurer la gouvernance mondiale, ce serait une façon de concrétiser un slogan, lui aussi né au moment de la rupture des années 70-80 : « *Penser globalement, agir localement* »...

Mais peut être serait-ce rajouter un élément supplémentaire de complexité dans un système mondial qui a déjà beaucoup de difficultés à gérer sa confusion institutionnelle !

¹⁹¹ A partir des travaux de l’OCDE et de l’AIE on peut estimer à **200 Trillions de dollars d’ici 2030** la somme des investissements à consacrer aux infrastructures et au logement – dont environ 25 Trillions pour l’énergie, 45 pour l’eau, les déchets, les infrastructures de transport et de télécommunication et environ 120-130 pour la construction, le logement et la construction de bâtiments industriels et commerciaux.

Samir AMIN

AU DELA DE LA MONDIALISATION LIBERALE : UN MONDE MEILLEUR OU PIRE ?

1. L'avenir vu par les puissances dominantes

1.1 La masse d'informations de toutes natures concernant tous les pays du monde collectées par la CIA est sans pareille. L'institution n'en tire pourtant aucune analyse qui sorte de la plus grande banalité, sans doute parce que ses dirigeants sont enfermés dans leurs préjugés, incapables de sortir de leur monde anglo saxon, et par là même dénués d'esprit critique et d'imagination.

Le rapport de la CIA sur le monde en 2020 n'imagine pas que les principes de la mondialisation libérale en vigueur, qualifiée de « projet Davos » soient remis en question. Car ces principes sont, d'évidence pour Washington et ses amis, parfaits. Donc sans alternative crédible ; et ceux qui ne pensent pas ainsi ne peuvent être que des déviants irrationnels, ou des démagogues sans principes. Le libéralisme mondialisé est considéré comme porteur d'une bonne croissance économique partout où il est sérieusement mis en œuvre. La mondialisation libérale est par définition heureuse.

Certes dans son déploiement réel ce projet qui constitue « la fin de l'histoire » (d'évidence pour ses défenseurs) souffre d'insuffisances génératrices d'échecs – passagers -, engendre des réactions absurdes (parce que remettant en question les bons principes du libéralisme) à l'origine de situations chaotiques. Dans cette vision les « peuples », les « politiciens » et les « idéologues » sont les seuls responsables des échecs et du chaos, la logique de l'expansion du libéralisme mondialisé (c'est à dire la logique de l'accumulation du capital) n'étant porteuse que de bienfaits pour tous (ou presque).

Ces manières de raisonner et ces visions du monde ne sont certainement pas particulières aux équipes au pouvoir à Washington. Elles reproduisent le discours dominant des pouvoirs dans leur grande majorité, et témoignent des limites étroites qu'imposent les préjugés sur lesquels elles sont fondées. Une analyse de la réalité qui aspirerait à être aussi vraie que possible, doit partir de la remise en question de ces préjugés, et soumettre les thèses qu'ils inspirent à une critique rigoureuse.

Les « écarts » entre le monde en 2020 vu par l'establishment des Etats Unis et le monde d'aujourd'hui ne sont alors que d'importance relative. Ces « écarts » ne concernent d'ailleurs que la place de l'Asie (Chine et Inde en particulier) dans l'économie mondiale du fait de la poursuite d'une croissance forte pour ces deux pays de taille majeure. Cette croissance s'inscrirait dans la mondialisation libérale et serait parfaitement compatible avec le maintien du leadership des Etats Unis. A aucun moment la question n'est posée de savoir si ce modèle peut être poursuivi indéfiniment sans que les contradictions internes aux pays concernés n'imposent des bifurcations dans des directions nouvelles et imprévues.

Ailleurs, « rien à signaler » ou presque.

L'Europe demeurerait enfermée dans ses « impuissances » (à se réformer radicalement dans le sens libéral, à adopter un modèle de gestion de ses immigrés inspiré par la pratique des Etats Unis etc.), de ce fait son économie serait frappée d'atonie opiniâtre. Mais à aucun moment il n'est envisagé que celle-ci puisse devenir insupportable au point de remettre en question le libéralisme aux niveaux nationaux, pan européen ou dans les relations avec le reste du monde. Il n'est pas davantage imaginé que l'Europe puisse sortir de l'atlantisme et de la protection des Etats Unis face aux terroristes que seul Washington serait à même de juguler par la conduite de guerres préventives.

La Russie, toujours réfractaire à la démocratie, serait incapable de se reconstituer en puissance industrielle modernisée et dynamique, et deviendrait une puissance exclusivement pétrolière (comme l'Arabie saoudite). Handicapée par sa démographie de déclin, embourbée dans des rapports tendus avec les nouveaux Etats d'Asie centrale et du Caucase, définitivement séparée de l'Ukraine, elle préférerait naviguer dans le sillage de Washington que de tenter un rapprochement avec l'Europe, auquel celle-ci au demeurant n'est pas intéressée.

L'Amérique latine demeurerait telle qu'on la voit aujourd'hui. Croissance dans le libéralisme dans le cône Sud et au Mexique, avancées en direction de l'intégration imaginée par le projet de zone de libre échange des Amériques, reconnaissance dans ce cadre du leadership de Washington. Le « vestige du passé » (Cuba) disparaît, les soubresauts populistes (type Chavez) sont sans avenir, la montée des indigénismes absorbable.

L'Afrique noire ne rentrerait toujours pas dans l'ère de l'industrie, incapable de suivre en cela les exemples de l'Asie et de l'Amérique latine. Handicapée par l'extension de la pandémie du sida et par une tradition opiniâtre de « mauvaise gouvernance », elle n'enregistrerait de croissance que pour l'exploitation de ses matières premières (pétrole) et – peut-être – quelques produits agricoles.

Enfin les mondes arabe et musulman – du Maroc à l'Indonésie – resteraient paralysés par le ralliement massif de leurs peuples au fantasme de la reconstruction d'un « Califat » mythique. L'échec permanent de ce projet produirait alors l'instabilité politique - rendant impossible le progrès démocratique - et la médiocrité des performances économiques, sans néanmoins que la dérive terroriste permanente qui les accompagne ne soit de nature à menacer réellement le reste du monde. L'échec du terrorisme a toutefois un prix : l'occupation permanente de l'Iraq (prévue d'ailleurs par Washington avant même son agression) – et la remise aux calendes de la démocratie dans ce pays ; le non règlement du problème palestinien ! Pour prix également les restrictions aux droits démocratiques dans les pays de l'Occident « civilisé ».

Les évolutions « probables » décrites ci-dessus conduisent à la conclusion que le leadership des Etats Unis ne serait pas menacé. Pas même par l'Asie triomphante, a fortiori par l'Europe enlisée dans la stagnation et de ce fait rivée par l'atlantisme (et l'OTAN) au char des Etats Unis. L'ONU poursuivrait son déclin, relayée pour la gouvernance politique du système mondial par les Etats Unis, avec le soutien éventuel (mais non nécessaire) de l'OTAN. Guerre préventive, devoir d'intervention (dite humanitaire), propagation (manipulation en fait) des droits de l'homme constituerait l'essentiel du discours de légitimation du nouvel impérialisme, en 2020 comme aujourd'hui.

1.2 Cette image de l'avenir du monde pose problème.

Cet avenir est présenté dans le cadre de prétendus « scénarios », qui en fait se résument à l'alternative « le monde selon Davos » (c'est à dire l'approfondissement de la mondialisation libérale, assurent le leadership plus ou moins exclusif des Etats Unis) ou le « chaos ». Il ne s'agit là que d'un faux contraste, car dans la réalité c'est la poursuite du « projet de Davos » qui engendre le chaos (les réactions « populistes » aux échecs sociaux, le terrorisme etc.). Il ne s'agit donc en fait que d'un seul scénario : la poursuite du projet libéral garanti par celle du leadership des Etats Unis et la gestion du chaos par la militarisation de la mondialisation.

L'establishment des Etats Unis (mais tout autant que lui la majorité des forces politiques au pouvoir dans le monde actuel) refuse d'envisager le contraste véritable qui est à dresser entre précisément ce projet et ceux qui correspondraient à des changements sensibles dans les rapports de force sociaux et politiques en faveur des classes populaires et des nations dominées, qui sont au demeurant la condition d'un recul du « chaos ». Par ailleurs les establishments en question refusent également d'examiner les chances, la portée et les conséquences d'une « sortie à droite » du libéralisme mondialisé en crise, comme celle que les Neo-cons des Etats Unis soutiennent.

Dans ces conditions on serait sans doute tout à fait en droit de poser les questions suivantes : pourquoi les « experts » de l'establishment des Etats Unis nous ont-ils proposé une vision de l'avenir aussi plate ? A qui s'adressent leurs documents ? Quels buts poursuivent-ils ? Sont-ils sincères ou cachent-ils leur jeu ?

Je crois pour ma part que l'objectif réel du document n'est pas de faire réfléchir le lecteur mais au contraire de le convaincre « qu'il n'y a pas d'alternative au libéralisme mondialisé et au leadership des Etats Unis ». Les rédacteurs sont d'ailleurs probablement plutôt démocrates que républicains et bien que les uns et les autres poursuivent les mêmes objectifs, les premiers évitent soigneusement le style arrogant de l'équipe en place à Washington. Sont-ils convaincus que le capitalisme libéral mondialisé peut être « bon » pour tous (ou presque), fût-ce au prix de quelques régulations (comme la « lutte contre la pauvreté » l'exigerait) ? Sont-ils convaincus que les Etats Unis sont investis d'une mission historique et porteurs d'un message de démocratie pour tous ? Sont-ils donc convaincus que l'hégémonie de Washington est par nature « gentille » ? Ou sont-ils des cyniques qui savent bien que le système en place garantit au capital des grandes transnationales un rendement maximal, et que c'est là leur préoccupation exclusive, au mépris des droits sociaux des classes populaires ? Qui se moquent bien de la « démocratie » pour les peuples de la Planète ? Qui n'hésitent pas à donner la priorité au pillage des ressources naturelles des pays soumis à leur protectorat pour le seul bénéfice des consommateurs des Etats Unis ?

Par leur formation et leur culture, ces individus sont sans doute largement convaincus qu'il n'y a pas d'alternative au capitalisme, parce qu'il serait le « meilleur système possible » en termes d'efficacité et d'équité, qu'il correspondrait le mieux à la « nature humaine », serait porteur de démocratie etc. Ils (et elles) croient souvent à la mission historique des Etats Unis. Dans leur manière « d'analyser » la réalité, ils séparent l'objectif de la bonne « économique » (réduit en fait à l'expansion des marchés) et celui de la bonne « politique » (réduit à son tour à la démocratie représentative et la bonne gouvernance). Le concept de « contradiction » est étranger à leur culture et l'idée donc que les contradictions du capitalisme réellement existant doivent, par la logique même de son déploiement, s'aggraver est, pour eux, rigoureusement incompréhensible.

Les « problèmes et les difficultés » n'étant pas le produit de la logique du système, sont donc toujours celui des circonstances du lieu et du moment. C'est dans ce sens qu'à l'origine de ces problèmes il y aurait toujours une responsabilité des « peuples », et que des solutions pourraient donc leur être apportées sans sortir des logiques de principe du système. On ne niera pas qu'il puisse y avoir des discriminations raciales, ou à l'égard des femmes, que les exigences d'une gestion saine de l'environnement puissent être oubliées ; mais il s'agit toujours de « problèmes particuliers », séparés les uns des autres.

Ce plaidoyer en faveur de « l'innocence » des responsables en question ne doit pas faire ignorer que leur culture sert parfaitement les intérêts particuliers promus par les politiques qu'elle légitime. Dans ce sens cette culture peut être lue valablement comme expression cynique des intérêts du capital dominant. Et certains promoteurs des politiques en question peuvent parfaitement avoir suffisamment de lucidité pour savoir quels sont les intérêts qu'ils défendent.

Au delà de ces questions de morale en apparence se profilent les carences que j'attribuerai à l'enferment des responsables de l'establishment des Etats Unis dans leur culture anglo-saxonne. Le texte frappe par l'ignorance qu'il étale de toutes les civilisations de la planète. Le racisme banal à l'égard des « Africains » (lire les « nègres ») et des « hispanos » dicte largement les conclusions concernant les peuples concernés. Une bonne dose de mépris est également affichée à l'égard de la « vieille Europe ».

La conclusion à laquelle cet establishment parvient au terme de ses « réflexions » - à savoir que le monde de 2020 ne sera pas différent du nôtre, sauf que la place commerciale que la Chine et l'Inde y occuperont sera plus marquée (au détriment de l'Europe, mais pas des Etats Unis) – pourrait paraître « plausible ». Quinze ans ne constituent en effet pas une période suffisamment longue pour imaginer des transformations qualitatives des sociétés, surtout lorsque – comme c'est le cas aujourd'hui – aucune alternative cohérente et crédible en apparence au moins (comme c'était le cas avec le modèle du socialisme au XXe siècle) ne se profile à l'horizon visible.

Mon analyse du capitalisme réellement existant me conduit à une conclusion tout à fait différente. Ce système – dans sa forme libérale mondialisée – n'est pas viable, au sens que le chaos qu'il engendre, loin d'être « maîtrisable » par les moyens imaginés par les classes dirigeantes du système, ne peut que s'aggraver rapidement et dans des proportions dramatiques. L'échec militaire et politique en Iraq, le rejet grandissant du « projet européen » par les peuples concernés, les explosions de violence (comme celles qui agitent en novembre 2005 les banlieues des villes de France), et bien d'autres phénomènes désormais quotidiens en témoignent. Cela étant je n'en conclus pas qu'une sortie acceptable « s'imposera nécessairement ». Le monde de demain – même à l'horizon proche de 2020 probablement – sera différent de celui d'aujourd'hui, mais pas nécessairement meilleur. Il pourrait être également pire .

Les scénarios intéressants et utiles pour l'avancée de la réflexion sont donc ceux qui imaginent le pire et le meilleur et en identifient les conditions de l'émergence.

La méthode et les préjugés sur lesquelles se fonde la vision des classes dirigeantes (et en particulier l'establishment des Etats Unis) ne le permet pas. Non pas que les jugements sévères portés à l'endroit des Etats (et des sociétés), tant européens que du tiers monde ne soient pas fondés.

Ils le sont, et ceux que je proposerai d'examiner dans ce qui suit ne le sont pas moins. Mais la sévérité en soi ne suffit pas. Encore faut-il saisir la nature des défis véritables auxquels les sociétés sont confrontées, ce que précisément les préjugés qui caractérisent l'idéologie dominante s'interdisent de faire.

2. Le projet européen est-il viable ?

1. Les discours euphoriques concernant le « projet européen » fournissent le pain quotidien de la grande majorité des politiciens du continent, à gauche comme à droite. Seuls, paraît-il, les extrémistes du « populisme » (partagé par l'extrême droite et l'extrême gauche dit-on) rejetteraient le projet qui serait sans alternative pour l'avenir des peuples concernés. Et pourtant les indicateurs d'une déception grandissante de ces peuples ne manquent pas.

Car en fait le projet européen est fort curieux : il s'emploie, surtout depuis le traité de Maastricht (1992) à réduire les marges des politiques économiques nationales sans faire émerger en contrepartie une gouvernance de substitution au niveau de l'Union ! Autrement dit l'Union Européenne fonctionne dans les faits comme la région du monde la plus parfaitement « mondialisée » au sens le plus brutal du terme (annihilation de la marge d'autonomie des Etats). Ce n'est pas le cas des Etats Unis bien sûr, ni même encore celui des autres régions du monde où l'Etat, même fragile et vulnérable, demeure en principe maître de ses décisions, limité « seulement » par les règles de l'OMC (celles-ci ayant néanmoins en perspective tout également l'annihilation progressive des droits et prérogatives des Etats). L'Europe est donc en avance sur le reste du monde dans le grand bond en arrière.

Cette mutilation que les Etats européens se sont infligés concerne tous les domaines de la vie économique : il n'y a plus en Europe ni politique monétaire, ni politique des changes, ni politique budgétaire, ni politique de l'emploi, ni politique industrielle.

La BCE s'est interdite de mettre en œuvre une quelconque politique monétaire, à laquelle elle a substitué l'objectif exclusif de « stabilité des prix » garantie, prétend-elle par l'interdiction absolue faite aux Etats de financer leur déficit par le recours à « leur » banque centrale. Celle-ci, opérant dans ces conditions, n'a plus d'interlocuteur public (ni les Etats, ni l'Union) auprès desquels elle serait tenue de justifier sa politique. Cette option déflationniste par principe constitue un obstacle supplémentaire permanent à la dynamisation de l'économie.

La BCE ne peut davantage mettre en œuvre aucune politique de change active, dont les objectifs (euro « fort » ou euro « faible ») devraient être définis par un interlocuteur public qui n'existe plus. Le gouvernement des Etats Unis par contre a conservé toutes ses prérogatives dans le domaine de la gestion monétaire. C'est donc Washington qui décide si le dollar sera fort ou faible, tandis que l'euro ne peut qu'enregistrer la décision et s'y ajuster. Ajoutons que l'étalon dollar est en fait un étalon pétrole/dollar : les prix du pétrole sont fixés en dollar et les Etats Unis s'emploient par l'intervention militaire si nécessaire (comme cela a été le cas en Iraq), à interdire aux pays producteurs d'offrir leur pétrole contre règlement en euro. Au demeurant les Etats européens ont, jusqu'à présent, refusé d'entrer dans ce jeu et « faire de la peine » à leur ami d'outre Atlantique. Mutilé de la sorte l'euro ne peut devenir une monnaie internationale à l'instar du dollar.

Le « Pacte de stabilité » a sonné le glas de toute possibilité de mettre en œuvre des politiques budgétaires. Cette option a été justifiée par le recours à une théorie douteuse de l'équivalence de la couverture d'un déficit des finances publiques par l'impôt ou l'emprunt.

Justification au demeurant superflue puisque le Pacte a limité à 3 % le déficit maximal autorisé et à 60 % du PIB le plafond de l'endettement ! Ni les Etats Unis, ni aucun autre pays du monde (sauf les semi-colonies soumises à l'administration du FMI !) ne se sont infligés une telle mutilation, qualifiée de simplement « stupide » - à juste titre – par Prodi.

L'abolition de principe de toute forme de politique industrielle nationale (sous prétexte que la « compétition » transparente – c'est à dire sans protection ou subvention – entraîne l'allocation la plus efficace des investissements) et de toute politique de l'emploi, abandonné aux seules lois du marché (la flexibilité étant supposé résoudre les problèmes !), renforcée par le démantèlement des services publics et les privatisations, n'a pas été compensée –fusse partiellement – par des politiques communautaires. Il n'y a ni « Europe industrielle », ni « Europe sociale » à l'ordre du jour. Sans doute de ce point de vue l'Europe se rapproche-t-elle du modèle qui a toujours été celui des Etats Unis, s'étant engagée désormais très en avant dans la rupture avec toutes les traditions qui aux XIXe puis au XXe siècles avaient été à l'origine de ses succès. Encore qu'aux Etats Unis il y a bien une stratégie du complexe militaro-industriel, fortement soutenue par l'Etat (en dépit du discours « libéral ») sans pareille en Europe. Il est amusant de faire observer que les deux seules percées de la technologie européenne (Airbus et la fusée Ariane) ont été le produit d'interventions de services publics et que, laissés à l'initiative privée, ces deux performances n'auraient tout simplement jamais eu lieu!

Dans un domaine particulier – celui de l'agriculture – l'Europe a effectivement mis en œuvre une politique active, communautaire, libérée du libéralisme doctrinaire. Cette politique a donné des résultats enviables ; elle a permis la modernisation de l'agriculture familiale, l'augmentation des superficies et l'intensification de l'équipement, une plus forte spécialisation, garanti des prix assurant l'équivalence entre le revenu du travailleur paysan et du travailleur urbain, et finalement dégagé des surplus d'exportation importants (trop même !). Qu'a-t-elle coûté ? Sans doute la moitié du budget de la communauté européenne, mais celui-ci est insignifiant (moins de 1 % du PIB des pays concernés). Aujourd'hui, comme on le sait, la PAC est remise en question.

Bénéficiant du second poste des dépenses de l'Union (un tiers du budget) les politiques régionales sont fondées sur de graves ambiguïtés et véhiculent des ambitions politiques discutables. L'objectif n'est pas tant la réduction des inégalités (entre les Etats de l'Union et au sein de ceux-ci entre les régions dont ils sont constitués) que le soutien à leur capacité de « soutenir la concurrence », celle-ci étant supposé être par elle même porteuse de progrès pour tous (le libéralisme doctrinaire n'est jamais remis en question en dépit des démentis cinglants que le passé et le présent lui infligent). Les soutiens aux Etats moins développés sont d'ailleurs appelés à perdre en importance (au moins relative) après l'incorporation des PECO dans l'Union. Articulés principalement sur les soutiens aux régions pour leurs dépenses d'infrastructure et d'éducation, les politiques de régionalisation mises en œuvre ont plutôt accentué les inégalités et favorisé les « régions porteuses d'avenir » sur les terrains ouverts à la concurrence mondialisée (comme la Bavière, la Lombardie ou la Catalogne). L'objectif politique poursuivi ici est d'ailleurs de réduire la portée des « unités nationales » au bénéfice des fidélités « régionales ». Le libéralisme mondialisé préfère toujours les petits Etats aux grands, parce que le démantèlement des fonctions de l'Etat est plus facile chez les premiers. Dans l'Union européenne on préfère l'affirmation « bavaroise », « catalane » ou « lombarde » à celle des Nations (toujours soupçonnées de dériver « chauvines »).

En définitive les conceptions qui dominent les visions de l'élargissement de l'Union ne sont pas d'une nature différente de celles sur lesquelles les Etats Unis ont fondé leur projet d'intégration de l'Amérique latine dans une vaste zone de libre échange des Amériques. Ces formes sont appelées à accentuer la cassure chez les partenaires périphériques (ici l'Amérique latine et là l'Europe de l'Est) entre de petites zones bien intégrées et avantagées, contrôlées par le capital dominant des centres (ici les Etats Unis, là l'Allemagne) et de vastes réserves à l'abandon. Le discours – qui prétend que le « rattrapage » se fera par lui même grâce au flux grandissant des investissements privés directs étrangers – n'a évidemment pas d'autres fonctions que de propagande. Mais, tandis que les peuples d'Amérique latine rejettent l'extension du libre échange à l'échelle continentale et combattent les Etats Unis sur ce terrain l'Europe orientale accueille avec la plus grande naïveté le projet analogue concocté par les centres capitalistes de l'Europe occidentale !

Les politiques de coopération de l'Union avec l'Afrique subsaharienne n'ont jamais été que « néo-coloniales », et ont perpétué l'enfermement du continent dans un statut « pré-industriel ». L'alignement libéral de l'Union qui commande les accords de Cotonou (2000) et ceux dits de « partenariats économiques régionaux » (APER) aggrave cette évolution défavorable. L'Afrique est, dans cette perspective, l'objet d'une « exclusion programmée » (Cf. S. Amin et alii, *Afrique : renaissance ou exclusion programmée*, 2005). En fait la « mondialisation ouverte » associée au maintien du continent dans un statut pré industriel est bel et bien une stratégie mise en œuvre pour donner au capital transnational dominant les moyens de piller à bon compte les ressources naturelles du continent. Mais il faut savoir que ce pillage bénéficiera alors plus aux transnationales des Etats Unis qu'aux européennes. Dans cette perspective du déclin entretenu de l'Afrique les politiques de coopération (aujourd'hui qualifiée de « partenariat » !) entre l'Union Européenne et les ACP sont appelées à perdre progressivement leur importance au profit d'autres initiatives en direction de l'Amérique latine, de l'Asie et de la région méditerranéenne. Mais jusqu'à présent rien n'indique que ces initiatives pourraient innover et prendre leurs distances par rapport aux logiques d'expansion du capital transnational. Les projets dits euro-méditerranéens sont eux, vidés de toute portée potentielle par le ralliement de fait des Européens aux initiatives de Washington et de Tel Aviv, en dépit de quelques contorsions rhétoriques par ci-par là. (Cf. S. Amin et A. El Kenz, *le monde arabe*, 2005).

2. Le projet européen tel qu'il est poussé jusqu'à l'absurde le ralliement à des logiques systématiquement défavorables au succès d'un déploiement économique du continent. On doit alors se poser la question de pourquoi ces options (que Prodi a qualifié à juste titre d'idiotes) ?

La seule réponse raisonnable qu'on puisse donner à cette question est que ce choix a été fait par le grand capital dominant parce que c'était le moyen – le seul possible – pour lui de briser la force sociale que les travailleurs européens (classes ouvrières en premier lieu) avaient acquis au terme de deux siècles de luttes. L'effondrement du système soviétique offrait cette occasion. L'option était donc parfaitement « rationnelle », mais évidemment relevant d'une logique politique du court terme, qui a toujours bénéficié spontanément de la préférence du capital. Le comportement absurde est celui des partis socialistes et sociaux-démocrates européens qui ont cru que l'effondrement des partis communistes ferait leur affaire, alors que la stratégie libérale visait à liquider les uns et les autres.

Le projet donc, tel qu'il est, fait l'affaire des Etats Unis, et c'est bien la raison pour laquelle Washington ne voit aucune « menace » se dessiner venant d'une Europe « compétitive efficace ». D'ailleurs la stagnation relative dans laquelle l'Europe s'est installée par cette forme extrême de l'option libérale facilite le financement du déficit des Etats Unis, causé lui par le leadership dont Washington s'évertue à poursuivre l'affirmation. La stagnation produit en effet un excédent de profits qui, ne pouvant trouver de débouché dans l'expansion des systèmes productifs européens, sont placés sur les marchés financiers des Etats Unis.

Le discours dominant attribue le handicap de l'Europe à la difficulté que ses sociétés éprouveraient à adopter franchement et intégralement les principes du libéralisme « à l'américaine », sans jamais faire la moindre allusion à l'asymétrie qui caractérise les rapports entre les deux rives de l'Atlantique. En fait si les Européens décidaient d'utiliser chez eux le surplus qu'ils prêtent aux Etats Unis - et seule cette décision pourrait sortir le continent de la stagnation - les Etats Unis seraient alors confrontés à l'obligation de réajuster leur économie et de réduire le gaspillage de leur mode de consommation et de dépense militaire. Cela ne se ferait pas sans crise politique majeure.

Les politiques mises en œuvre par l'Europe ne vont pas dans le sens requis pour que sa puissance économique potentielle puisse s'affirmer, mais exactement dans le sens inverse. La privatisation et le démantèlement des services publics de grande efficacité en Europe (la SNCF, EDF et d'autres en sont de beaux exemples) offrent au capital financier des Etats Unis, notamment aux Fonds de Pensions, une occasion exceptionnelle d'écrémer les profits dans les segments les plus intéressants des économies en question, réduisant alors d'autant les moyens de sortie de crise à la disposition des Européens.

Doit-on donc désespérer et accepter le pronostic de Washington selon lequel rien ne remettra en cause les choix européens, pour absurdes qu'ils puissent-être ? Le risque existe et ne doit pas être sous estimé par les mouvements altermondialistes. La classe dirigeante dominante au sens étroit du terme - le grand capital des oligopoles - est fortement tentée de s'enfermer dans cette voie sans issue pour les peuples européens. Car elle bénéficie en contre partie des avantages que sa participation à l'impérialisme collectif de la triade lui procure. Sans doute le gendarme qui neutralise les effets du chaos que ce déploiement impérialiste entraîne - les Etats Unis - sont-ils en mesure de faire payer le prix de leurs services à leurs partenaires subalternes. Mais ceux-ci n'ont pas d'alternative et de ce fait acceptent les postures serviles qui leur sont dévolues. Après tout cela ne sera ni la première fois dans l'histoire, ni la seule dans le monde actuel qu'il en est ainsi.

J'ajoute qu'il faut prendre la mesure des options géopolitiques affligeantes en cours, qui réduisent les marges d'autonomie de l'Europe et lui imposent de naviguer dans le sillage de Washington. L'Europe n'a pas choisi de construire une Eurasie face à laquelle les Etats Unis n'auraient pas pesé bien lourd, laquelle impliquait le rapprochement avec la Russie et la Chine. Au contraire l'Europe a choisi de soutenir - et d'encourager même - les chauvinismes « anti-russes » baltes et polonais (on se croirait retourner en 1920 et au « cordon sanitaire » antisoviétique de Versailles !). Elle accepte l'expansionnisme israélien et entérine la présence militaire des Etats Unis en Irak, en Asie centrale et au Caucase.

Le plus grave est sans doute l'alignement de l'Europe sur les positions du projet de contrôle militaire de la Planète par les forces armées des Etats Unis.

Cet alignement a été signé le jour où, à l'occasion des guerres yougoslaves, l'Europe a accepté que l'OTAN soit investie des fonctions nouvelles de gendarme du monde, associé aux forces propres des Etats Unis. On aurait pu croire qu'avec l'effondrement de l'URSS, l'OTAN perdrait sa raison d'être (« la défense de l'Europe contre une agression soviétique éventuelle »). La décision qui a été prise est allée exactement dans le sens inverse : substituer à l'ONU l'OTAN désormais responsable de la gestion des relations politiques internationales. A partir de là la dérive était difficile à éviter.

Cette dérive a atteint des proportions que l'opinion publique en Europe ignore généralement. Car ce qui a suivi n'a été rien de moins que l'annulation unilatérale par les puissances occidentales de la Charte des Nations Unies qui avaient proscrit la guerre. Les Etats Unis se sont en effet octroyés le « droit » de prendre l'initiative de « guerres préventives » sans que ses alliés de l'OTAN ne réagissent comme il aurait fallu le faire, en se désolidarisant officiellement de cette décision. Il y a plus grave encore puisque Washington s'est également donné le droit d'une première frappe nucléaire, s'il le juge « utile ». Daniel Ellsberg a fait savoir à cette occasion que les documents officiels du Pentagone estiment les « victimes possibles » de telles initiatives à rien moins que six cent millions d'êtres humains ! (cent holocaustes écrit D. Ellsberg). L'Europe et l'OTAN, en gardant le silence sur cette décision, sont désormais les complices du projet criminel des Etats Unis. La seule riposte efficace qui puisse être donnée à cette dérive est l'organisation d'une campagne mondiale pour l'interdiction absolue de l'usage des armes nucléaires (et sans doute également chimiques). Car il va de soi que le traité de « non prolifération » que les puissances de l'OTAN promeuvent est, dans ces conditions, inacceptable pour les peuples d'Asie et d'Afrique, parfaitement conscients qu'ils sont tous menacés d'holocauste par les Etats Unis et l'OTAN.

Cette servilité des segments dominants des classes dirigeantes et de leurs débiteurs politiques (de droite et de gauche) peut-elle s'imposer indéfiniment aux sociétés européennes ? J'en doute fort, parce que précisément – et c'est là que se situe l'essentiel de ma thèse sur la question – les cultures politiques européennes ne devraient pas le permettre. Je ne reviendrai pas ici sur cette thèse que j'ai développée dans *Le Virus libéral* et *Pour un monde multipolaire*, dont j'ai résumée les conclusions dans la phrase suivante : le déploiement de la logique des l'économie des oligopoles dominants rapproche les Etats Unis et l'Europe, celui de leurs cultures politiques les sépare.

3. Je ne crois donc pas que le projet européen tant dans sa dimension libérale extrême que dans son alignement sur la géostratégie de Washington soit viable.

La question de savoir comment il sera remis en cause, aux contraintes de quelles évolutions il sera soumis reste cependant ouverte.

Je reviens donc ici au point de mon analyse qui porte sur les « cultures politiques ». Celles d'une bonne partie du continent européen peut être lue comme une succession de développements majeurs qui ont façonné la cassure droite/gauche : la Philosophie des Lumières, la Révolution française et particulièrement la Convention montagnarde, la formation du mouvement ouvrier et socialiste au XIXe siècle, le marxisme et la Commune de Paris, la Révolution russe et la formation des partis communistes.

La droite s'est constituée en contrepoint au cours de la Restauration (la « Sainte Alliance »), par la formulation d'idéologies « antimarxistes » (dérivant vers les fascismes), la corruption idéologique pro coloniale (et raciste), l'anti-soviétisme. Les étapes de la formation de la culture politique des Etats Unis n'ont rien à voir avec cette histoire. Cette culture s'est constituée dans une succession différente de développements majeurs: l'immigration en Nouvelle Angleterre de sectes anti-Lumières, le génocide des Indiens et l'esclavage intérieur à la société (dont l'impact est autre que celui de l'esclavage pratiqué dans des colonies lointaines), l'avortement de la conscience de classe politique à la place de laquelle les vagues successives d'immigrants ont substitué des communautarismes. La culture politique produite par cette histoire n'est pas celle d'un contraste fort gauche (potentiellement socialiste)/droite mais d'un « consensus » pro-capitaliste relativisant fortement la bipolarité électorale (Démocrates/Républicains).

La question qui se pose aujourd'hui en Europe est de savoir si l'héritage de la culture politique est appelé à s'effriter (et la gauche à disparaître en tant que porteuse d'un projet post capitaliste) au bénéfice d'une « américanisation » en cours (les partis social-libéraux rejoignent le concert des défenseurs du « capitalisme éternel »), ou si une « nouvelle gauche » est capable de se cristalliser autour de programmes à la hauteur des défis. Les deux évolutions restent, à mon avis, possibles.

L'offensive idéologique de la droite nouvelle (qui intègre la majorité de la gauche électorale) a développé un discours hargneux « anti-français », parce que, à juste titre, cette droite voit dans la France – qui a joué un rôle majeur dans la cristallisation des cultures politiques en Europe – le « maillon faible » dans le système européen, engagé sur la route de l'américanisation. « Colbertisme » (c'est à dire un système qui en son temps a construit – avec la Monarchie absolue- les bases de la modernité capitaliste dépassant le féodalisme), « jacobinisme » (qui avait compris que le libéralisme économique étant l'ennemi de la démocratie la Révolution devrait être populaire et non strictement bourgeoise comme le fut celle de l'Angleterre), « laïcité » (dont le « radicalisme » handicape la maturation d'identités « communautaires » souhaités par le modèle de droite pro-américain), voire « gaullo-communisme » (auquel Mr Cohn Bendit préfère sans doute le pétainisme anti-soviétique !) constituent tous les thèmes répétés ad nauseam par cette propagande médiatique. Or il faut bien constater que tous ces thèmes sont dominants dans les discours « européens » (au sens de pro Union Européenne telle qu'elle est et telle qu'on la veut être).

Au delà de la pratique du projet européen il serait donc bon de faire l'analyse du discours dans lequel celle-ci se drape. Dans ce discours toute référence à l'héritage de la culture politique européenne est qualifiée de « ringardise »: la défense des intérêts de classes (inlassablement traitée de « corporatisme » !), le respect du fait national (on lui préfère les régionalismes impuissants face au capital, les communautarismes, voir les ethnocraties à la balte, croate etc.) Sont « modernes » par contre : l'éloge de la compétition entre travailleurs, régions et pays (quel qu'en soit le prix social), ou celui de concepts antilaïcs de la religion (comme la papolatrie à la polonaise).

La reconstruction d'une gauche européenne exige d'évidence la critique radicale de tous ces discours. Elle exige de surcroît qu'on identifie les principes sur la base desquels l'alternative peut être construite, et en tire concrètement les conséquences en termes de programmes à court et à long termes.

Les considérations précédentes constituent une lecture sévère non seulement du « projet européen » tel qu'il est mais encore des réactions qu'il suscite même au sein des mouvements sociaux progressistes engagés. Le projet tel qu'il est devrait sans doute être qualifié non de « projet européen » mais de « volet européen du projet atlantiste placé sous l'hégémonie des Etats Unis ». Les réactions majeures critiques du projet me paraissent être davantage articulées à la recherche d'un équilibre moins asymétrique au sein de la triade impérialiste (par un aménagement dans ce cadre des relations entre l'Europe et les Etats Unis) qu'à celle d'un équilibre mondial moins désavantageux pour le « reste du monde ».

Dans ces conditions la question reste ouverte : le projet européen peut-il « changer de direction », ou doit-il pour que cela soit rendu possible, passer par la phase de la reconnaissance ouverte de sa faillite ?

3. Le Sud peut-il faire reculer l'impérialisme ?

L'impérialisme collectif de la Triade (Etats Unis, Europe, Japon) est à l'offensive et s'emploie activement à refaçonner le monde en fonction de ses objectifs propres. Il est déjà parvenu à réduire les pouvoirs dans la presque totalité des pays du Sud au statut de « compradore ». Dans ce cadre les Etats Unis, parce qu'ils constituent le fer de lance de cette offensive, sont en position de déployer leur projet hégémoniste spécifique. Ce projet passe par la mise en place d'un « contrôle militaire de la Planète » (les termes même dans lesquels Washington exprime sans pudeur ses ambitions).

Pour la mise en œuvre de ce projet Washington a choisi le Moyen Orient comme région de première frappe, pour différentes raisons que j'ai rappelées ailleurs (Cf. S. Amin, *L'hégémonisme des Etats Unis et l'effacement du projet européen*, 2000). Mais le projet vise bien au delà du Moyen Orient le « Sud » dans son ensemble c'est à dire toute l'Asie, l'Afrique et l'Amérique latine. L'impérialisme collectif nouveau n'a pas d'autre moyen pour imposer à terme le maintien des pays concernés dans leur statut de dominés, et c'est pourquoi les partenaires de la triade sont en définitive alignés sur ce projet, quelque démentiel et criminel soit-il, en dépit de réserves exprimées de temps à autre. Le « Sud » demeure la « zone des tempêtes » dans ce sens que les révoltes de ses peuples victimes de dévastations sociales sans précédents sont appelées à se multiplier. Il faudra alors les réduire par la violence militaire – une véritable nouvelle « guerre de cent ans » entre le « Nord » (tant qu'il demeurera impérialiste) et le « Sud ».

Dans cette perspective l'establishment des Etats Unis considère que la Chine constitue son adversaire stratégique majeur. Cet establishment est néanmoins divisé sur cette question centrale. Une fraction pense que la Chine pourrait poursuivre son développement économique accéléré en s'inscrivant dans la mondialisation libérale telle qu'elle est, et que, de ce fait elle acceptera de jouer le jeu et s'accommodera du leadership des Etats Unis. Dans ce cas la Chine demeurerait plutôt un allié qu'un adversaire, même si cet allié peut exiger (et obtenir) des concessions particulières à son profit. Une forme de complémentarité se construirait alors entre la Chine qui couvrirait une proportion grandissante des importations de biens de consommation manufacturés des Etats Unis et ces derniers, fournisseurs de technologies avancées et de capitaux. Mais une autre fraction de la classe dirigeante de Washington craint que la Chine joue son propre jeu, tente de s'appropriier les technologies avancées et simultanément de renforcer ses capacités militaires. Il faudrait alors envisager une guerre préventive contre cet adversaire stratégique avant qu'il ne soit trop tard.

Peut-on, en regardant ce qui se passe dans la société chinoise elle-même pour identifier les contradictions qui s'y développent, donner un meilleur éclairage de la question posée qui concerne la place de la Chine dans le système de ses rapports aux centres impérialistes du système d'une part et aux autres périphéries de celui-ci d'autre part ?

Ce sont là des questions qui ne sont pas considérées dans le discours de l'économie conventionnelle qui se satisfait de vérités simples et superficielles comme la croissance du PIB. Les classes dirigeantes des pays concernés – la Chine en l'occurrence – ont elles-mêmes tendance à se satisfaire de l'image de l'avenir qu'on croit pouvoir déduire de ce genre de « projections », surtout lorsque les « choses vont bien » (que la croissance enregistrée est forte). Les uns et les autres n'imaginent rien d'autre que le sempiternel engagement sur le « chemin du rattrapage ».

Le moment actuel est caractérisé d'une manière générale par l'éclatement du Sud, et le contraste grandissant entre un groupe de pays dits « émergents » (comme la Chine, l'Inde, le Brésil, mais aussi des pays de taille plus modeste, la Corée entre autre) à un pôle, un « quart monde » stagnant, voire même régressant à l'autre. Peut-on en conclure que les pays émergents sont sur le chemin du développement au sens du rattrapage ? Mon analyse, qui porte sur les caractéristiques du nouveau système centres/périphéries, me conduit à une réponse négative à cette question. Dans cette analyse les nouveaux avantages décisifs qui définissent les postures de domination des centres ne sont plus constitués par le monopole de l'industrie comme par le passé lorsque la contradiction centres-périphéries était pratiquement synonyme de pays industrialisés/pays non industrialisés, mais par le contrôle des technologies, des flux financiers, de l'accès aux ressources naturelles, de l'information et des armements de destruction massive. Par ce moyen les centres impérialistes contrôlent effectivement les industries délocalisées dans les périphéries « émergentes » - les véritables périphéries de l'avenir.

On se fait beaucoup d'illusion, dans les pays émergents en question, sur l'avenir que les développements en cours préparent. Dans le cas de la Chine le succès de l'option de ce qui pourrait être une perspective capitaliste nationale - celle d'un capitalisme puissant devenu acteur actif dans le système mondial - se heurte à des obstacles appelés à devenir toujours plus sérieux. D'une part cette option ne peut pas associer les très larges masses populaires paysannes et urbaines aux bénéfices de la croissance économique. Les résistances de celle-ci sont donc appelées à se manifester avec toujours plus de vigueur. J'ai appelé l'attention ici sur la résistance particulière des paysans, bénéficiaires d'une révolution radicale en leur faveur, menacés par le projet de privatisation du sol agraire (un projet « d'enclosure »). Le développement de ces luttes pourrait faire infléchir le projet chinois en direction d'un « socialisme de marché » authentique, c'est à dire d'une combinaison donnant toute sa force à la priorité sociale (la justice sociale) dans le modèle de développement, réorienté vers l'expansion prioritaire de la demande interne des classes populaires. On s'éloignerait alors beaucoup du modèle de la Chine s'inscrivant simplement dans la mondialisation libérale. Je renvoie ici aux débats sur le sujet, vifs en Chine (S. Amin, *Theory and practise of Chinese market socialism*, 2005).

D'autre part, il faudrait être naïf pour penser que les puissances impérialistes dominantes accepteront sans réagir de voir un pays de la taille de la Chine s'ériger en « partenaire égal ».

Lorsque la Chine a cru pouvoir acheter une transnationale du pétrole pour s'insérer davantage dans la mondialisation libérale et s'assurer dans ce cadre de son ravitaillement, les Etats Unis – en violation de tous les principes que seuls les doctrinaires du libéralisme croient être ceux qui régissent la réalité des rapports économiques – ont fait capoter la tentative par une intervention politique brutale. Les heurts entre la Chine et les puissances impérialistes dans tous les domaines que concernent l'accès aux ressources naturelles de la planète, la commande des technologies modernes, les droits de propriété industrielle, sont appelés à devenir violents. Plus sans doute que les conflits qui ne manqueront pas non plus de se développer au fur et à mesure que la Chine s'imposera sur les marchés internationaux de produits banalisés.

Les illusions que nourrissent les uns et les autres dans les autres pays émergents sont encore plus grossières. Au Brésil par exemple, mais souvent également ailleurs en Amérique latine, des segments importants de la gauche imaginent possible la construction de blocs hégémoniques gérés dans la tradition de la social démocratie (la « bonne » - celle du Welfare State de l'après guerre en Europe, pas celle d'aujourd'hui alignée sur le libéralisme).

On oublie les conditions tout à fait exceptionnelles qui ont permis le Welfare State social démocrate. Les sociétés occidentales concernées disposaient d'une avance sur toutes les autres qui permettrait à la fois des concessions du capital au travail et la poursuite de leur domination impérialiste sur le reste du monde. La social-démocratie a été social-impérialiste et même social-colonialiste jusqu'à la victoire des mouvements de libération. Par ailleurs la menace que constituait l'alternative communiste a été décisive dans ce glissement du pouvoir en direction du compromis historique capital/travail qui caractérise ce moment exceptionnel de l'histoire. Pour la première fois la cause des classes ouvrières avait acquis une « respectabilité » dont elle n'avait jamais bénéficié jusqu'alors. Ces conditions ne sont pas celles des sociétés de la périphérie d'aujourd'hui, même dans les pays « émergents » qui sont loin de pouvoir s'imposer à égalité avec les centres impérialistes. De surcroît la page du compromis historique en question est tournée dans les centres développés eux mêmes. La social démocratie s'est faite social libérale parce que le libéralisme est le moyen par lequel les centres développés poursuivent leur domination impérialiste sur le reste du monde. La social démocratie ne sort pas du cadre de sa tradition social impérialiste ; et parce que le social impérialisme aujourd'hui est social libéral, le glissement en question était tout à fait attendu. Il reste que le libéralisme, fut-il quelque peu atténué dans ses effets dévastateurs par les social libéraux, ramène les classes travailleuses populaires des centres au statut de dominés pratiquement exclus du pouvoir qui avait été le leur jusqu'en 1945. Les conditions nouvelles pourraient donc constituer la base objective de la reconstruction d'un front internationaliste des peuples (du Nord et du Sud), à condition bien entendu que les forces politiques qui, au Nord, ont l'audience des travailleurs, rompent catégoriquement avec les ambitions de l'impérialisme.

Le sort que le projet impérialiste réserve aux peuples des périphéries « non émergentes » est encore plus dramatique. Les régions du monde dites « marginalisées » sont en fait l'objet de politiques systématiques des forces dominantes que j'ai qualifiées de stratégies « d'exclusion programmée » des peuples concernés facilitant une intégration plus poussée de leurs ressources naturelles soumises à un pillage intensifié. La mise en œuvre de ce projet passe par l'agression et l'occupation militaire (comme en Irak), la mise sous tutelle pour cause d'endettement (cas des pays d'Afrique). Dans ce cadre l'Europe et le Japon se sont pratiquement alignés sur Washington.

La conférence de l'Euro Med tenue à Barcelone (fin Novembre 2005) témoigne de cet alignement : l'Europe y a tenté d'imposer l'agenda qui a la préférence de Bush – la priorité à la « lutte contre le terrorisme ». Les gouvernements arabes, aujourd'hui dociles à l'extrême face aux exigences des maîtres du système, ont été contraints de rappeler qu'il n'était pas possible de mépriser à ce point les droits des peuples palestinien et irakien. L'Europe fait donc passer ses « intérêts » dans la région arabe après ceux des Etats Unis exprimés dans le projet dit du « grand Moyen Orient ». Il en est de même pour ce qui concerne l'Afrique subsaharienne, comme l'illustrent les accords de Cotonou (2000) et les projets dits de partenariat entre l'Union Européenne et les Communautés régionales d'Afrique. L'alignement de tous sur les mêmes discours insipides concernant la « réduction de la pauvreté » ou la « bonne gouvernance », les prises de position arrogantes du nouveau directeur général de l'OMC (le « socialiste » Pascal Lamy !) – à faire pâlir celles des ambassadeurs de l'administration Bush -, témoignent de cette unité de vue des partenaires de la triade impérialiste.

Face à ce défi d'une brutalité sans pareille les réactions du Sud en question sont soit timides à l'extrême soit inappropriés. Les gouvernements, comme ceux des protectorats d'autrefois, ne disposent plus que d'une marge de mouvement limitée à l'extrême, et se gardent de remettre en question le libéralisme économique dont leurs pays font les frais. Désarmés, de larges secteurs des classes populaires embrayent derrière des rhétoriques para religieuses ou para ethniques qui accusent les divisions entre les peuples du Sud.

Les peuples du Sud sont parfois, dans ces conditions, confrontés seuls brutalement aux interventions violentes des impérialistes. C'est le cas en Irak en particulier, comme en Palestine. Bien que leur résistance (partiellement armée) soit héroïque, celle-ci ne bénéficie pas des soutiens moraux et politiques qu'elle mérite. On paie ici le prix des reculs de la conscience progressiste qui caractérisent le moment actuel tant dans les pays européens que dans ceux du Sud. L'isolement relatif de ceux qui combattent en première ligne le projet de déploiement impérialiste favorise parfois des dérives dans les méthodes de la résistance qu'ils promeuvent. A son tour cela ne facilite certainement pas la reconstruction nécessaire de l'internationalisme des peuples.

Reconstruire le front uni du Sud face à l'impérialisme collectif de la triade et à l'offensive militariste des Etats Unis constitue le défi auquel les peuples d'Asie, d'Afrique et d'Amérique latine sont confrontés.

Les peuples d'Asie et d'Afrique étaient bien parvenus – durant « l'ère de Bandoung » (1955-1975) à faire reculer l'impérialisme de l'époque, grâce au front uni qu'ils lui opposaient. Mais les conditions qui ont permis ces succès ne sont plus celles qui gouvernent la conjoncture actuelle. A l'époque les pouvoirs en place, issus des mouvements de libération nationale et parfois même d'authentiques révolutions populaires, bénéficiaient de ce fait d'une légitimité certaine et de la confiance de leurs peuples. De surcroît les Etats qu'ils dirigeaient pouvaient compter jusqu'à un certain point sur l'appui de l'Union soviétique, contraignant les agresseurs impérialistes à une certaine retenue. On sait que par la suite, après la disparition de l'Union soviétique, les puissances impérialistes sont revenues à leur tradition d'agression brutale.

A travers le Mouvement des Non Alignés, le front des Etats et celui des peuples concernés s'exprimaient simultanément. Un « remake » de Bandoung est aujourd'hui impossible. L'érosion du populisme national qui définissait le contenu des politiques mises en œuvre à l'époque et l'offensive impérialiste, amorcée dans les années 1980 puis redoublant de

violence à partir de 1990, ont produit la dérive compradore des pouvoirs locaux. Ceux-ci ont de ce fait largement perdu leur légitimité aux yeux de leurs peuples. De plus les gauches communistes s'étaient largement alignés sur le soutien (fut-il dit « critique ») aux régimes du populisme national de l'ère de Bandoung et de ce fait, ne paraissent pas crédibles, capables d'offrir une alternative nouvelle authentique. Le vide idéologique a opéré comme un appel d'air, permettant aux culturalismes para religieux et para ethniques de répondre au désarroi par des illusions dangereuses que véhiculent leurs discours.

L'alternative authentique – que j'appellerai un Bandoung (et une Tricontinentale) des Peuples se heurte donc à des obstacles sérieux. Les tâches que les gauches dans les pays du Sud ont à accomplir ne sont pas plus faciles que celles au défi desquelles les gauches européennes sont confrontées.

4. Sur le front culturel : en arrière toute

Le recul éventuel de la culture européenne et l'américanisation du monde se traduisent par la généralisation du principe du « large consensus » fondé sur l'affirmation forte de « l'identité communautaire ». On ne doit pas sous estimer le danger fatal pour la civilisation humaine que constituerait le succès possible d'une évolution – que je qualifierai de dérive – dans cette direction. Cette dérive, qui est d'ailleurs déjà amorcée, pourrait constituer une sortie à droite de la crise du capitalisme sénile et permettre son dépassement non par des avancées en direction du socialisme mais par la construction d'un nouveau système de type « tributaire » (« néo-tributaire ») dont je préciserai plus loin les grands caractères. Autrement dit non seulement un « autre monde est possible », mais un « autre monde » est certain, qui peut être meilleur mais tout également pire que celui dans lequel nous vivons.

La réflexion sur ce sujet que je propose est fondée sur un refus de la version linéaire du « progrès humain fatal d'étape en étape du déploiement de l'histoire », que cette version soit fondée sur l'idéologie (européenne d'origine) de la Raison associée à l'économisme de la modernité bourgeoise ou sur l'interprétation marxiste vulgaire de la succession des modes de production. Aux points tournants de l'histoire, c'est à dire lorsque le déploiement d'un système est parvenu à son terme du fait de l'accumulation des contradictions que celui-ci a produit (autrement dit lorsque ce système entre dans l'âge de la sénilité), l'avenir possible se conjugue au pluriel. A ces points tournants les bifurcations de l'évolution ultérieure sont multiples et les directions de l'évolution possible diverses. Cette multiplicité des bifurcations est devenue l'objet d'une formulation mathématique rigoureuse (la théorie du chaos). On peut discuter la pertinence de cette formulation (certainement établie pour certains objets d'étude, comme la météorologie) pour le domaine qui nous concerne (l'histoire des sociétés humaines). Pour ma part, je doute fort de cette pertinence. Par contre je parviens à la même conclusion (la diversité des avènements possibles) par une interprétation non doctrinaire du matérialisme historique, fondée sur ce que j'ai qualifié de « sous détermination des instances » (Cf. S. Amin, *Critique de l'Air du Temps*).

Dans l'analyse que je propose les instances idéologiques et politiques conquièrent une autonomie réelle dans leurs rapports à l'instance économique. Une combinaison particulière de ces différentes instances – parmi d'autres possibles – et la dominance de l'une ou l'autre de celles-ci qui caractérise cette combinaison permettent alors de qualifier le système qui se constitue en réponse à la crise du modèle en place devenu sénile.

J'ai prétendu par ailleurs que le système capitaliste était bel et bien entré dans ce temps final de la sénilité, dans le sens que la gravité des contradictions produites par la logique de son déploiement est désormais telle que leur gestion implique un usage permanent de la plus grande violence politique et militaire des maîtres du système, entre autre la guerre permanente du Nord contre le Sud.

Il ne résulte pas de cette constatation que la crise du système capitaliste mondial sénile en cours débouche nécessairement sur son dépassement par le socialisme tout également mondial. C'est un possible. Lequel exigerait dans l'analyse que je propose : (i) au plan des évolutions politiques et sociales l'association du progrès social, de l'approfondissement de la démocratie et du renforcement de la marge d'autonomie des Nations dans une mondialisation multipolaire négociée ; (ii) au plan idéologique et culturel le renouvellement des valeurs de l'universalisme.

Dans cette seconde dimension les évolutions dominantes en cours vont exactement dans le sens inverse. Les manifestations de ce grand bond en arrière sont visibles dans ce que propose le « post modernisme », tout au moins dans ses courants dominants, par sa remise en cause de la « vérité objective » et la valorisation de la « multiplicité des discours ». Alan Sokal et Jean Bricmont proposent une critique décapante de cette démission de la Raison (cf A. Sokal, *Pseudosciences et postmodernisme*, 2005).

La science prétend faire un usage à la fois de la Raison (la logique) et de l'observation qui lui permettrait de découvrir des vérités objectives, quand bien même serait-elle parfaitement consciente que celles-ci sont toujours partielles et relatives (la science ne cherche pas à connaître la « vérité absolue du tout »), que ses découvertes et les théories qu'elle en déduit doivent être l'objet d'une remise en question permanente qui permet de corriger ses erreurs et d'avancer. Dans cette définition la science plonge ses racines dans le comportement humain depuis la plus haute antiquité de toutes les sociétés de la planète. Il reste que la science a fait un bond en avant qualitatif gigantesque dans l'Europe moderne à partir de la Renaissance. C'est dans ce cadre qu'elle a rompu d'une manière plus systématique avec les méthodes du raisonnement par analogie, substituant la métaphore à la rigueur de l'observation et du raisonnement, qui caractérisait (et caractérise toujours) les « para-sciences » (comme l'astrologie) et la magie. Ce n'est pas un hasard si ce bond en avant est étroitement associé à la critique des dogmatiques religieuses (fondées sur l'interprétation des « textes sacrés »), ni qu'il est associé à la naissance du capitalisme. Simultanément ce bond en avant est de ce fait associé avec une tendance forte à l'eurocentrisme, qui prétend que pour une raison ou une autre il ne pouvait être le fait que des « Européens », comme il l'est avec d'autres caractéristiques de la société moderne dans laquelle la science se déploie – le machisme patriarcal en particulier. Toutes ces limites de la science telle qu'elle est peuvent parfaitement faire l'objet elles mêmes d'une critique scientifique, c'est à dire elle aussi fondée sur l'usage de la raison et de l'observation et le doute sceptique.

Mais dans cette version le post modernisme qui a le vent en poupe ne propose pas ce mode de critique. Il prétend remettre en question le statut privilégié de la science en matière de connaissance. Il prétend que la « vérité objective » n'existe simplement pas, que la vérité est ce que les « gens » pensent vrai. Autrement dit il place le discours scientifique (qualifié de narration) sur le même plan que les autres narrations (celles de la magie, des para sciences, des religions). Il prétend même que la multiplicité de fait des narrations effectivement en cours annihile toute prétention à l'universalité.

Il place tous ces discours sur un même plan et, chose curieuse (mais non incompréhensible) s'abstient de soumettre ceux qui s'auto qualifient de contre hégémoniques à la même rigueur critique qu'il réserve au « discours dominant ».

Le discours post moderniste accompagne et légitime les évolutions majeures en cours c'est à dire l'émergence des « culturalismes » (à conjuguer toujours au pluriel). J'entends par là l'affirmation que les « cultures » constitueraient des réalités transhistoriques fondées sur des valeurs diverses, incommensurables et permanentes. Rien dans l'histoire réelle des peuples ne confirme cet a priori aberrant. Le « culturalisme » - qu'il ne faut pas confondre avec le fait banal et évident que constitue la diversité culturelle – légitime les discours de poursuite de l'absolu dont se nourrissent tous les mouvements para religieux (l'Islam politique, l'hindutva, le christianisme fondamentaliste des Etats Unis, les innombrables « sectes » de toutes natures) ou para ethniques. Il ne s'agit de rien de moins que de discours super réactionnaires qui ne participent en rien aux aspirations à la libération des êtres humains et plus particulièrement des classes et peuples dominés, mais au contraire les enferme dans l'impasse et leur fait accepter la domination réelle dont ils sont les victimes – celle du capitalisme sénile.

Les questions concernant la diversité culturelle et les discours contre hégémoniques sont tels qu'ils facilitent souvent la confusion que je crois nécessaire d'éviter. Soyons donc clairs sur le sujet. Oui, la modernité réellement existante produite par le capitalisme impérialiste est culturellement biaisée, eurocentrique, masculine et patriarcale, prométhéenne au sens qu'elle traite la nature en objet. Oui, les discours contre hégémoniques qui le démontrent (le féminisme, l'écologisme, l'anti-impérialisme culturel) constituent les éléments positifs incontournables de toute alternative humaniste. Mais cette alternative, loin d'être la négation de la modernité, en est le développement rationnel et radical abolissant l'eurocentrisme, la dictature machiste et le mépris des nations.

Face à ce défi, appeler à renoncer à l'aspiration universaliste est fondamentalement réactionnaire. C'est accepter qu'une place soit donnée aux discours contre hégémoniques à condition qu'ils restent enfermés dans les ghettos auxquels ils sont assignés. La démocratie style Etats Unis encourage cette « diversité » impuissante. On alignera des « women studies », des « black studies » auxquels toutes les proclamations seront autorisées, tandis que le discours conventionnel de l'économie dominante poursuivra sa route sans éprouver la moindre gêne. Cette idéologie dite post moderniste ne peut pas inspirer le radicalisme nécessaire pour changer le monde.

Tous les communautarismes se singularisent par le fait qu'ils traitent le groupe dans lequel ils s'identifient comme « homogène ». Il y a « les » Noirs, « les » Croates, « les » Musulmans etc. Or, si l'appartenance aux groupes mentionnés définit parfois –mais pas toujours- une identité réelle dans certaines circonstances, cette identité n'est jamais exclusive, même lorsqu'elle est vécue comme telle dans les cas extrêmes d'aliénation.

Certaines interprétations féministes et écologistes – mais certainement pas toutes – rejoignent les communautarismes dans cette bévue. Les femmes ne constituent pas un groupe homogène – pas plus que les hommes –, même si, d'une manière générale elles souffrent toutes des positions de dominées dans lesquelles le système, fondé sur la domination masculine, les enferme. Certains écologistes traitent également des intérêts communs de l'humanité pour la sauvegarde de la vie sur la Planète comme si l'humanité en question constituait une réalité homogène.

Tous ces courants de pensée et d'action qui occupent des places importantes dans les « mouvements » de notre époque font référence à des réalités incontestables. Sans les racismes, les dominations masculines, le mépris de la nature, ils n'existeraient simplement pas. Ces réalités qu'on doit combattre sont donc à l'origine de leur force. Mais ce combat ne sera efficace que s'il intègre toutes les dimensions du problème dans une analyse d'ensemble (en évitant les réductions vulgaires simplificatrices – faut-il le rappeler ?) et sait en dériver des stratégies à la hauteur des défis.

C'est la raison pour laquelle cette « idéologie » est celle que promeuvent les forces dominantes, et plus particulièrement l'establishment des Etats Unis. Rien de plus fonctionnel pour la poursuite des dominations en place que cette idéologie, parce qu'elle donne forme à des consensus apparents d'ensembles d'individus qui se définissent par leur « identité particulière irréductible ». J'exprimerai la réalité de cette fonctionnalité par l'image suivante : si vous tenez dans une main une bouteille de coca-cola et dans l'autre l'emblème de votre identité prétendue (le Coran, la Bible ou un insigne ethnique) vous n'êtes pas dangereux (bien que vous le croyiez !).

En contrepoint l'affirmation du besoin de science et d'universalité comme seuls fondements possibles pour la civilisation humaine, n'exclut en aucune manière un culte quelconque de la « modernité ». Car si la date de naissance et les conditions de la formation de la modernité réellement existante peuvent être reconnues, celle-ci n'est pas parvenue au terme de son parcours (il n'y a d'ailleurs pas de terme à celui-ci, l'histoire n'a pas de fin). Et puisque la modernité réellement existante jusqu'à ce jour est celle du capitalisme il appartient aux sociétés de la planète de la dépasser par une modernité post capitaliste supérieure.

Les involutions réactionnaires en cours, si elles devaient s'affirmer dominantes et réduire au silence ses contradicteurs, contribueraient alors à un dépassement post capitaliste que je qualifierais de construction d'un système « néo-tributaire ».

L'analogie dans le choix de la qualification fait référence aux caractères par lesquels j'ai identifié la spécificité des systèmes pré-modernes (pré-capitalistes), en contrepoint au capitalisme (moderne). Je prétends d'ailleurs que cette distinction est celle que Marx lui même propose dans *Le capital, Critique de l'économie politique*, comme dans l'ensemble de ses écrits (en particulier *L'idéologie allemande*). La détermination en dernière instance par l'économique n'exclut pas la diversité des formes de dominance des différentes instances : dans le capitalisme l'économique est l'instance dominante (et de ce fait la forme d'aliénation qui définit le système est l'aliénation économe – dans le marché en termes vulgaire), dans les systèmes antérieurs l'instance dominante est le politique (et la forme d'aliénation qui le permet est l'aliénation religieuse).

La nouvelle idéologie prépare un retour à la dominance du politique. Celle de l'économique, propre au capitalisme, est en effet nécessairement remise en question par le développement même des forces productives, c'est à dire par ce qu'on appelle la nouvelle révolution technologique en cours. Mais la dominance du politique (ou mieux et plus précisément du politico/culturel) peut prendre différentes formes associées à des contenus sociaux eux-mêmes divers.

Elle peut prendre la forme (supérieure) d'une dominance de la socialisation par la démocratie (en contre point de la socialisation par le marché), d'une dominance de la solidarité (en contrepoint de celle de la compétition) et donner ainsi un socle solide à une société

communiste. C'était, je crois, la vision de Marx ; et c'est dans ce sens que j'ai écrit que le communisme se définit par la dominance du culturel (Cf. *Critique de l'air du temps*).

Mais cette dominance peut prendre une autre forme, celle définie dans le programme des Néo-cons des Etats Unis : dictature absolue du marché (c'est à dire du grand capital des oligopoles), « démocratie » consensuelle vidée de toute portée contestataire et rénovatrice, affirmation violente de l'appartenance identitaire aux communautés (religieuses et « raciales » pour employer le langage même des Néo-cons). On aurait bien tort de sous estimer le danger que ces options représentent. Car même si d'évidence leur expression par les Néo-cons est extrême et frise parfois l'extravagance, les tendances de l'évolution vont dans ce sens partout, aux Etats Unis, en Europe, dans le reste du monde. Le modèle de la « démocratie-droits de l'homme » proposé par les classes dirigeantes en constitue le socle, et la mascarade qu'il est en réalité est loin d'apparaître comme telle pour beaucoup. Ce modèle de dominance du politique est conforté – et non contre dit – par la réduction du rôle de l'Etat, que la doctrine libérale prétend légitimer en termes de renforcement de la démocratie mise en œuvre par la société civile. Celle-ci est conçue et construite dans une pyramide de sous ensembles de paracitoyens se donnant l'apparence d'être actifs alors qu'ils sont dépouillés de tout pouvoir réel, œuvrant ensemble à la construction de consensus vides de contenu. Le modèle traite également la « culture » sur le mode pluriel, ayant rejeté l'universalisme, glorifié la « différence » et adopté le point de vue du « culturalisme ». Il permet alors à la politique de domination qu'il promet d'instrumentaliser les « différences » en question.

Les caractères probables principaux du mode de gestion économique de cette alternative ultra réactionnaire transparaissent déjà dans le « nouvel âge du capitalisme » : financiarisation qui renforce la centralisation des postes de commande au bénéfice de petits groupes, affirmation de nouvelles formes « maffieuses » de la classe dirigeante prenant la succession des valeurs bourgeoises traditionnelles etc. Au plan mondial l'économie en question est celle de « l'apartheid à l'échelle mondiale ». Elle implique donc, comme le prévoit expressément le projet de Washington et de l'OTAN, la « guerre permanente » du Nord contre le Sud. D. Ellsberg nous rappelle que son coût pourrait être six cent millions de victimes !

C'est un autre monde que celui dans lequel nous vivions encore hier, mais évidemment pas meilleur, mais bien plus inhumain et criminel.

5. Reconstruire l'internationalisme des peuples face à l'impérialisme

Le libéralisme économique et l'impérialisme constituent les deux faces indissociables de la même réalité du capitalisme dominant de notre époque. Qu'on le qualifie de « nouveau capitalisme » (pour en faire l'éloge d'une certaine manière), de capitalisme « cognitif » ou autrement ne change rien à la nature du défi auquel les peuples sont confrontés.

Il n'y aura donc pas de sortie humaine au système mondial « post libéral » sans que celle-ci ne s'ouvre sur des relations internationales réellement « post impérialistes ». A défaut la crise du système débouchera sur un avenir encore plus sombre, un système néo-tributaire et bien entendu super impérialiste.

A l'aune des analyses que j'ai proposées ici tant en ce qui concerne l'Europe que les Suds, il apparaît que les « mouvements » de protestation et de lutte sont loin d'avoir développé une vision stratégique alternative cohérente et forte, à la hauteur des défis. Il faut avoir le courage lucide de le dire. Trop de « mouvements » s'autocongratulent mutuellement pour leurs actions

(parfaitement légitimes) sans croire nécessaire d'aller plus loin, encore moins de mettre l'accent sur les insuffisances. Une certaine idéologie du « mouvement » prétend que l'addition de toutes ces résistances et luttes produit par elle-même l'alternative. Ni l'histoire ni la réflexion théorique et l'observation de la réalité ne confortent ce point de vue facile.

Les peuples font leur histoire, mais dans les limites des possibilités objectives offertes en leur temps, a-t-on dit. Or il se trouve justement que les possibilités objectives offertes par le développement technologique moderne sont immenses : tous les problèmes matériels majeurs de l'humanité entière pourraient être résolus. L'obstacle est constitué par les logiques de la rentabilité financière que le capitalisme impose. Libérés de leur soumission à ces logiques les peuples donneraient à la crise du système l'issue humaine souhaitée. Autrement dit l'avenir dépend des options idéologiques et de l'invention de formes d'organisation politique adéquates. Ou encore : le socialisme mondial n'est pas seulement nécessaire, il est objectivement possible.

Cette proposition ne signifie nullement que la réponse au défi soit « facile ». Le renversement nécessaire dans le système des idées et des valeurs dominantes que la proposition implique est en effet d'une ampleur gigantesque. Il suppose que les peuples des centres du système – en particulier les Européens – réinventent une culture de gauche authentique, en rupture avec le capitalisme et l'impérialisme. Qu'à la longue série des chapitres successifs qui ont constitué la « culture politique de la gauche européenne » (les Lumières, la Révolution française, le mouvement ouvrier et le marxisme, la Révolution russe) l'imaginaire des peuples européens s'avère capable d'inventer un chapitre nouveau. Il suppose que les peuples des périphéries – la zone des tempêtes – se libèrent à la fois des illusions d'un développement possible dans le cadre de la mondialisation capitaliste et des fantasmes d'alternatives passéistes et qu'ils formulent des alternatives d'une nouvelle déconnexion répondant aux défis et aux possibilités de notre époque. Il suppose que les uns et les autres réinventent des formes d'organisation et d'action politiques adéquates et efficaces, dont l'agenda des exigences est lourd de questions encore sans réponses convaincantes.

J'indiquerai ici seulement, en termes fort brefs, quelques uns des axes principaux du défi tel que je les vois :

(i) définir de nouveaux sujets historiques capables de maîtriser les évolutions et de leur donner les directions souhaitées.

(ii) définir le défi stratégique politique que je propose de « résumer » dans les termes suivants : concevoir des programmes capables d'associer (et non de dissocier) : a) le progrès social, b) des avancées démocratiques, c) le respect des Nations et des peuples. Cela implique entre autre de concevoir une Union européenne respectueuse des Nations et non construite contre elles.

(iii) combiner la socialisation par le marché et une socialisation par la démocratie appelée à s'affirmer progressivement dominante.

(iv) combiner la « compétition » et la « solidarité », en prenant la mesure de la supériorité de la solidarité, qui, à travers l'histoire, a été à l'origine du progrès davantage encore que la concurrence.

(v) traduire en termes concrets les politiques de régulation et de protection efficaces pour avancer en direction d'un développement multidimensionnel, équitable socialement, et durable écologiquement, ce qui implique qu'on attribue à la « loi » une autorité supérieure à celle du contrat » (conformément à la tradition européenne en conflit ici également avec celle des Etats Unis).

(vi) prendre la mesure exacte des évolutions démographiques du continent européen (le « vieillissement » qui n'est pas « négatif » - sauf pour ceux que la maximisation du profit seul intéresse – mais le produit du progrès de l'humanité), leur donner des réponses correctes en termes de migrations (fondées sur le rejet de la perspective communautariste) et en termes de « financement des retraites » (fondées sur le principe de la répartition et non celui des Fonds de Pensions qui opposent les générations).

(vii) identifier les constituants de blocs hégémoniques nationaux, populaires et démocratiques, anti impérialistes dans les conditions concrètes des différents pays du Sud et formuler des objectifs stratégiques d'étape qui leur correspondent.

Des avancées dans ces directions deviennent synonymes de construction progressive de l'internationalisme des peuples. Il s'agit en effet d'articuler les luttes des peuples du Nord (à travers la recomposition de la culture de gauche européenne) et celles des peuples du Sud. Cet internationalisme nécessaire des peuples – de tous les peuples – ne peut pas être fondé sur de vagues concepts de « solidarité humaine à l'échelle mondiale », qui souvent frisent la charité ou l'indigence de l'analyse. La lutte contre la « pauvreté », la « bonne gouvernance », l'affirmation des intérêts communs de l'humanité face aux défis écologiques (raréfaction des ressources, détérioration des climats) sont emblématiques de cette méthode « idéaliste » (au sens péjoratif du terme) qui ignorent les intérêts des groupes sociaux concernés et leurs conflits éventuels. L'internationalisme en question doit être fondé sur l'identification d'intérêts communs, face à un adversaire commun qu'on ne peut qualifier que de « capitalisme impérialiste ».

En son temps, la troisième internationale léniniste puis maoïste avait construit des alliances mondiales qui répondaient – en théorie et en partie tout au moins – à un défi analogue, formulées dans les conditions et les limites de l'époque. Il ne saurait être question de produire un « remake » de ce chapitre de l'histoire, clos définitivement. L'articulation nouvelle des luttes anti-impérialistes au Nord et au Sud reste à inventer pratiquement de A jusqu'à Z.

Sans prétendre être en mesure de formuler plus que la question qui nous concerne ici, je proposerai de considérer que cette construction passe d'abord par la mise en déroute du projet des Etats Unis de contrôle militaire de la planète. C'est là, dans mon analyse, la condition nécessaire sans laquelle toute avancée démocratique ou sociale réalisée ici ou là demeurera vulnérable à l'extrême.

L'internationalisme des peuples n'exclut pas la reconnaissance de « contradictions au sein du peuple ». Le peuple dont il s'agit ici étant celui de la Planète, ces contradictions s'expriment non seulement au sein d'un peuple particulier mais également entre les peuples du monde. C'est la raison pour laquelle le respect de l'autonomie des Nations constitue le seul socle solide sur lequel l'internationalisme peut être construit. L'argument développé ici n'est pas celui du « culturalisme » par lequel on fait de la singularité culturelle un motif de rejet de l'aspiration universaliste. Certes la singularité des parcours historiques est une réalité et comme telle ne doit jamais être ignorée et méprisée. Mais bien au delà de cette platitude, la modernité construite par le capitalisme étant fondée sur l'insertion inégale des peuples dans la mondialité, l'émancipation (au nom des valeurs universelles qu'elle sublime) passe par la construction d'un monde multipolaire. La recette libérale qui consiste à soumettre la planète entière aux mêmes « règles » (au moins en apparence sinon réellement – puisque la réalité est toujours celle du « deux poids, deux mesures » en faveur des puissants bien entendu) produit nécessairement l'approfondissement des inégalités.

Si la construction de l'internationalisme des peuples relève en définitive de la responsabilité des peuples (par distinction des « gouvernements »), c'est à dire des classes travailleuses comme des mouvements et des organisations qui sont les leurs, le combat pour avancer dans cette direction ne peut négliger les contradictions (fussent-elles « secondaires ») entre les classes dirigeantes (c'est à dire les Etats). Je renverrai aux propositions de lecture que j'ai faites des conflits Nord-Sud en cours de cristallisation (Cf. interview de S. Amin par Rémy Herrera, *50 ans après Bandoung*, Recherches Internationales 2004).

Un autre monde – meilleur bien entendu – est possible. Les conditions objectives existent pour qu'il puisse en être ainsi. Il n'y a pas de déterminisme historique antérieur à l'histoire. Les tendances inhérentes à la logique du capital se heurtent à la résistance de forces qui n'en acceptent pas les effets. L'histoire réelle est alors le produit de ce conflit entre la logique de l'expansion capitaliste et celles qui découlent de la résistance de forces sociales victimes de son expansion. Le développement des luttes sociales peut porter au pouvoir des blocs hégémoniques différents de ceux qui gouvernent l'ordre néolibéral mondialisé en place, fondés sur des compromis entre des intérêts sociaux dont on reconnaît la diversité et la divergence (blocs de compromis capital-travail dans les centres capitalistes, blocs nationaux-populaires-démocratiques anti compradore dans les périphéries). Dans ce cas l'Etat retrouve une large marge de manœuvre dans le cadre d'un système mondial fondé sur le principe de la multipolarité négociée. Il faut œuvrer à ce qu'il en soit ainsi. La multipolarité est alors synonyme de marge d'autonomie réelle pour les Etats. Cette marge sera utilisée d'une manière donnée définie par le contenu social de l'Etat en question.

Le moment actuel est caractérisé par le déploiement d'un projet nord américain d'hégémonisme à l'échelle mondiale. Ce projet est seul à occuper aujourd'hui toute la scène. Il n'y a plus de contre projet visant à limiter l'espace soumis au contrôle des Etats-Unis, comme c'était le cas à l'époque du bipolarisme (1945-1990) ; au-delà de ses ambiguïtés d'origine le projet européen est lui-même entré dans une phase d'effacement ; les pays du Sud (le groupe des 77, les Non Alignés) qui avaient eu l'ambition au cours de la période de Bandoung (1955-1975) d'opposer un front commun à l'impérialisme occidental y ont renoncé ; la Chine elle-même, qui fait cavalier seul, n'a guère que l'ambition de protéger son projet national (lui-même ambigu d'ailleurs) et ne se pose pas en partenaire actif dans le façonnement du monde.

L'impérialisme collectif de la triade est le produit d'une évolution réelle du système productif qui a produit la solidarité des oligopoles nationaux des centres du système laquelle s'exprime dans leur souci de « gérer ensemble », et à leur profit, le monde. Mais si « l'économie » (entendue comme l'expression unilatérale des exigences des segments dominants du capital) rapproche les pays de la triade, la politique divise leurs nations. Le potentiel porté par le conflit des cultures politiques, appelant effectivement à mettre un terme à l'atlantisme, reste alors hypothéqué par les options des gauches majoritaires (en termes électoraux les partis socialistes européens), ralliés au social-libéralisme.

La Russie, la Chine et l'Inde, sont les trois adversaires stratégiques du projet de Washington. Les pouvoirs en place dans ces trois pays en prennent probablement une conscience grandissante. Mais ils paraissent croire qu'ils peuvent manœuvrer sans heurter directement l'administration des Etats-Unis. Un rapprochement eurasiatique (Europe, Russie, Chine et Inde) qui entraînerait alors certainement l'ensemble du reste de l'Asie et de l'Afrique et isolerait les Etats-Unis, est certainement souhaitable.

Et il y a quelques signes allant dans ce sens. Mais on est encore loin de voir sa cristallisation mettre un terme au choix atlantiste de l'Europe.

Au demeurant le Sud en général n'a plus de projet propre comme c'était le cas durant l'ère de Bandung (1955-1975). Sans doute les classes dirigeantes des pays qu'on dit « émergents » (la Chine, la Corée, l'Asie du Sud-est, l'Inde, le Brésil et quelques autres) poursuivent-elles des objectifs qu'elles semblent bien définir elles mêmes et pour la réalisation desquelles leurs Etats agissent. Ces objectifs se résumeraient dans la maximisation de la croissance au sein du système de la mondialisation. Ces pays disposent – ou croient disposer – d'un pouvoir de négociation qui leur permettrait de tirer un meilleur profit de cette stratégie « égoïste » que d'un vague « front commun » construit avec plus faibles qu'eux. Mais les avantages qu'ils peuvent obtenir de la sorte sont particuliers aux domaines singuliers qui les intéressent et ne remettent pas en cause l'architecture générale du système. Ils ne constituent donc pas une alternative et ne donnent pas à ce vague projet (illusoire) de construction d'un « capitalisme national » la consistance qui définit un véritable projet sociétaire. Les pays du Sud les plus vulnérables (le « Quart monde ») n'ont même pas de projet propre de nature analogue, et le produit éventuel de « substitution » (les fondamentalismes religieux ou ethnistes) ne mérite pas ce qualificatif. Aussi c'est le Nord qui prend l'initiative seul d'avancer « pour eux » (on devrait dire « contre eux ») ses propres projets, comme l'association Union Européenne – ACP (et les « accords de partenariat économique » appelés à prendre la relève des accords de Cotonou avec les pays d'Afrique, des Caraïbes et du Pacifique), le « dialogue euro-méditerranéen », ou les projets américano-israéliens concernant le Moyen Orient et même le « grand Moyen Orient ».

Les défis auxquels la construction d'un monde multipolaire authentique est confrontée sont plus sérieux que ne se l'imaginent nombre de mouvements « altermondialistes ». Dans l'immédiat il s'agit de mettre en déroute le projet militaire de Washington. C'est la condition incontournable pour que soient ouvertes les marges de libertés nécessaires sans lesquelles tout progrès social et démocratique et toute avancée en direction de la construction multipolaire resteront vulnérables à l'extrême.

A plus long terme une « autre mondialisation » implique donc qu'on remette en question les options du capitalisme libéral et la gestion des affaires de la planète par l'impérialisme collectif de la triade dans le cadre de l'atlantisme extrême ou de sa version « rééquilibrée ». Je renvoie ici aux développements que j'ai proposés ailleurs concernant la construction du monde multipolaire souhaité (Samir Amin, *Pour un monde multipolaire*, 2005).

Le monde multipolaire authentique ne sera devenu une réalité que lorsque les quatre conditions qui suivent auront été remplies :

- i. que l'Europe soit réellement avancée sur la voie d'une « autre Europe » sociale (et donc engagée dans la longue transition au socialisme mondial) et qu'elle ait amorcé son désengagement par rapport à son passé et présent impérialiste. Cela implique, d'évidence, plus que simplement sortir de l'atlantisme et du néo-libéralisme extrême.
- ii. qu'en Chine la voie du « socialisme marché » l'ait emporté sur les tendances fortes à la dérive illusoire de la construction d'un « capitalisme national » qu'il serait impossible à stabiliser parce qu'il exclut les majorités ouvrières et paysannes.
- iii. que les pays du Sud (peuples et Etats) soient parvenus à reconstruire un « front commun », condition à son tour pour que des marges de mouvements permettent aux classes populaires non seulement d'imposer des « concessions » en leur faveur mais au-delà de

transformer la nature des pouvoirs en place, substituant aux blocs compradores dominants des blocs « nationaux, populaires et démocratiques ».

iv. qu'au plan de la réorganisation des systèmes de droits, nationaux et internationaux, on ait avancé dans la direction de construction conciliant le respect des souverainetés nationales (en progressant de la souveraineté des Etats à celle des peuples) et celui de tous les droits individuels et collectifs, politiques et sociaux.

Samir AMIN

IS THE EUROPEAN PROJECT VIABLE?

1. Euphoric discourses about the « European Project » provide daily bread and butter for the majority of politicians on the continent, both from the left and right wing. Only, so it would seem, “populist” extremist supporters (supposedly divided up into far right and far left wingers) oppose the project which would be without alternative for the future of the concerned peoples. And yet, indicators of growing disillusionment of these peoples are not lacking.

The European Project is, in fact rather odd: it attempts, especially since the Maastricht Treaty (1992), to reducing the margins of manoeuvre of national economic policies without making a governance of substitution emerge in return at the level of the Union! In other words, the European Union operates, in actual terms, as the most perfectly “globalised” region on Earth in the most brutal sense of the word (annihilation of the margin of autonomy of the States). This is not of course the case for the United States, or not even the case in the other regions of the world where, the State, even if fragile and vulnerable, remains in principle master of the decisions it makes, the “only” restriction being the rules imposed by the WTO (which also has in perspective the same project of progressive annihilation of the rights and prerogatives of States). Europe is then ahead of the rest of the world in the Great Leap into regression.

This self-inflicted mutilation by European States relates to all aspects of economic life: there no longer exists in Europe any monetary or foreign exchange, budgetary, employment or industrial policies.

The ECB has prohibited itself implementing any kind of monetary policy, to which, it has substituted the exclusive objective of guaranteed “price stability through absolute prohibition imposed to States to finance their deficit via « their » central banks”; so it claims. By operating thus, it no longer has any public interlocutor (neither the States, nor the Union) it would be accountable for its policy. That deflationist option constitutes in principle a permanent additional obstacle to revitalizing the economy.

The ECB cannot implement any active foreign exchange policy either, the objective of which (a « strong » or « weak » Euro) should be defined by a public interlocutor which no longer exists. The government of the United States has, on the contrary, kept all its authority in the area of monetary policy. Consequently, Washington decides whether the dollar will be strong or weak, while the euro can only acknowledge that decision and adjust to it. Let us add that the dollar standard is in fact an oil/dollar standard: oil prices are set in dollar and the United States make all possible efforts, if necessary through military interventions (as was the case in Iraq) to prohibit producer countries to sell their oil against payments in euro. As a fact, European States have so far refused to play that game and “grieve” their friend of the other side of the Atlantic. Thus weakened, the euro cannot, like the dollar, become an international currency. The actual potential competitor of the dollar is not so much the euro than the Chinese yuan.

The «Stability Pact» has tolled the bell to all possibilities of implementing budgetary policies. That option was justified by resorting to a doubtful theory of the equivalence of coverage of a deficit of public finance by taxation or borrowings. That justification is, as a fact, futile as the Pact limits to 3% maximum authorized deficit, and to 60% of the GDP maximum level of

indebtedness! Neither the United States, nor any other country in the world (to the exception of semi-colonies under domination of the IMF's administration!), have inflicted themselves such a mutilation qualified as simply "ridiculous" – rightfully so – by Prodi (who did not draw any consequences from his assessment).

The abolition on principle of all forms of national industrial policy (under the pretext that transparent « competition » - i.e., without protection or subsidies – lead to the most efficient allocation of investments) and employment policy, which is abandoned to the sole laws of the market (flexibility being thought to resolve the problems!), reinforced by the dismantlement of public services and privatisation, has not been compensated – if only partially – by community policies. There is no "industrial Europe" or "social Europe on the immediate agenda. No doubt that, from this view, Europe is drawing closer to the model which has always been the one adopted by the United States; having, at present, very far on the path to committing itself to breaking away with all traditions, which in the XIXth, then XXth centuries were at the origin of its successes. Still in the United States, however, there exists indeed a strategy of the military-industrial industry which is strongly backed by the State (in spite of the "liberal" discourse which is, by far, more advanced than the one held in Europe. It is amusing to note that the only couple of breakthroughs achieved by European technology (Airbus and the Arian rocket launcher) were achieved through public service interventions, and that, if these were left to private initiative, these two successes would simply never have occurred!

In a specific area – the one of agriculture – Europe has indeed implemented an active and community based policy, freed from doctrinaire liberalism. That policy has given enviable results; it has enabled modernisation of family agriculture, extension of farm areas and intensive use of equipment, greater specialisation, guaranteed prices that ensure balanced income between farm workers and urban workers, and finally produced important (even too important!) surpluses for export. How much did that policy cost? No doubt, half the budget of the European Community, but that budget is insignificant (less than 1% of member countries GDP). It is common knowledge that today, the CAP is being questioned.

Being the second most important area of expenditure of the Union (a third of the budget), regional policies are based on serious ambiguities and convey outdated political ambitions. Their objective is not so much the reduction of inequalities (among the States of the Union and within the individual regions which constitute them) than supporting their capacities to "face competition", which supposedly, is by itself holder of progress for all (doctrinaire liberalism is never questioned, in spite of its utter state of incoherence highlighted both by history and present times). In that logic, support to the least developed countries is thus compelled to decrease in importance (at least relatively) after the inclusion of CEEC in the Union. Being principally articulated around the support to regions for their expenditures on infrastructure and education, the implemented regionalisation policies have rather made inequalities more acute and given preference to the "promising regions" in places opened to global competition (like Bavaria, Lombardy or Catalonia). Here, the pursued political objective is, in fact, to reduce the importance of "national entities" to the advantage of "regional" preferences. Globalised liberalism has always had preference for smaller rather than larger States, because dismantling of State prerogatives is always easier in the first case. Within the European Union, preference is given to "Bavarian", "Catalan", or "Lombard" positions rather than to the positions of Nations (always suspected of being "chauvinistic" drifts).

In the end, the conceptions which dominate the visions of the enlargement of the Union are not of a different nature than the ones on which the United States have based their project of integrating Latin America into a vast free trade zone of the Americas. These forms of union are designed to widen the gaps, within peripheral partners, (Latin America on the one hand, and Eastern Europe on the other) between well integrated and advantaged small zones under control of dominant capitalist centres (the United States on the one hand, and Germany on the other) and huge fallow reserves left adrift. The discourse – which contends “catching up” will occur by itself thanks to growing flows of private foreign direct investment – has evidently no other function than propaganda. But, while the peoples of Latin America reject the extension of the free trade zone at continental scale and fight the United States on that ground, Eastern Europe is welcoming with the most basic naivety its twin project concocted by the capitalist centres of Western Europe!

Cooperation policies between the Union and Sub-Saharan Africa have never been other than “neo-colonial” and have perpetuated confinement of the continent in a « pre-industrial » state. The liberal stand of the Union, which governs the Cotonou Agreement (2000) and so called “regional economic partnership” agreements (REPA) worsen that adverse evolution. Africa is, from that perspective, subject to a “programmed exclusion” (Cf. S. Amin et alii, *Afrique: renaissance ou exclusion programmée ?*, 2005). In fact, “open globalisation” associated with the fettering of the continent in a pre-industrial state is, indeed, a strategy implemented to give dominant transnational capital the means to loot the natural resources of Africa at low expense. But then, one needs to know that looting will benefit more US transnational firms than European ones. In that perspective of the planned decline of Africa, cooperation policies (now qualified as being a “partnership”!) between the European Union and ACP countries are bound to progressively decrease in importance to the benefit of other initiatives in the direction of Latin America, Asia and the Mediterranean. But, up to now, nothing indicates those initiatives could innovate and take distance from the logics of expansion of transnational capital. As for so-called Euro-Mediterranean projects, they are deprived of all potential impact because of the de-facto adhesion of Europeans to Washington and Tel Aviv’s initiatives, in spite of rhetoric gymnastics performed here and there. (Cf. S. Amin et A. El Kenz, *le monde arabe*, 2005).

2. The European project, as it stands, pushes to the absurd adhesion to logics systematically unfavourable to a successful economic expansion of the continent. The question needs then to be asked; why take such options.

The only reasonable answer that could be given to that question is that the option was taken dominant big capital because this was its means – the only possible one – to crush the social power that workers in Europe (in the first place, working classes) had conquered after two centuries of struggle. The collapse of the soviet system offered that opportunity. The option was then perfectly “rational”, but of course, stemmed from short-term policy logic which has always had spontaneous preference of the capital. Absurd was the behaviour of socialist and socio-democratic European parties which believed the collapse of communist parties would benefit them, when, the objective of the liberal strategy was eliminating them all, the ones after the others.

The project then, as it stands, suits the United States, and this is indeed the reason why Washington sees no “menace” looming from a “competition efficient” Europe. As a fact, the relative stagnation in which Europe trapped itself because of that extreme form of liberal option facilitates the financing of the US deficit which, in turn, is caused by the leadership

position that Washington persists claiming it has. Stagnation produces indeed excess profits which, from lack of investment opportunities in the expansion of European productive systems, are invested on the United States' financial markets.

The prevailing discourse attributes Europe's handicap to the difficulty its societies supposedly have to openly and fully adopt « American style » liberalism, without ever making any reference to the asymmetry which characterises the relationships between the two sides of the Atlantic. In fact, if Europe made the decision to use in its domestic economy the surplus it lends to the United States – and this is the only decision which could take the continent out of stagnation – the US would then face the obligation to readjust its economy and reduce their waste-making-based mode of consumption and military expenditure. This would not happen without a major crisis.

Policies implemented by Europe do not go in the required direction that would express its potential economic power, but exactly reverse way. Privatisation and dismantling of truly efficient public services in Europe (SNCF, EDF and others are highly telling examples) provide US financial capital, especially Pension Funds, exceptional opportunity of profit-creaming on the most lucrative segments of its economies, reducing proportionally the means available to Europeans to exit the crisis.

Should we give in to despair and accept Washington's prognostic according to which nothing will run counter European choices, however absurd they may be? The risk is real and should not be underestimated by alterglobalist movements. The dominant ruling class, in the narrow sense of the term – the big capital of oligopolies – is tempted to lock itself up on the that dead end path for European peoples because, it benefits in return of advantages its participation in collective imperialism grants. Undoubtedly, the gendarme who neutralises the effects of the chaos incurred by that imperialist expansion – the United States – can make their servile partners pay for services they provide. But these do not have the choice, and consequently, accept the slavish positions they are assigned. After all, this will be neither first time in history nor, the only occasion such a situation occurs in today's world.

I will add there is need to take full measure of current pathetic geopolitical options, which reduce Europe's margin of autonomy, and impose it to toe the line of Washington. Europe did not opt out for the construction of a Eurasia against which the United States would have appeared a dwarf; and which simply implied a rapprochement with Russia and China. On the contrary, it opted out supporting – and even encouraging – Baltic and Polish “anti-Russian” chauvinism (one would believe we went back to 1920 and the Versailles' anti-soviet “quarantine line”!). It accepts Israel's expansionism and endorses US military presence in Iraq, Central Asia and the Caucasus.

Most pathetic is certainly the alignment of Europe on the positions of the project of military control of the Planet by the armed forces of the United States. That alignment was materialised the day when, on the occasions of the wars in Yugoslavia, Europe accepted that NATO be vested with the new functions of gendarmes of the world; in association with the United States own forces. It might have been thought that, with the collapse of the USSR, NATO would lose its *raison d'être* (“defending Europe against potential soviet aggression”). The decision made went exactly reverse way: substituting the UN with NATO, which henceforth became the administrator international political relations. From that moment, the drift was hard to avoid.

That drift has reached proportions the European public opinion is generally not informed about, because what followed was nothing less than unilateral cancellation by western powers of the United Nations Charter which proscribed the war. The United States have, indeed, reserved themselves the “right” to take initiative of waging “preventive wars” without having their NATO allies react as they should have done; by officially disassociating themselves from that decision. There is even worse, as the U S have also reserved themselves the right of a first nuclear strike, if they deem so “useful”. Daniel Ellsbergs made it clear on that occasion that official documents of the Pentagon estimate “toll” of such initiatives at no less than six hundred million human lives! (a hundred holocausts, D. Ellsberg writes). Europe and NATO, be keeping silent that decision, are now the accomplices of the United States’ murderous project. The only efficient counter attack to that drift is the organisation of a global campaign for the complete banning of nuclear weapons (and certainly chemical weapons as well). Because, it is obvious that the “non proliferation” treaty promoted by NATO powers is, under such conditions, unacceptable for the peoples of Asia and Africa, who know perfectly well they are all under the threat of a US and NATO triggered holocaust.

Can this docility of the leading segments of ruling classes and their political debtors (from right wing and left wing) be indefinitely imposed to European societies? I doubt so, precisely because – and here is the central idea of my thesis on that issue – European political cultures would not allow such a thing. I will not, here, come over on the thesis I developed in *Le Virus libéral et Pour un monde multipolaire*, the conclusion of which I summed up in the sentence below: the development of the logic of the economies of prevailing oligopolies closes the gap between United States and Europe, the one of their respective political cultures widens it.

.3. Consequently, I do not believe the European project in its extreme liberal dimension as much as in its alignment on Washington’s geo-strategy is sustainable.

The answer to the question as to know how it will be challenged and to the constraints of which evolution it will be submitted remains open however.

I will then come back to the point of my analysis which focuses on “political cultures”. The political cultures of an important part of the European continent can be analysed as a succession of major developments which shaped the right wing/left wing divide: the Philosophy of Enlightenment, the French Revolution, and the Mountain Convention, the formation of the labour and socialist movement in the XIXth century, Marxism and the Commune of Paris, the Russian Revolution and the formation of communist parties. The right wing movement stood as a counterpoint during the Restoration (“the Holy Alliance”), through the formulation of “anti-Marxist” ideologies (drifting towards forms of fascism), pro-colonial (and racist) ideological corruption, and the anti-soviet movement. The stages of the formation of the United States’ political culture have nothing to do with that history. That culture was shaped by a succession of major events: immigration to New England of anti-Enlightenment sects, the genocide of American Indians and slavery within society (the impact of which is other than the one practiced in far away colonies), the abortion of political class consciousness to which successive flows of immigrants substituted communitarianisms. The political culture produced by that history is not one born from a strong left wing (potentially socialist)/right wing contrast but, the off-spring of a pro-capitalist “consensus” which strongly relativizes electoral bipolarity (Democrats/Republicans).

The question raised in Europe today is to know whether the heritage of the political culture is set for erosion (and see the left wing die out as holder of a post-capitalist project) to the advantage of an “Americanisation” in progress (socio-liberal parties are joining the concert of the advocates of “perpetual capitalism”) or, whether a “new left wing” is capable of crystallising around programmes up to the challenges. In my view, both evolutions remain possible.

The ideological offensive of the new right wing (which includes the majority of electoral left wing) has developed an aggressive “anti-French” discourse, because, rightfully so, that right wing sees France as a country – which played a major role in the crystallisation of political cultures in Europe – the “weak link” in the European system engaged on the road to Americanisation. “Colbertism” (i.e. a system, which in its own time, laid – with absolute Monarchy – the bases of capitalist modernity, making feudalism obsolete), “Jacobinism” (which understood that economic liberalism being the enemy of democracy, Revolutions should be popular and not strictly bourgeois as was the case of the British revolution), “secularism” (the “radicalism” of which handicaps maturation of “community” identity sought after by the pro-American right wing model), and may be even “Gaullo-communism” (to which M. Cohn Bendit certainly prefers the phrase anti-soviet Petainism!) constitute all themes harped on ad nauseam by this media propaganda. Now, there is need noting these themes dominate the “European” discourse (in the sense of pro European Union as it is today, and as it is hoped to be).

Beyond the praxis of the European project, it would then be useful to analyses the discourse which drapes it. In that discourse, any reference to the heritage of European political culture is viewed as “old hat”: the defence of the interests of social classes (is invariably qualified as “corporatism”!), patriotism (preference goes to powerless regionalisms vis-à-vis the capital, communitarianisms, or even, Baltic or Croat style ethnocracies, etc.). On the contrary: glorification of competition among workers, regions and countries (whatever their social cost), or anti-secular concepts (such as the Polish style pope worshiping) are view as modern.

The reconstruction of a European political left wing evidently demands radical criticism of all these discourses. It furthermore demands identifying the principles on the basis of which the alternative can be constructed, and, from that, concretely draws consequences in terms of short-term and long-term programmes.

Views above constitute a severe analysis not only of the “European project” as it is but also the reactions it produces, even within committed progressive social movements. The project as it should certainly be qualified as a non “European project” but as the “European component of the Atlanticist project under the hegemony of the United States”. The major critical reactions to the project seem to me more articulated around a search of a less asymmetrical balance within the imperialist triad (through the organisation, in that framework, of the relationships between Europe and the United States) than to a search of a world balance less unfavourable for the “rest of the world”.

Under these conditions the question remains open: can the European project “change direction” or is it necessary, for that to be possible, to go through the phase of open recognition of its failure?

We know that the main argument – may be even the exclusive argument – of Europe’s political left wing advocates is based on their fear that rejection of the European project may bring about vigorous resurrection of nationalisms which caused the misfortune of the

continent in the XXth century. I certainly share that fear with these friends, and have no illusions on the necessarily demagogical and retrograde character of these apparent autism. I am saying apparent because, in fact, these far right wing movements will never challenge the leaderships of the plutocracy of the oligopolies. I contend that persistence in “the defence of the European idea at all cost” and the de facto acceptance of the realities of its formulation inside the project in place that it incurs (under the pretext that situation is “less worse” than what the far right populist alternative would represent) are indeed the guaranteed means to prepare for the right wing collapse of the project. Thinking it possible to make Social Europe move slow motion is perfectly unrealistic. The existing institutional framework will never allow but cosmetic reforms without impact. The peoples know it already. The political left wing has understood the impact of that and drawn consequences.

The United States are perfectly lucid and neutral on that issue: the Europe of Brussels institutions, as it stands, suits perfectly their plans; a Europe divided into States under domination of populisms would equally suit them.

That evolution, – safeguarding at all cost the European project, or falling into chaos – if it was the only possible alternative, would mean that Europe has engaged on the path to inexorable decline. If I remain optimistic, it is because I believe the reconstruction of authentic political left wing movements on the continent is possible through the renaissance of its political culture of the conflict.

LE MONDE EN 2025

INDICATEURS DEFENSE ET SECURITE : VERS DAVANTAGE D'INSECURITE

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I) L'accélération du temps politique

L'accélération des rythmes historiques est un phénomène moderne majeur, aussi bien pour les découvertes scientifiques, l'évolution économique que pour les bouleversements politiques. Le monde il y a dix ans était très différent de ce qu'il est aujourd'hui et le monde d'aujourd'hui, marqué par le retour russe, l'échec américain en Irak, la prolifération iranienne, la puissance chinoise, était totalement imprévisible il y a dix ans.

Même à plus courte échéance, la fragilité des prévisions est flagrante, tant est en effet rapide l'évolution des phénomènes politiques. Prenons par exemple l'année 2002 comme repère : à cette date, l'Administration Bush pouvait croire et faire croire qu'elle mettrait fin au terrorisme et qu'elle dominerait pour longtemps le monde et l'agenda international. Le système unipolaire semblait avoir remplacé la dualité de la guerre froide et la supériorité américaine était telle que les Etats-Unis pouvaient apparaître comme le nouvel et le seul élément structurant des relations internationales. La démocratisation du monde, et en particulier du Grand moyen orient était considérée comme un objectif possible et souhaitable pour la sécurité globale de l'Occident. Six ans plus tard, l'échec de la diplomatie américaine est sévère, sa puissance militaire empêtrée en Irak, son leadership délégitimé aux yeux d'une bonne partie de l'opinion internationale, la multipolarité est devenue une évidence du système international et le Moyen orient s'enfonce dans une série de crises et de décompositions, à l'ombre de la prolifération nucléaire iranienne.

Du côté russe, il y a six ans, la décolonisation se poursuivait sans grands heurts, la Russie devenait un partenaire privilégié des Etats-Unis dans la guerre contre le terrorisme, une certaine dynamique intérieure augurait bien d'une sorte de démocratisation. Aujourd'hui, la Russie est redevenue un Etat autoritaire, elle conteste pieds à pieds les initiatives américaines, remet en cause des accords de désarmement essentiels pour la sécurité européenne, conteste les élargissements des institutions occidentales, joue la carte du chantage énergétique à l'égard des pays européens.

Le reste du monde, Chine comprise, tentait, au début des années 2000, de suivre et de profiter de la dynamique de la mondialisation, sans revendiquer une remise en cause du statu quo stratégique (sauf Inde et Pakistan) ni modifier leur comportement traditionnel en matière de sécurité. Aujourd'hui, la Chine modernise considérablement son appareil militaire, ses technologies balistiques et spatiales, l'Inde est en passe de devenir l'allié stratégique majeur des Etats- Unis dans la zone.

Quant à l'Union européenne, en 2002, elle célébrait l'avènement de l'euro et se préparait à négocier un élargissement historique. Comparées à cette formidable dynamique « civile », la PESC et la politique de défense commune de l'Union étaient balbutiantes. L'OTAN apparaissait à l'inverse comme la plus puissante organisation politique et militaire du monde. En 2008, l'Union a complété sa puissance économique en s'affirmant très rapidement comme un acteur de sécurité de plus en plus demandé sur la scène internationale.

Ce ne sont pas moins de 10 000 soldats et 3000 policiers qui participent à une quinzaine d'opérations sur quatre des cinq continents, alors que l'OTAN se retrouve de son côté en difficulté majeure en Afghanistan

Ces quelques exemples témoignent d'un contraste si frappant qu'il donne à réfléchir, sur la fragilité de la puissance, la réversibilité des politiques, la permanente accélération de l'histoire. Ils rendent l'appréhension du devenir international d'autant plus incertaine et fragile.

2) Mondialisation et sécurité : les tendances lourdes qui modèlent la sécurité internationale

Les effets politiques de la mondialisation peuvent être synthétisés en trois formules : un monde moins occidental, un système moins régulé, une tension majeure entre la logique de la mondialisation et la logique des rapports de forces géopolitiques.

• Le « rétrécissement » de l'Occident

Ce rétrécissement est d'abord démographique : en 2025, les Etats-Unis et l'Europe ne représenteront plus que 9% de la population mondiale (770 millions d'habitants), alors que les pays asiatiques pèseront pour plus de 50 % (4,7 milliards d'habitants sur un total mondial de 7,9 milliards). L'Occident vieillit également beaucoup plus vite que le reste de la population mondiale. La population de plus de 60 ans atteindra 30% dans les pays développés, contre 13% dans les pays en voie de développement.

Sur le plan économique, une redistribution monumentale de la puissance est en cours, au profit des autres. Dans vingt ans, l'Asie du sud-est sera l'un des centres moteurs de l'économie mondiale. La Chine, qui a connu entre 2003 et 2005 un taux de croissance de 35% de son commerce extérieur, devrait devenir en 2025 le premier importateur et exportateur mondial, la moitié de ses exportations étant à destination de la région asiatique elle-même. L'Inde est devenue le leader mondial pour les technologies et les services électroniques. Les pays de l'OCDE ne produiront plus que 40% de la richesse mondiale (contre 55% en 2000), alors que la part de l'Asie passera de 24 à 38 %, soit pratiquement à égalité avec la zone OCDE.

Quant au leadership politique qui fut celui de l'Occident, et notamment des Etats-Unis depuis la fin de la seconde guerre mondiale, rien n'autorise à parier sur son maintien. D'ores et déjà, Américains et Européens ne suffisent plus à résoudre, seuls, les crises internationales. Ni l'Iran, ni l'Irak, ni la Corée du Nord, à l'instar des autres conflits du Moyen orient ou des questions globales telles le réchauffement climatique ou la santé, ne peuvent être gérés sans le concours de la Russie, de la Chine, ou d'autres puissances régionales.

Et l'Occident est contesté. L'image et la légitimité des Etats-Unis comme puissance mondiale dominante ont connu une détérioration spectaculaire depuis le lancement de la guerre en Irak en mars 2003. Au Moyen orient, la distinction entre politique européenne et politique américaine s'estompe. Notre grille de lecture du monde n'est pas devenue universelle et la notion même de valeurs universelles est ouvertement contestée.

• Un monde de plus en plus multipolaire, mais de moins en moins régulé

Le monde multipolaire est devant nous. Mais dire que la Chine, l'Inde, le Brésil et d'autres seront aussi des acteurs politiques d'un monde multipolaire ne veut rien dire. La véritable question concerne le type de multipolarité qui prévaudra dans vingt ans : sera-t-elle agressive,

régie seulement par la poursuite des intérêts nationaux ? Anarchique, sans autre régulation que le droit du plus fort ou l'aléa des circonstances ? S'agira-t-il à l'inverse d'une multipolarité régulée par un ensemble de normes, d'institutions, de règles édictées par tous au profit de tous ?

La façon dont les Etats parviendront ou non à réguler cette multipolarité sera l'un des enjeux stratégiques majeurs de la prochaine décennie.

Or la plupart des institutions de gouvernance internationale sont en crise, de légitimité ou d'efficacité : l'ONU, le FMI, l'OMC, le TNP, la plupart des accords de désarmement (START, FNI, SFE, CTBT, BTWC etc.), alors que les nouvelles instances internationales créées à l'heure de la mondialisation ne sont pas parvenues à créer du consensus international (Kyoto, TPI).

Trois scénarios de structuration du système international coexistent aujourd'hui de façon plus ou moins ouverte : le modèle chinois repose sur un mélange de mondialisation économique brutale et de realpolitik très traditionnelle. La vision américaine du monde reste de son côté bipolaire, fondée sur la promotion de la démocratie et l'alliance des démocraties contre toutes les menaces possibles. La version européenne serait plutôt celle d'une gouvernance mondiale collective, i.e., « multilatéraliser la multipolarité », mais tout reste à faire et les Européens sont en réalité divisés entre la vision occidentaliste promue par les Etats-Unis et la vision multilatéraliste portée par l'histoire et la culture de l'Europe.

- **La mondialisation se géopolitise**

Contrairement aux attentes, voire aux espoirs, de la précédente décennie, la mondialisation économique se double d'un retour aux rapports de force bruts, l'unification des marchés progresse autant que la fragmentation de la scène politique, les processus d'interdépendance fonctionnent autant que les logiques de compétition et d'affrontement. Le « retour » de la Russie, la militarisation de l'Asie, la concurrence pour l'accès aux ressources énergétiques de la planète, sont autant d'éléments qui nuancent fortement l'effet théoriquement pacificateur des solidarités économiques et commerciales mondiales. Autrement dit, la mondialisation se géopolitise, tout comme la géopolitique traditionnelle se mondialise.

Cette ambivalence de la mondialisation transparaît dans une série de dynamiques contradictoires :

- entre l'enrichissement global de la planète et la paupérisation continue de pays ou de régions entiers. 56 pays comptent pour moins de 0.01% des échanges mondiaux ; un tiers de la population mondiale vit en deçà du seuil de pauvreté ; si rien n'est fait pour inverser cette tendance d'ici 20 ans, 38% de la population africaine risque d'être en état d'extrême indigence. Autrement dit, même si la pauvreté régresse considérablement à l'échelle globale, le différentiel de richesse entre les riches et les pauvres progresse, au sein des nations comme entre les nations.
- entre une logique de flux, de réseaux, de libre circulation, d'ouverture des sociétés, qui tend à intégrer et unifier les marchés, les cultures, les représentations collectives. Et une logique de ruptures, de contestations, de compétitions, de fermeture des marchés et des sociétés, laquelle se nourrit des échecs ou des failles de la mondialisation elle-même.

3) La nouvelle donne de la sécurité internationale :

a) les menaces et défis transversaux

- ❖ L'augmentation des menaces globales non militaires. La mondialisation, tout comme l'urbanisation massive de la population mondiale, renforcent les probabilités de menaces et de risques « anonymes » globaux : qu'il s'agisse des catastrophes naturelles liées au changement climatique, de la diffusion plus rapide des pandémies, des répercussions globales d'une crise financière ou boursière.
- ❖ La vulnérabilité des systèmes informatiques constitue une donnée nouvelle, qu'ils soient victimes d'incidents majeurs ou d'attaques délibérées, de la part d'Etats ou de réseaux non étatiques. La nécessité d'une « cyberdéfense » est devenue une urgence de la mondialisation.
- ❖ Le défi énergétique :
D'ici 20 ans, les prévisions tablent sur une augmentation de 60% de la demande en énergie fossile (deux tiers de cette croissance étant dus à l'Asie) La question n'est pas celle des réserves mais de l'accès aux ressources et de la modernisation des infrastructures. Toutes les zones productrices de matières énergétiques vitales pour la défense et la sécurité (y compris l'uranium) sont des zones de crises majeures : Russie, Moyen Orient, Afrique.
Le défi pour l'Europe est assez clair : sauf à une véritable révolution énergétique ou technologique, elle sera en effet de plus en plus dépendante de zones de plus en plus instables (Afrique, Moyen orient, Russie)
- ❖ L' Irréductibilité du terrorisme et de la prolifération.
Le terrorisme international, type Al Quada, se déplace sans s'affaiblir : le Maghreb, l'Irak, le Liban, le Pakistan, la Somalie, l'Afghanistan, sont aujourd'hui des zones de recrutement et d'entraînement, alors que les cellules implantées sur le continent européen progressent. La probabilité d'attentats majeurs en Europe reste élevée, y compris par des moyens non conventionnels. Quant à la prolifération des ABM, elle se double d'une prolifération balistique considérable, en particulier au Moyen Orient et en Asie. L'Iran est, après le Pakistan en 1998, l'une des puissances régionales capables de remettre en cause le statu quo stratégique dans la zone. Les risques de prolifération par détournement du nucléaire civil se nourrissent de la carence d'un système de contrôle efficace.
- ❖ La Relativité de la puissance militaire
La grande leçon des crises extérieures de la dernière décade (Irak, Iran, Liban, et même Kosovo) est que l'on ne règle pas des crises politiques complexes à partir des seuls outils militaires. (Même si le cas de l'Iran montre a contrario que les seuls outils diplomatiques peuvent également être inopérants)
Paradoxe des armées : hors schéma d'agression de x par y, elles sont de moins en moins pertinentes pour résoudre les crises extérieures, mais de plus en plus indispensables pour stabiliser les pays *après* les conflits.
Paradoxe des programmations militaires : l'accent est mis sur les capacités et les technologies, quand le besoin premier est celui d'effectifs, civils et militaires, disponibles sur le temps long d'une transition de crise

Le dilemme stratégique risque donc de se poser entre des armées de plus en plus sophistiquées et de moins en moins pertinentes sur les terrains d'opérations, le décalage ne cessant de se creuser entre la sophistication des technologies militaires et la barbarisation de la violence planétaire.

❖ Une panoplie complète de conflits armés.

Un conflit inter étatique majeur reste possible, notamment dans la zone moyen-orientale. La décomposition d'Etats, sur fond de sous développement, de conflits ethniques, de partages des ressources naturelles, se poursuit, en Afrique sub saharienne notamment. La déstructuration des sociétés et des Etats peut prendre des dimensions régionales.

❖ La Privatisation de la violence

Les acteurs non étatiques impliqués dans les conflits armés ou les trafics de toutes sortes se diversifient (mafias, crime organisé, réseaux terroristes) ; tandis que se développent des sociétés privées spécialisées, auxquelles ont recours de plus en plus les forces armées officielles. Ce brouillage entre les acteurs étatiques et privés, pour la gestion de la sécurité, est une tendance majeure (Irak, Nigeria)

❖ La force des passions

L'émotionnel collectif est devenu une variable importante des relations internationales : aux Etats-Unis après le 11 septembre (la religion de la démocratie de l'Administration Bush), dans la rue du Moyen orient (la satanisation de l'Occident). Dans sa version délirante, la passion collective peut conduire au terrorisme radical, mais celui-ci a également bien d'autres fondements.

❖ La question de la légitimité

La conséquence majeure de cette géopolitique des passions concerne évidemment la légitimité de l'action internationale : la légitimité juridique (mandat ONU, accord du pays hôte etc.) reste sans doute une condition nécessaire de toute intervention extérieure. Mais elle n'est plus forcément une condition suffisante (l'OTAN peut-elle à l'avenir intervenir au Moyen orient ? Voire en Afrique ? Qu'en sera-t-il demain de l'UE ?)

❖ L'interconnexion des menaces et des risques

L'un des effets de la mondialisation, par la perméabilité des frontières qu'elle suscite, par l'immédiateté de l'information qui la caractérise, par la multitude des flux qu'elle permet tant légalement qu'illégalement, est de brouiller les catégories traditionnelles de la sécurité internationale : le terrorisme se nourrit de délabrements économiques et sociaux et de la non résolution des conflits régionaux, les mafias prolifèrent sur la décomposition des Etats, les flux de réfugiés rendent difficile le « containment » des crises à un seul territoire etc. . La sécurité et la défense se pensent en continuum, tant dans l'origine des crises que dans les moyens nécessaires à leur solution, voire leur prévention.

Ce brouillage stratégique affecte également la distinction traditionnelle entre sécurité intérieure et sécurité extérieure, via le terrorisme, les ruptures énergétiques, la vulnérabilité informatique, mais aussi les risques pandémiques ou les catastrophes naturelles, voire les flux migratoires.

b) Les évolutions géopolitiques

- ❖ La montée en puissance stratégique de l'Asie
- ❖ La dégradation du Sud, en particulier de la zone moyen orientale
- ❖ De toutes les zones d'instabilité potentielle, c'est le Moyen orient qui a subi la dégradation la plus rapide en termes de stabilité. Tous les indicateurs sont au rouge pour cette région, de même que pour l'Afrique sub-saharienne.
- ❖ La faiblesse relative des Etats Unis
- ❖ L'incertitude européenne

4) L'imprévisible est possible

- ❖ Un accident global majeur peut arrêter net le processus même de la mondialisation : pandémie planétaire incompressible, attentat terroriste nucléaire, guerre ou crise pétrolière, catastrophe écologique majeure, les scénarios ne manquent pas. Ils sont presque par nature imprévisibles. Mais ils sont réels. Avec des conséquences incalculables où toutes les imaginations deviennent possibles (fermeture des frontières, retour au local, autoritarisme, guerres de survie)
- ❖ Le facteur américain, bien qu'affaibli, reste important : selon les nouvelles politiques de sécurité qu'adoptera le/la nouveau président des Etats-Unis, le système international peut évoluer vers davantage de confrontation (maintien du messianisme radical des Etats-Unis et bipolarité entre démocrates et autocrates), d'anarchie (option de l'isolationnisme américain) ou au contraire de coopération internationale (nouveau wilsonisme US)
- ❖ Le leadership européen dans la gouvernance mondiale : désespérément improbable sur le plan politique, alors que l'Union a tous les moyens de faire la différence !

THE WORLD IN 2025: FOCUS ON RUSSIA

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This paper reflects the background of Russia's view on main forces and crucial elements to consider in the perspective towards 2025. It also incorporates positions of key/primary experts who are involved directly and indirectly in various foresight exercises in Russia carried out independently by several Ministries as well as private companies and state corporations. This paper does not represent official position of one or another Ministry; in case of controversial points between Ministries or within expert community (several of those are in eco, security and S&T sectors) we present the position which is more likely to dominate in the forthcoming future due to developing political and socio-economical situation in Russia and, hence, determine consecutive actions, irrespective of whether it's currently represented by relevant Ministry or institution.

Starting with the environment, health, climate and energy

Russia expects increased calls for the follow up of Kyoto protocol for Russia and China as well as certain related activities taking place in these countries. These will not by any means lead to it's following, no to considerable investments in renewable resources.

This internal position is well supported by S&T research stating that climate changes taking place in recent years have little to do with human activity. In fact, they are caused by "warm part" of mid-term 1000-years climate cycle. The lowest or coldest part of this cycle took place at the end of 17th – beginning of the 18th century (so-called "minor ice age"), the highest and warmest would be in the middle of the 22nd century. No political, economic, legal or military measures taken by countries or international organizations can significantly influence climatic processes. Climate changes forecast can be based on well-documented "climate optimum" of the 11th century. We may forecast reduction of ice cover in Greenland and its transformation into "Green Isle" of Scandinavian sagas. Western Antarctic glacier would melt as well. Navigation across shelf Polar seas would become easier, but no complete opening of Arctic should be expected.

The warming would be accompanied with masses of icebergs, which might be found far away to the south, up to 50th degree of northern latitude and further. Cyclonic activity would be pushed away to the periphery of Eurasian continent. It might, in turn, cause destruction of stable anticyclone of the Azores and creation of North Atlantic "bad weather zone". The growth of average temperatures would be accompanied with increase of humidity, growth of rivers and reduction of arid zones. These tendencies would be more noticeable in the Northern Hemisphere, than in the Southern. Forecast proposals on the use of Russia land for agriculture (e.g. Siberia) in the next 20 years is overestimated and in fact neglects some bio-particularities of those areas. At present, Russia still hasn't yet taken possible advantages of upcoming warm phase of climate cycle. In several years these would lead to changes in regional policy and anticipated nationalization and privatization of Polar and Okhotskoye seas shelf.

However, taking a longer period of time into consideration, general state of environment would change towards its complete inclusion in human activity.

Food crisis (taking in consideration, that it is possibly has short-term nature) together with simple common sense would lead to reduction of areas planted with bio-fuel agricultures.

With regards to energy crisis, Russia would certainly develop all major sources of alternative energy, including nuclear stations, but wouldn't make considerable investments in renewable sources. Renewable and traditional sources of energy wouldn't go besides niche markets - up to 5% of total generation during the period considered; meanwhile hydrogen energy would also play a modest role during the next 15 years.

Russia envisages a systemic fail of energy saving policy: specific consumption of energy would decrease, while total consumption would grow. In Russia energy crisis will have regional nature, closely linked to structural problems of this industry and in fact can be partially overcome by government regulatory policy. Inevitable development of heavy and energy dependant industries is discussed everyday in most papers about Russia; however, is one of the avoided topics for foresight studies and future vision experts in Russia.

Oil and gas prices will grow, together with volumes of their extraction. Development of oil sands is very likely, and development of shelf is almost unavoidable.

Nuclear energy renaissance is scenario-dependent. It is unavoidable in case of creation of closed nuclear fuel cycle that includes combination of «fast» and «slow» neutron reactors. In all other cases, it's problematic. It should be noticed that development of nuclear energy has a lot of artificial non-economic barriers. Hence, nuclear energy renaissance must be accompanied with hard struggle against so-called «green mind». Russia would conduct considerable R&D in fast neutron reactors and closed-cycle reactor system, however, quick large-scale introduction of such systems is rather unlikely.

As far as it concerns population health, Russia lags behind developed European states. One of the National goals for the upcoming 10 years is to make a shift to healthy lifestyle and avoid a “pharmacological counterrevolution”. During all forecasting period, health costs would only increase. We forecast a number of scandals with recently announced “smart targeted medicine” etc. These scandals might possibly slow development of such medicine for years. This, together with energy consumption limits, might stop further increase of average human lifetime. Death rate of suicides including those caused by nerve breaks and psychological problems would rise. “Slow infections” would remain important problem. In the near future we expect Russia to face the problem of growth of medical faults, caused by commercial medicine promotion.

Russia expects the crisis of industrial phase of economic development will lead to decline in productivity of funds, growing gap between production of goods and services and circulation of capital, separation of the stock market from the real economic activity, fight for reduction of production costs and increase of exploitation rates. It's expected that in the next 20 years main drivers of economic growth are not oil and gas prices, but contradiction between industrial and postindustrial economies and rapid development of previously underdeveloped sectors of the economy. It will be resolved through a new regional policy towards the simultaneously ultra developed and underdeveloped country. Partially this tendency is being formed and built at this present moment. Innovation model solution can become one of the effective instruments in Russia only in case of regulation scenario with significant state involvement.

Regional innovational policy will be accompanied by intensive restructuring of transportation system within the discussed period. However, it's important to mention “long-term vision” experts position that beyond 2030 Russia (and others) would benefit from “transport minimization strategy” and most probably will face it's inevitability beyond 2050.

Industrial crisis will inevitably lead to the development of logistics, including intercontinental logistics, staff logistics and resource deficiency logistics.

Development of regional policies in Russia also backed up by a relatively favorable situation in the field of migration with certain changes in migration and demographics policy attracting labor forces both from CIS countries and Russian diasporas. This even in spite of socially unpopular decisions which make rational management of migration complicated.

The upcoming economic crisis makes standard macroeconomic indicators a serious survival test. Multiple double counting of GDP would lead to permanent growth of economic indicators accompanied by real decline in production and real income level of population. It's strongly anticipated that within the next decade Russia will introduce and move to new group of macroeconomic indices that avoid double counting.

Technology, research and education

One of the crucial points for today world globally is the growing imbalance between technological and humanitarian accumulated knowledge (and studies). In case of communication technologies and cognitive sciences this imbalance between these two different basis of knowledge significantly slow down their growth and lower potential. Rapid uncontrolled development of limited numbers of mainstream technologies without adequate development of humanities increases the disbalance further. This expects to lead to a serious crisis in the next two decades in the area of global management and regulation. There is no satisfactory answer to the problem apart from suggestion for an innovation system which can ensure mass production of different types of innovation. Concept of technological packages, which considers technological and humanitarian aspect in a single block, is strongly criticised by some experts as well as strongly supported by others.

“New science” in Russia would be actively involved in all aspects of shelf related development, regional development, governance and other humanitarian technologies. The “old science” will be primarily focused on security and defence, incl. military, and energy R&D – this includes bioscience and nano-bio which will be pushed through these sectors primarily.

In the field of education Russia is becoming more and more unsatisfied with the role foreseen by Europe for Russia within Bologna process and will be actively looking for solution to “change the cards”.

In the search for more effective educational systems, Russian experts has developed the following understanding of the current and forthcoming situation in educational arena: the decrease of age of loss of cognitive activity of a child crosses out the whole range of traditional educational strategies; in conjunction with the problem in humanities it leads to a potential crisis which will have serious effect on USA, Australia, Canada, New Zealand and parts of Europe; countries like Japan, Island and Ireland might be faster to find the solution based on their existing cognitive social practices; countries which will be able to introduce and regulate development and installation of new educational strategies (including multi-age education, cognitive systems, second and third stage education, knowledge approach, etc.) at state level in addition to corporate and various social clusters will have a strong advantage. Countries like China, India, Indonesia and Malaysia which are more likely to go through the crisis easily will become major sources for required labour migration within the next decades.

With regards to widely and actively discussed Russia's inevitable integration in European and also world community, it's important to bear in mind that preservation of its own identity is the key factor for Russia and will remain primary value. This will at some stages inevitable slow down the integration process.

Overall, taking all the aspects in consideration, Russia has chosen regulation scenario as the basis. However, due the past there is a very limited range of installed instruments in the state and in the society, as opposed to Europe and US. To ensure successful implementation of this scenario trend, it will make all efforts to widen the range of regulation instruments.

Rongping MU

INNOVATIVE DEVELOPMENT AND INNOVATION CAPACITY-BUILDING IN CHINA

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I. Introduction

During the past two decades, there are increasingly more Chinese scholars who pay attention to the research topics such as technology innovation theories, industrial technology innovation, innovation in enterprises, and innovation policy as well as the national innovation system. However, most of these studies focus on technological innovation in enterprises □Chen Xiaotian, Yang Liexun□ 1999□¹⁹². Since 1998, Chinese scholars have published a series of papers to discuss innovation policy in China based on the concept of national innovation system introduced by Freeman (Freeman□1987)¹⁹³. Wang Chun-fa □Wang Chun-fa, 1998□¹⁹⁴ has analyzed the theory base and policy tools for technology innovation policy. Feng Zhi-jun (Feng Zhi-jun, 1999)¹⁹⁵ has introduced the theories of national innovation system systematically and emphasized on the reform of science and technology system. Lu Yong-xiang (Lu Yong-xiang, 1998)¹⁹⁶ divided the national innovation system into four sub-systems, namely: the knowledge innovation system, the technology innovation system, the knowledge diffusion system, and the knowledge application system. Some scholars define the national innovation system as “an institution network which consists of the organization of public and private sectors, with key actors such as governments, academic institutes, universities and enterprises”, and emphasize the key role of government in building national innovation system (Shi Dinghuan, 1999)¹⁹⁷. President Hu Jintao (Hu Jintao, 2006)¹⁹⁸ has outlines the tasks for building innovation-oriented country in his speech at the China’s National Conference on Science and technology in 2006, and emphasizes that the government should play a leading role in the scientific and technological innovation, while the market will play basic role in the allocation of scientific and technological resources, which indicates that Chinese government has a clear understanding about the function, the key actors and their relationship of the national innovation system.

Chinese government has issued the “Outline of Medium and Long-term Plan for National Science and Technology Development” in January 2006 (The State Council, 2006)¹⁹⁹, with an ambitious goal to become an innovative country by 2020. Meanwhile, the capacity building

¹⁹² Chen Xiaotian, Yang Liexun (eds). 1999. Ten Years Technological Innovation (Jishu Chuangxin Shi Nian). Beijing, Science Press.

¹⁹³ Freeman, C. 1987. Technology policy and economic performance: Lessons from Japan, London, Pinter Publishers.

¹⁹⁴ Wang Chun-fa. 1998. Technology innovation policy: theory base and policy tool selection. Beijing, Economic Science Press.

¹⁹⁵ Feng Zhi-jun. 1999. The Theories and Policy Tools of National Innovation System. Beijing, Economic Science Press.

¹⁹⁶ Lu Yong-xiang. 1998. Innovation and Future. Beijing, Science Press.

¹⁹⁷ Shi Dinghuan eds. 1999. National Innovation System: Status and Future [M]. Beijing. Economy and Management Press, pp. 5-10.

¹⁹⁸ Hu Jintao. 2006. Adhere to a New Path of Innovation with Chinese Characteristics and Strive to Build an Innovation-oriented Country (a speech at the National Conference on Science and technology in China). Beijing, People's publishing House.

¹⁹⁹ The State Council. 2006. Outline of Medium and Long-term Plan for National Science and Technology Development, Guofa (the state council issue), No.44. http://www.gov.cn/jrzq/2006-02/09/content_183787.htm.

for innovation has become the core of national strategies, and results in a fundamental change in the national innovation strategy and related policies. Mu Rongping (Mu Rongping, 2008)²⁰⁰ has reviewed the changing innovation capacity and related key factors in China, analyzed the change of innovation strategy and policy in China, and some policy recommendations for future national innovation policy.

It is worthwhile to point out that the outline has proposed some indicators such as GERD per GDP exceeds 2.5%, the contribution of S&T progress to economic development accounts for more than 60%, the dependency on foreign technology is less than 30%, the number of invention patent granted ranks top five in the world, and the citation of international S&T papers ranks top five in the world. However, there are still lots of issues to be discussed. What does the innovation-oriented country really mean? How to describe national innovative development? How to describe national innovation capacity? How to explain the relationship between national innovative development and national innovation capacity-building? In practice, there is no official or broadly accepted definition on innovation-oriented country so far.

Therefore, it is necessary to clearly define the concepts such as innovative development and innovation capacity so as to set up indicator systems for monitoring the evolution of national innovative development and national innovation capacity-building in China, which will be very important to identify key issues that affect the effectiveness of innovation policy so as to provide necessary support for innovation policy-making and its improvement. Meanwhile, it is also very important to measure the gap in innovation capacity and in innovative development between China and developed countries so as to adjust national innovation strategy and related policies.

This paper consists of four parts. Firstly, the paper tries to review previous research on technology innovation policy in China, and to identify the issues to be discussed in this paper. Secondly, the paper tries to define the national innovative development and the index for national innovative development so as to measure it with international comparison. Thirdly, the paper tries to define the national innovation capacity and the index for national innovation capacity so as to measure it with international comparison. Finally, the paper tries to conclude from three aspects, namely: the main driving force for evolution of the innovative development and the innovation capacity of China, the policy for promoting the innovative development, and the perspective of the previous two indexes of China.

II. Evolution of the National Innovative Development of China

China has chosen a way of innovative development, namely development mainly relying on the innovation instead of increasing investment of factors such as cheaper labor forces, capitals and others. “Innovative development” means a development driven by innovation, which concerns the effectiveness, efficiency and efficacy of innovation activities.

1. Definition of National Innovative Development

The level of national innovative development could be influenced by the progress in five aspects, including: the progress in S&T and innovation, in industrialization, in informatization, in urbanization, in education and health, in marketization and in

²⁰⁰ Mu Rongping. 2008. The Changing Strategy and policy of Innovation in China, in: Reinhard Meckl, Mu Rongping and Meng Fenchun (eds), Technology and Innovation Management: Theories, methods and practices from Germany and China, Oldenbourg Verlag, pp.1-16.

internationalization. The progress in S&T and innovation means the effectiveness, efficiency and influence of S&T and innovation activity, not only the results of innovative development, but also the input of innovative development. The progress in industrialization means the effectiveness, efficiency and influence of economic activity. The progress in informatization means the effectiveness of information infrastructure construction. The progress in urbanization means the development of service sectors and populations. The progress in education and health is not only the result of innovative development, but also the input of innovative development. The marketization and internationalization are external conditions for innovative development. Therefore, the national innovative development could be described in five dimensions including: S&T and innovation, industrialization, informatization, urbanization, education and health.

2. Index of National Innovative Development

The indicator system for innovative development (innovative development index) consists of five sub-indices concerning industrialization, informatization, urbanization and education & health, S&T and innovation, including 19 indicators, as shown in figure 1.

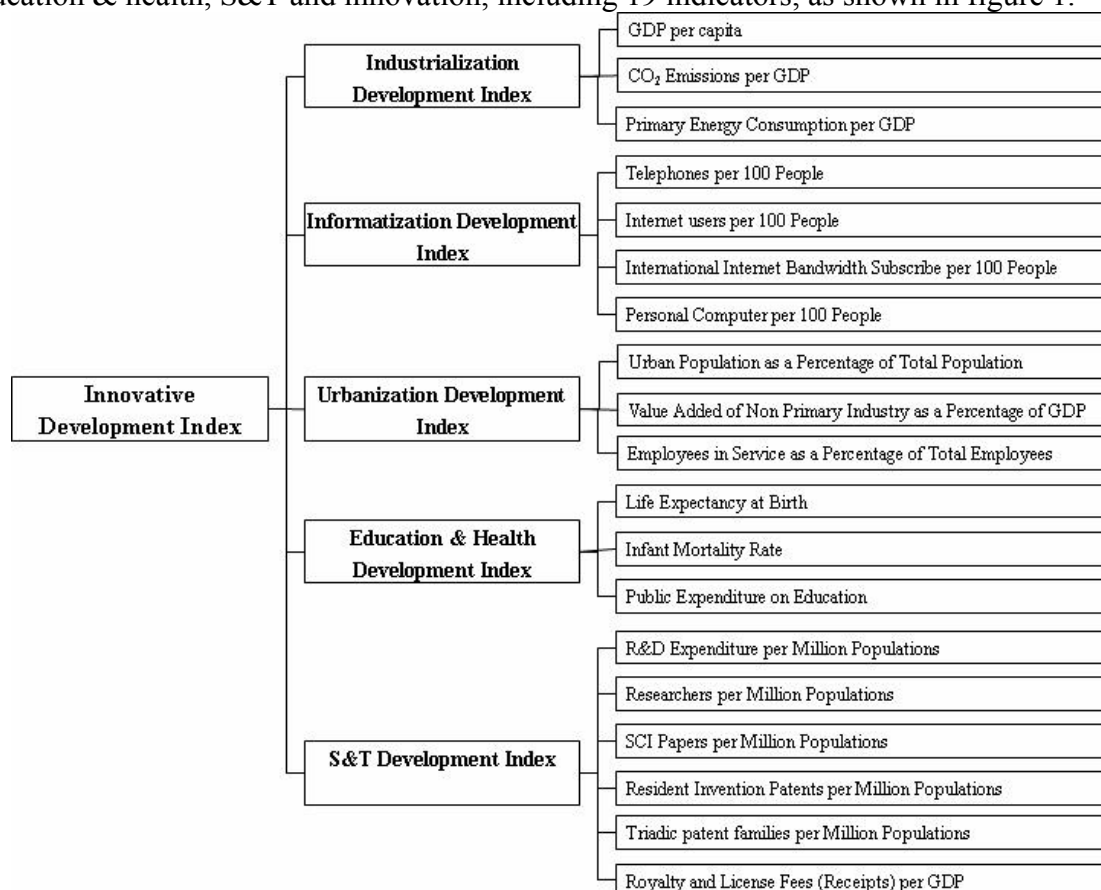


Figure 1: Indicator System for National Innovative Development

Three indicators are selected to describe the effectiveness, efficiency and influence of industrialization, namely: the GDP per capita, the CO2 emission per GDP and the energy consumption per GDP. The GDP per capita indicates the level of industry development, while

the CO2 emission per GDP and the energy consumption per GDP reflect the results of upgrading of industry and transformation of industrial structure.

Four indicators are selected to describe the effectiveness of informatization, which provides necessary support for science & technology and innovation activity as well as economic & social activity, and increases their efficiency and effectiveness. Three indicators concerning population, value-added and employee are selected to describe the progress in urbanization, namely: the share of urban population, the share of value-added of non-primary industry, the share of employees in service sectors. Three indicators are selected to describe the progress in education and health, namely: life expectancy at birth, infant mortality rate, and public expenditure on education. Six indicators are selected from the perspective of R&D expenditure and researchers as well as their output to describe the progress in science and technology as well as innovation activity, namely: R&D expenditure per million population, researchers per million population, SCI papers per million population, Resident invention patents per million population, triadic patent families per million population, and revenue of royalty and license fees per GDP.

3. International Comparative Study of National Innovative Development

In order to monitor the evolution of innovative development of China, 34 countries have been selected for comparative studies, including: Switzerland, Japan, Sweden, Norway, United States, Finland, United Kingdom, Netherlands, Germany, France, Belgium, Ireland, Austria, Australia, Canada, Korea, Italy, Spain, Portugal, Slovenia, Greece, Czech Republic, Hungary, Argentina, Poland, Slovakia Republic, Mexico, Brazil, Russia, Turkey, Romania, South Africa, India, and China. The Innovative Development Index is calculated according to following method:

$$I_{\text{inno.}} = 0.25 * I_{\text{industr.}} + 0.15 * I_{\text{info.}} + 0.15 * I_{\text{urban.}} + 0.25 * I_{\text{E\&H}} + 0.20 * I_{\text{S\&T}}$$

The Switzerland, Japan, Sweden, Norway, United States, Finland, UK, Germany, Netherland and Austria are among the top ten countries in terms of the index of innovative development in 2000. The BRICS countries such as Brazil, Russia, China, South Africa and India rank the 28th, 29th, 32nd, 33rd and 34th place in terms of the index of innovative development in 2000 respectively, as shown in Figure 2.

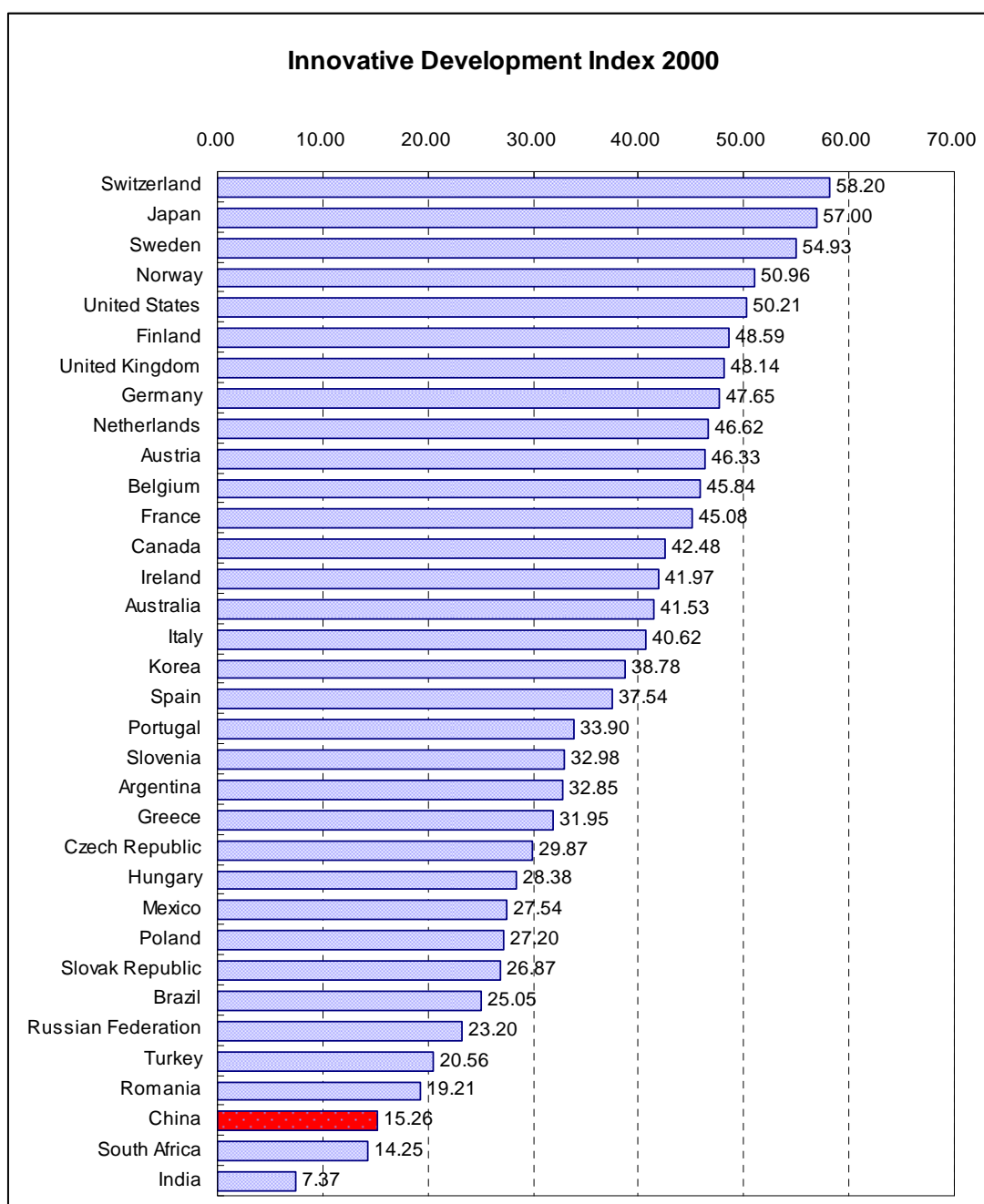


Figure 2: Innovative Development Index in 2000

In 2005, Switzerland, Sweden, Japan, Norway, United States, UK, Finland, Netherland, Germany and France are top ten countries in terms of index of innovative development, while Belgium, Ireland, Austria, Australia, Canada, Korea, Italy, Spain, Portugal and Slovenia rank from the 11th to 20th place in terms of the index of innovative development. The BRICS countries such as Brazil, Russia, China, South Africa and India keep the 28th, 29th, 32nd, 33rd, 34th place in terms of the index of innovative development respectively, as shown in Figure 3.

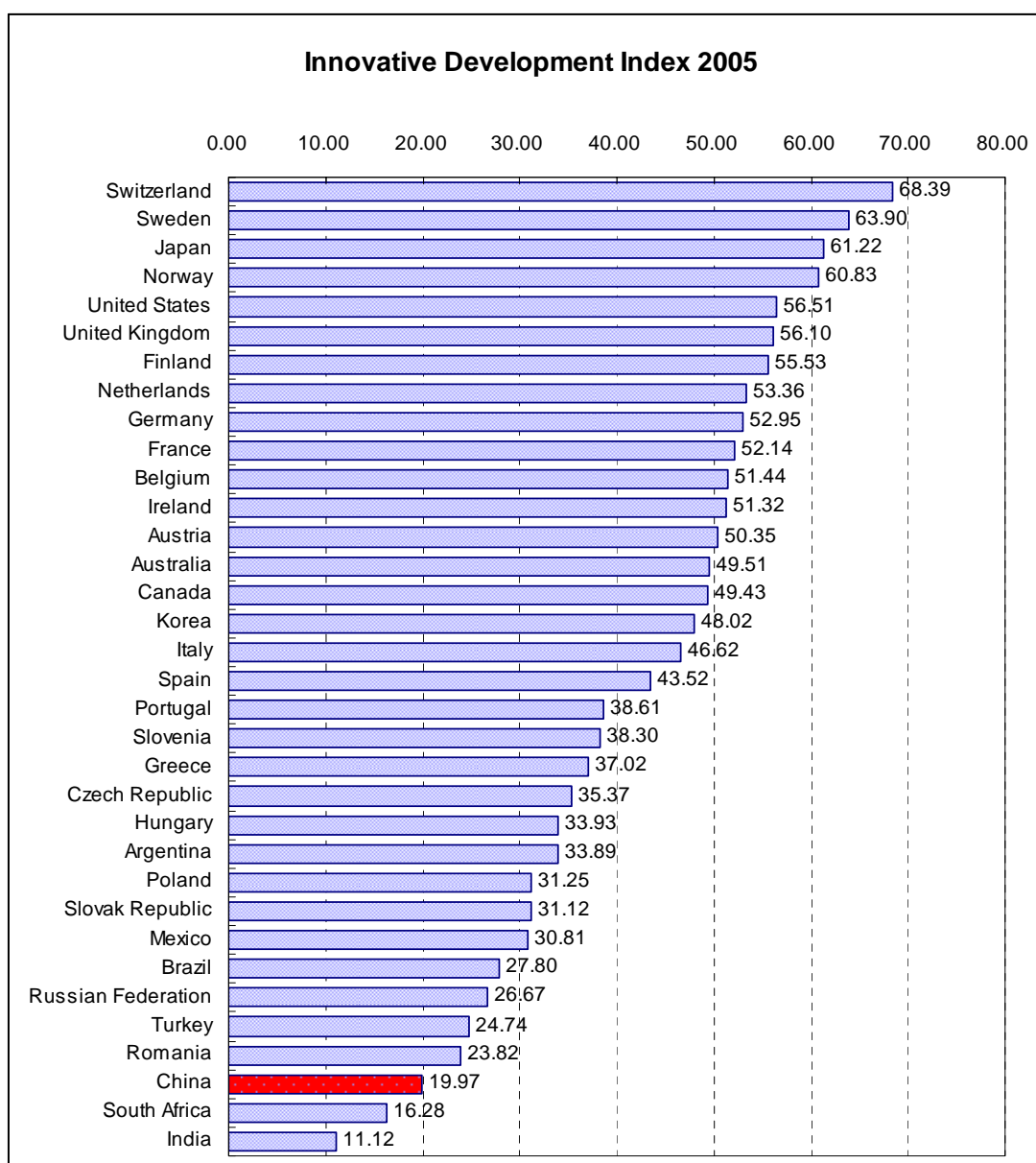


Figure 3: Innovative Development Index in 2005

During 2000 to 2005, nine countries keep in the top ten places in terms of the index of innovative development, the only change is that France replaces Austria ranks the 10th place. Meanwhile, the index of innovative development of Switzerland has increased from 58.20 to 68.39, keeping the first place among 34 countries, while the index of innovative development of China has increased from 15.26 to 19.97, keeping the 32nd place among 34 countries. The index of innovative development of India increased from 7.37 to 11.12, and keeps ranking the last place among 34 countries.

India is the fast country in terms of the annual growth rate of the index of innovative development. China is the second fast country in terms of the annual growth rate of the index of innovative development. Brazil, Austria, Argentina, Japan and Romania are the last five countries in terms of the annual growth rate of the index of innovative development, as shown in figure 4.

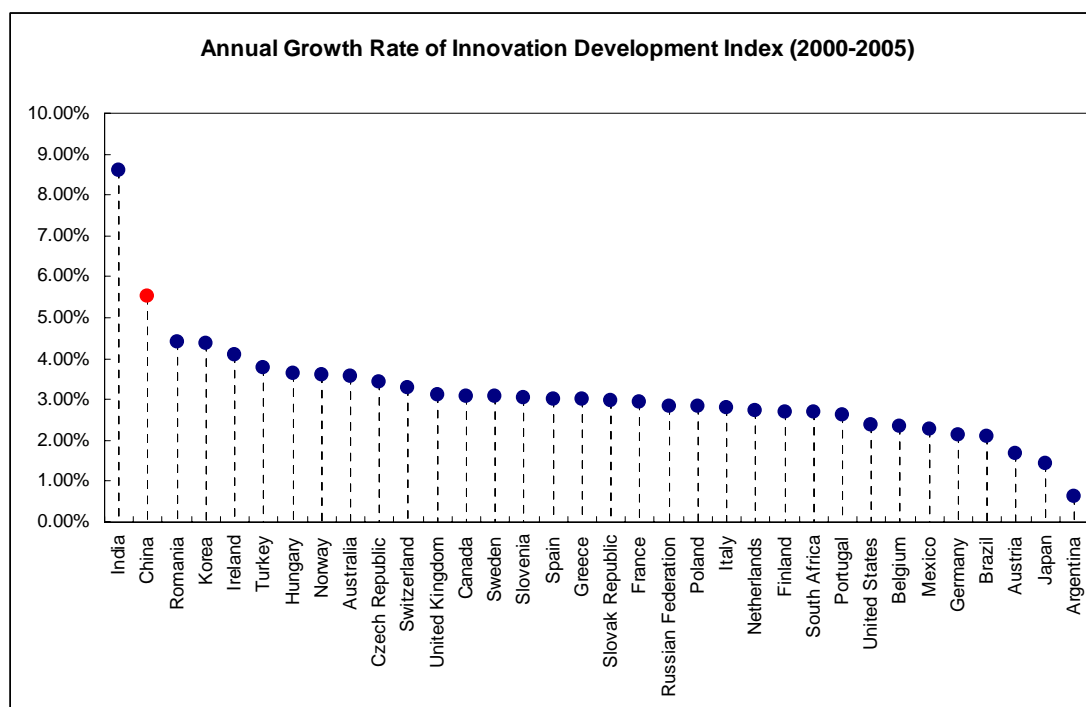


Figure 4: Annual Growth Rate of Innovation Development Index (2000-2005)

Russia is the fastest country in terms of the annual growth rate of the index of Industrialization Development during 2000 to 2005, while Romania, Slovak, Czech, Hungary, Ireland, Greece, Poland, South Africa and Australia rank from the 2nd to 10th. The annual growth rate of the index of Industrialization Development of India is about 5%, while China almost has no growth during the period of 2000-2005, ranks the second slowest country in terms of the annual growth rate of the index of Industrialization Development, as shown in figure 5. The major factor that results in the stagnation of the annual growth of the index of Industrialization Development is the increase of energy consumption.

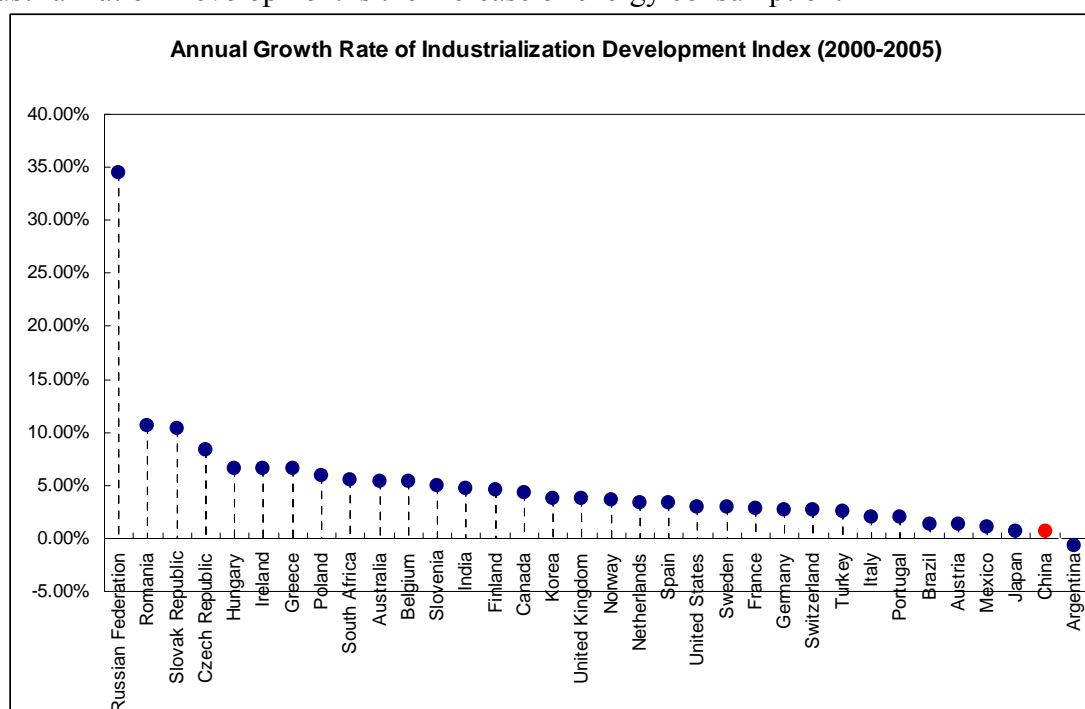


Figure 5: Annual Growth Rate of Industrialization Development Index (2000-2005)

India is the fastest country in terms of the annual growth rate of the Informatization Development index, while China, Romania, Russia, Poland, Hungary, Brazil, Czech, Mexico and Slovak rank from the 2nd to 10th, with an annual growth of more than 20%. Ireland, Korea, Austria, Finland and US rank from the 30th to 34th in terms of the annual growth rate of the Informatization Development index, as shown in figure 6.

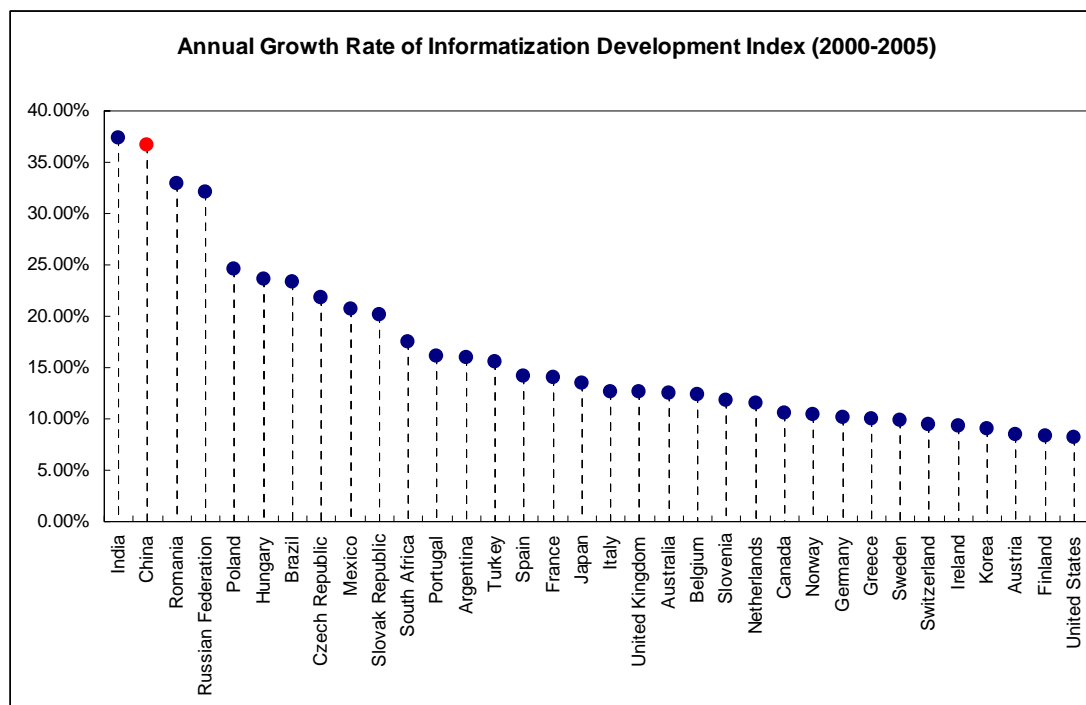


Figure 6: Annual Growth Rate of Informatization Development Index (2000-2005)

India and China show the fastest pace with an annual growth of more than 7% in terms of the urbanization development index during the period of 2000-2005, while Romania, Switzerland, Greece, Hungary, South Africa, US, Turkey, Ireland rank from the 3rd to 10th. The urbanization in Netherland, Argentina, Germany and Japan in the same period tends to decline, as shown in figure 7.

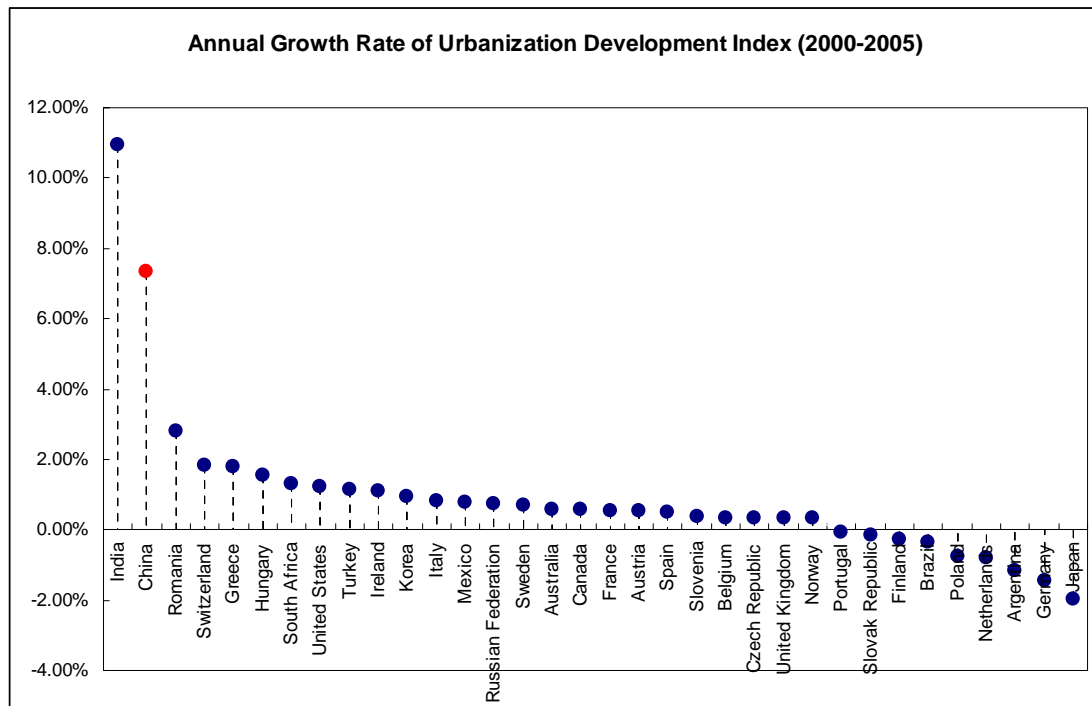


Figure 7: Annual Growth Rate of Urbanization Development Index (2000-2005)

India shows the fastest pace in the education & health development, with an annual growth rate of over 7% during the period of 2000 to 2005, while Turkey, Norway and China take the 2nd, 3rd and 4th place in the same period. 24 of 34 countries have small growth in education & health development, with an annual growth rate of 1% to 2%. South Africa shows their decline in education & health development, ranking the 34th, as shown in figure 8.

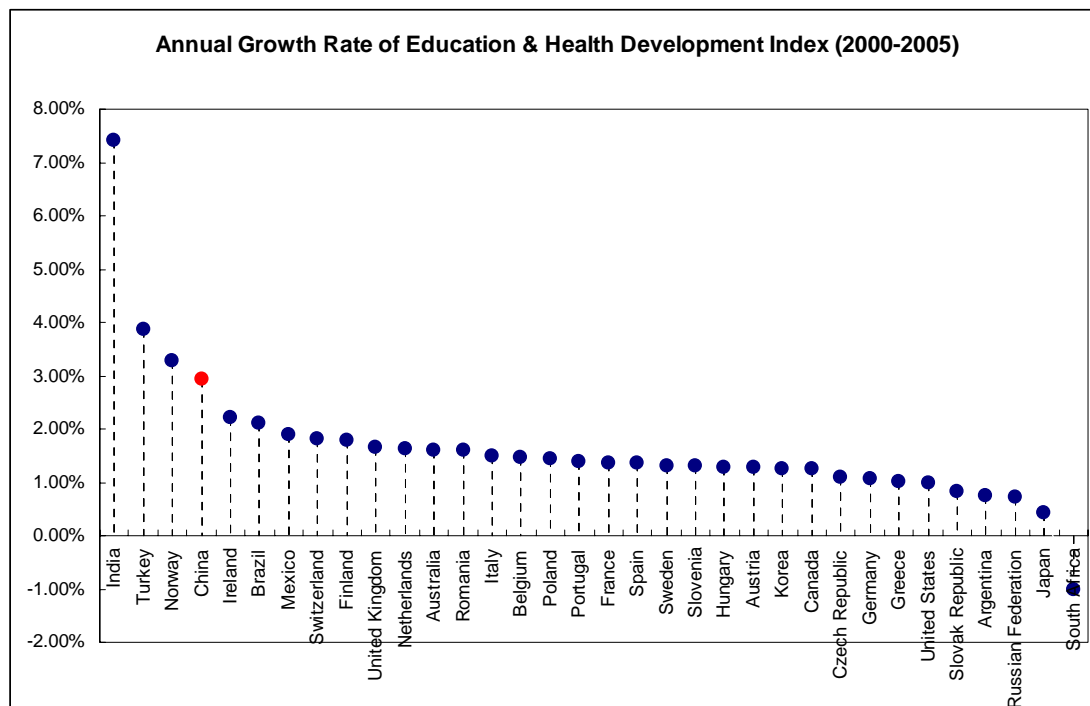


Figure 8: Annual Growth Rate of Education & Health Development Index (2000-2005)

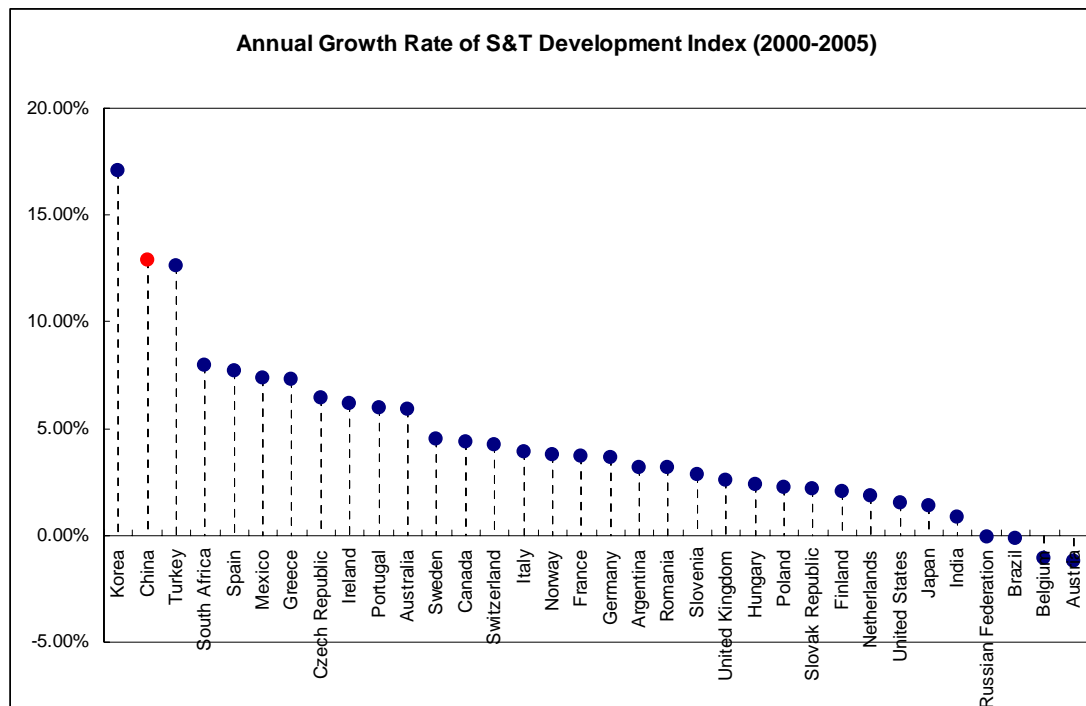


Figure 9: Annual Growth Rate of S&T Development Index (2000-2005)

Korea, China and Turkey have made great progress in the development of science, technology and innovation, with an annual growth rate of over 10% during the period of 2000 to 2005, while Brazil, Belgium and Austria show their decline in the development of science, technology and innovation, ranking the 32th, 33th and 34th place, as shown in figure 9.

III. Evolution of the National Innovation Capacity of China

Innovation is an activity to create value for clients so as to get economic revenues, including: design, invention, development and application activity for product technology, process technology, service and business mode. Innovation capacity could be classified into four kinds of capacities, namely: national innovation capacity, industrial innovation capacity, regional innovation capacity, and innovation capacity of enterprise.

1. Definition of National Innovation Capacity

National innovation capacity is the ability of a country to conduct scientific discovery, technological innovation and related commercialization activities. In a broad sense, national innovation capacity is the ability of a country to integrate innovation resources so as to transform them into fortune, an integrative capacity to promote economic and social development.

National innovation capacity is an important base of national competitiveness, which determines the industrial structure, the level of industry development and its international competitiveness, and finally determines the capacity for national sustainable development and for adapting the changes resulted from new technology revolution and market demands. Innovation-driven countries usually have stronger capacity for national innovation, which

indicates high efficiency and effectiveness of innovation activities, and drives social-economic development with a comprehensive coordination and sustainable way.

National innovation capacity consists of five aspects, namely: innovation input, innovational output, innovation condition, innovation performance. Capacity for innovation input consists of the capacity for capital input and the capacity for human resources. The capacity for innovation output consists of the output capacity in the scientific discovery and technological innovation activity, including generation capacity of S&T papers and patents. Innovation condition is not only the input of innovation, but also the output of innovation. This paper emphasizes the influence of informatization on innovation activity, and chooses the indicators such as the users of PC, telephone, internet and internet bandwidth subscribe to describe the innovation condition. The innovation performance indicates the direct and indirect economic effectiveness of innovation activity, including royalty and GDP.

The innovation environment, including the supply of human resources for innovation, the capital supply for innovation, IPR protection, incentives government purchase policy, the financing cost and entrepreneurship, is an important factor which to some extent determines the efficiency, effectiveness and efficacy of innovation activity. It is possible to put the factor of innovation environment into the indicator system for innovation capacity if the factor of innovation environment is regarded as external factor of innovation activity. It is also possible to move the factor of innovation environment out of the indicator system for innovation capacity if the factor of innovation environment is regarded as internal factor of innovation activity. This paper takes the innovation environment into consideration only in the process of explaining the evolution of national innovation capacity.

It is necessary to point out that the concept of national innovative development is clearly different from the concept of national innovation capacity. The concept of innovation development emphasizes the efficiency of innovation activity and the intensity/density of innovation performance, while the concept of national innovation capacity emphasizes both the factors concerning innovation efficiency/intensity/density and the factors concerning scale of innovation activity and performance. Theoretically to say, small country with high innovation efficiency may stronger than large country with low innovation activity in terms of national innovation capacity. Therefore, this paper tries to describe the national innovation capacity by introducing two concepts, namely: the innovation strength and the innovation effectiveness.

2. Index of National Innovation Capacity

The indicator system for national innovation capacity (innovation capacity index²⁰¹) consists of two sub-indices concerning the innovation strength and the innovation effectiveness. The strength index²⁰² for national innovation consists of four indices, namely: the strength index for innovation input, the strength index for innovation output, the strength index for innovation condition, the strength index for innovative performance. The effectiveness index²⁰³ for national innovation consists of four indices, namely: the effectiveness index for innovation input, the effectiveness index for innovation output, the effectiveness index for innovation condition, the effectiveness index for innovative

²⁰¹ The index of national innovation capacity: $I_{capacity} = 0.5 \times I_s + 0.5 \times I_e$

²⁰² The strength index of national innovation: $I_s = 0.2 \times I_{s_i} + 0.3 \times I_{s_o} + 0.2 \times I_{s_c} + 0.3 \times I_{s_e}$

²⁰³ The effectiveness index of national innovation: $I_e = 0.2 \times I_{e_i} + 0.3 \times I_{e_o} + 0.2 \times I_{e_c} + 0.3 \times I_{e_e}$

performance. The indicator system for national innovation capacity includes 27 indicators, as shown in figure 10.

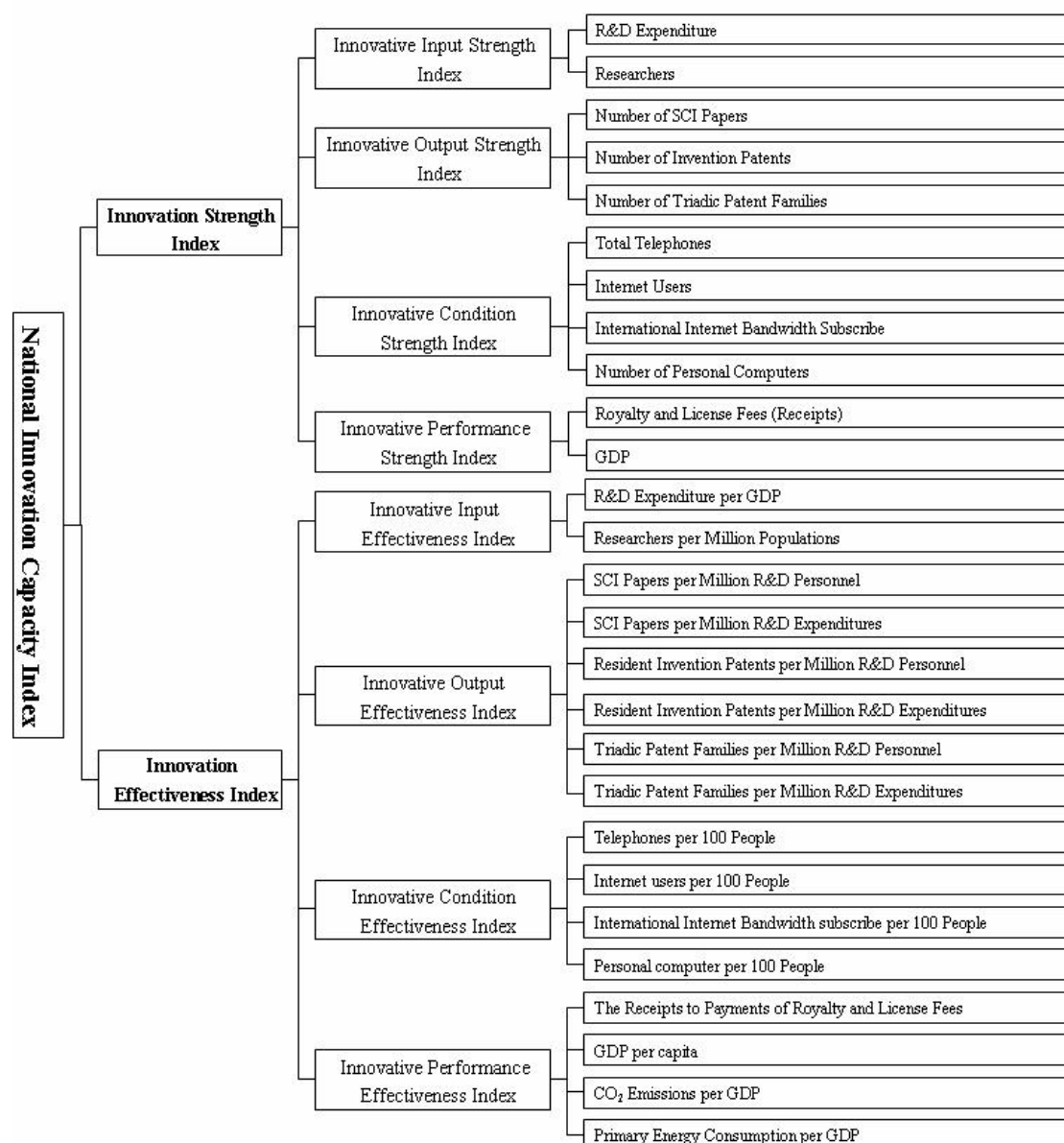


Figure 10: Indicator System for National Innovation Capacity

3. International Comparative Study of National Innovation Capacity

In order to monitor the evolution of innovation capacity in China, 38 countries have been selected for comparative studies, including: United States, Japan, Germany, Sweden, United Kingdom, France, Israel, Netherlands, Finland, Canada, Iceland, Luxemburg, Singapore, Norway, Australia, Austria, Ireland, Belgium, New Zealand, Italy, Spain, Portugal, South Africa, Greece, Hungary, Korea, Russia, Brazil, India, Mexico, Slovenia, Czech Republic, Slovakia Republic, Poland, Argentina, Turkey, Romania, and China. The index of is calculated according to following methods:

The Index of National Innovation Capacity of China has increased remarkably since 2000, from 6.80 in 2000 to 18.53 in 2006, as shown in figure 11.

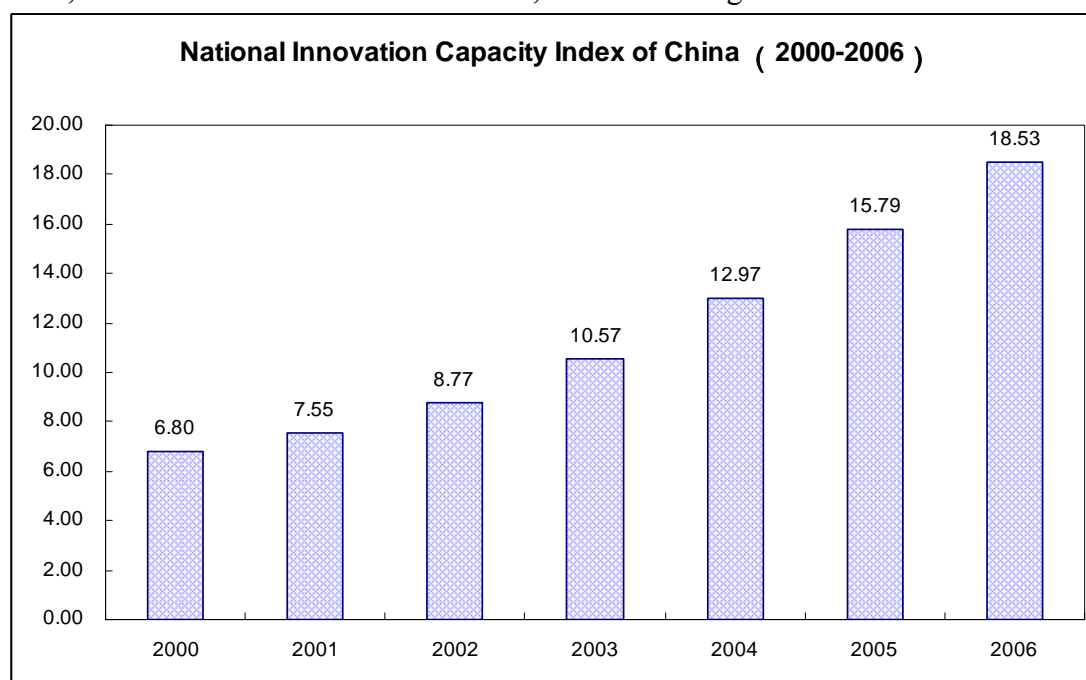


Figure 11: Evolution of National Innovation Capacity Index of China

However, the growth of the index of innovation capacity of China mainly results from the scale expansion of the innovation and economic activities instead of the efficiency, effectiveness and efficacy of innovation activity, as shown in figure 12.

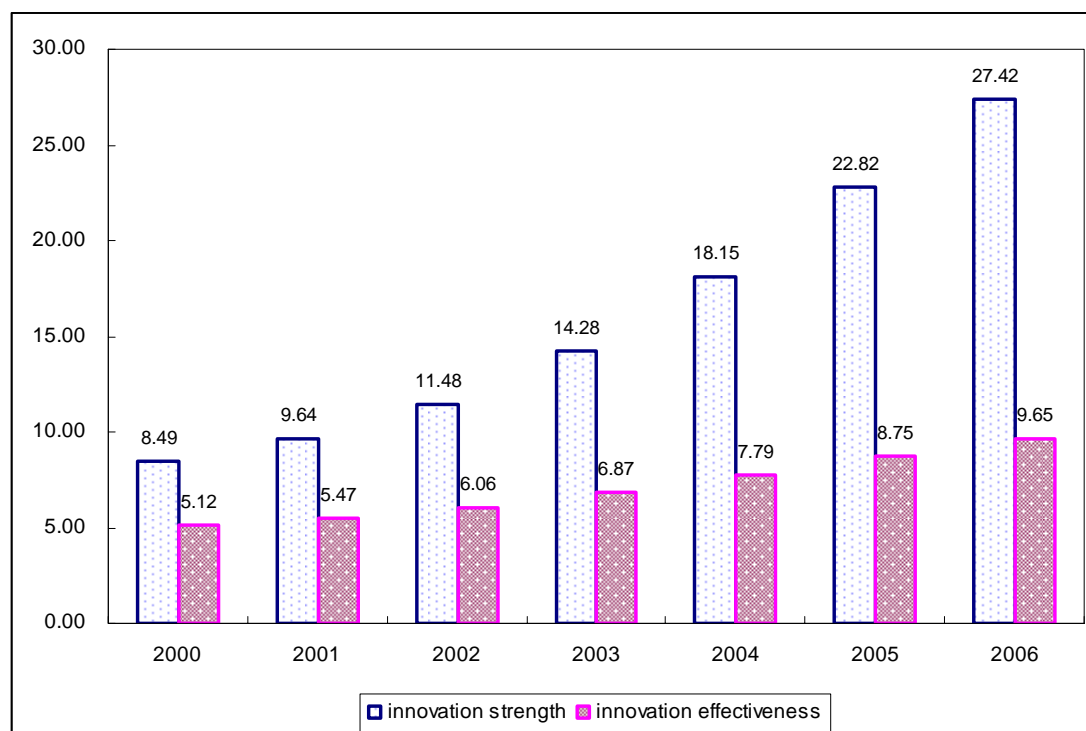


Figure 12: The Structure of National Innovation Capacity Index of China

Among 38 countries, United States, Japan are superpower in terms of national innovation capacity in 2000, while Germany, Sweden, Finland, UK, Israel, France, Netherland and Korea rank range from the 3rd to 10th place in terms of the index of national innovation capacity in 2000. The BRICS countries such as Russia, China, Brazil, South Africa and India rank the 20th, 28th, 34th, 37th, 38th place in terms of the index of national innovation capacity in 2000 respectively, as shown in figure 13.

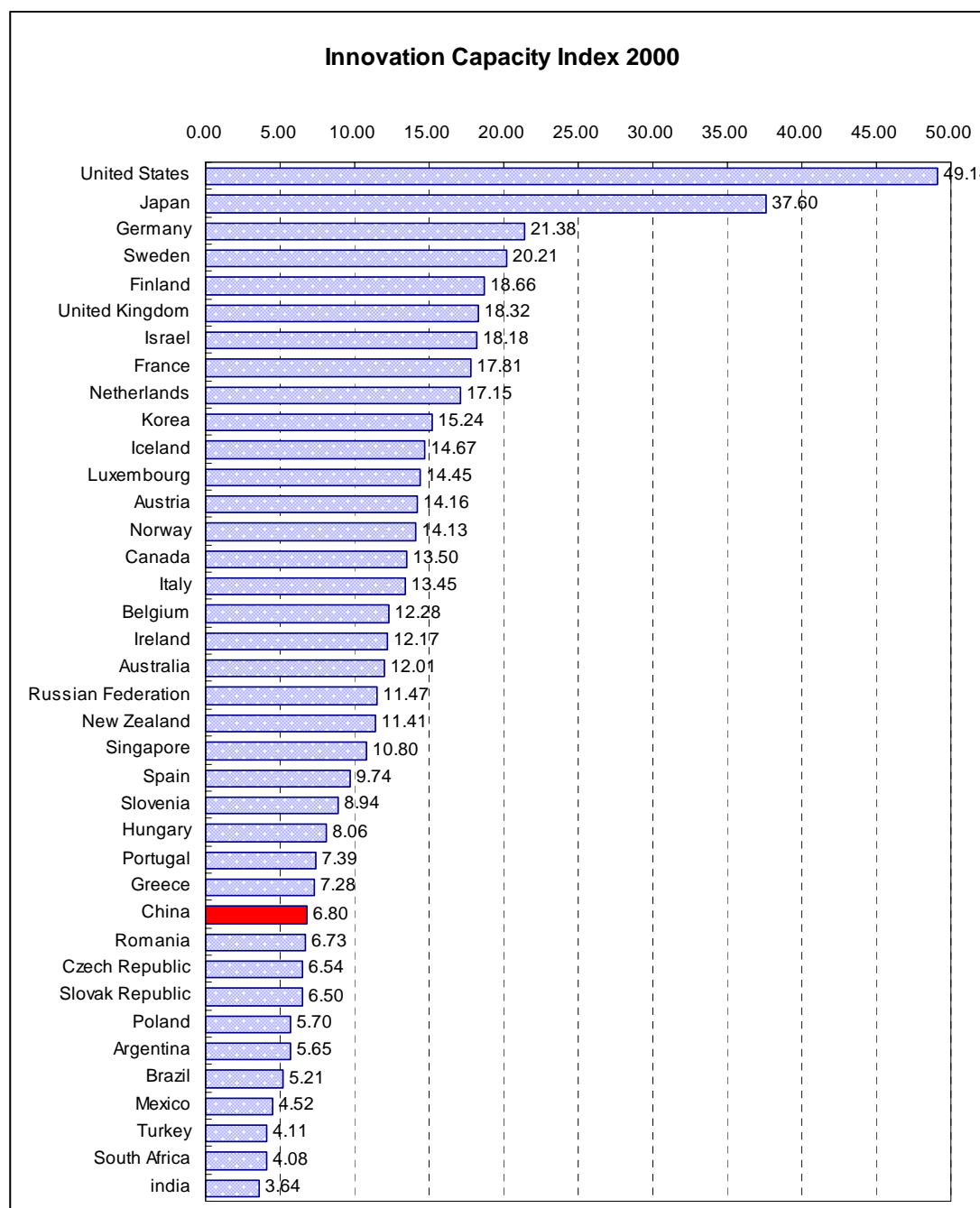


Figure 13: National Innovation Capacity Index in 2000

In 2005, United States and Japan still keep the first and the second place in terms of the index of national innovation capacity, while Germany, Sweden, Korea, UK, France, Israel, Netherland and Finland take the place ranging from 3rd to 10th. The BRICS countries such as

China, Russia, Brazil, India and South Africa keep the 17th, 25th, 32nd, 37th, 38th place in terms of the index of national innovation capacity respectively, as shown in figure 14.

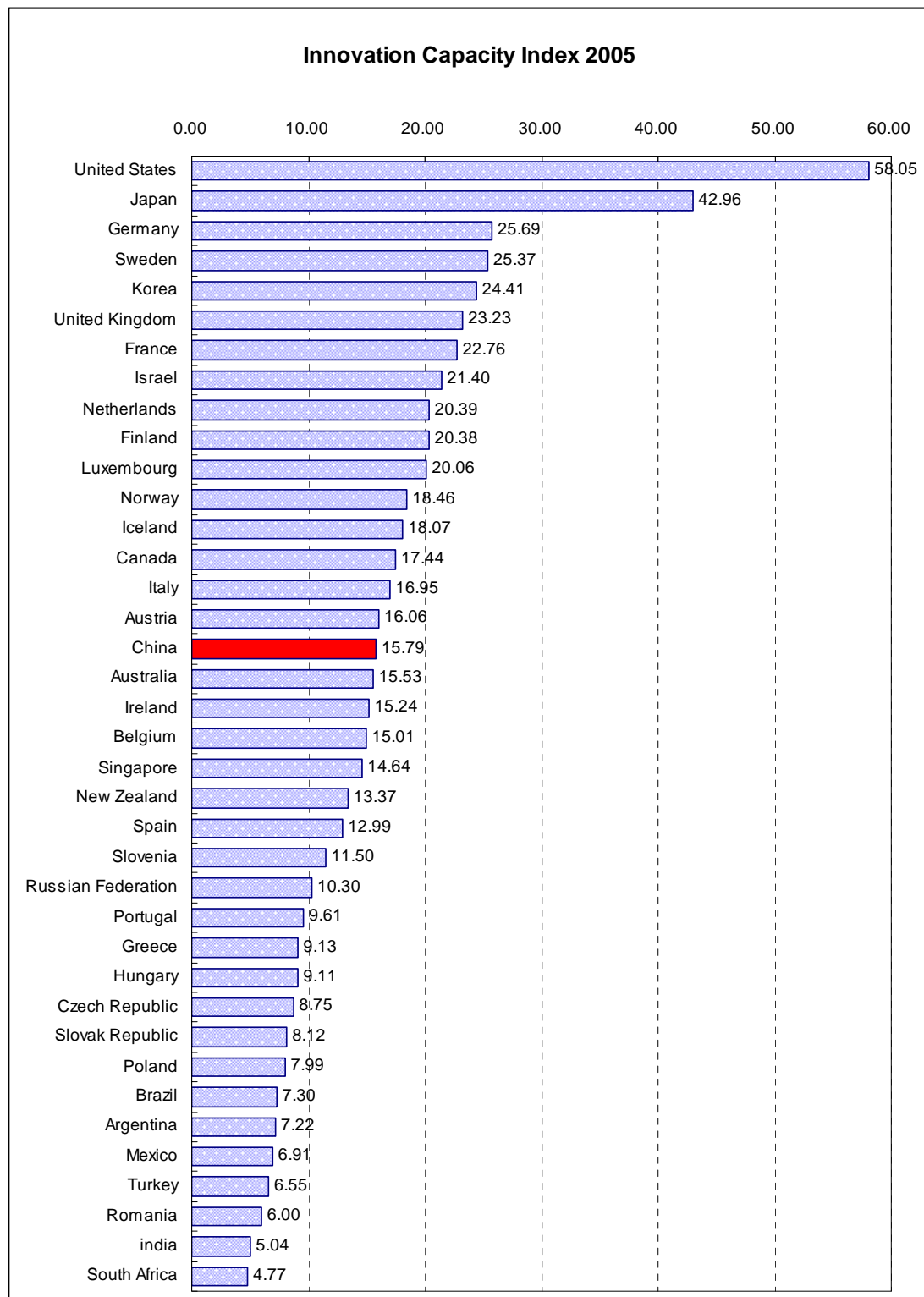


Figure14: National Innovation Capacity Index in 2005

During 2000 to 2005, the ten countries such as US, Japan, Germany, Sweden, Korea, UK, France, Israel, Netherlands and Finland keep in the top ten places in terms of the index of national innovation capacity. However, The Korea has shown its great progress in national

capacity-building for innovation during the period of 2000 to 2005, and ranks the 5th in 2005 instead of 10th in 2000, while France ranks the 7th in 2005 instead of the 8th, Finland ranks the 10th in 2005 instead of 5th in 2000. India has slightly improved its national innovation capacity during the period of 2000-2005, while China has increased its index for national innovation capacity from 6.80 to 15.79, ranking from the 28th in 2000 to the 17th place in 2005.

China is the fastest country in terms of the national capacity building for innovation, with an over 18% of annual growth rate of the national innovation capacity index during the period of 2000-2005. Meanwhile, Korea, Turkey and Mexico rank from the 2nd to 5th place in terms of the annual growth rate of the national innovation capacity index, as shown in figure 15.

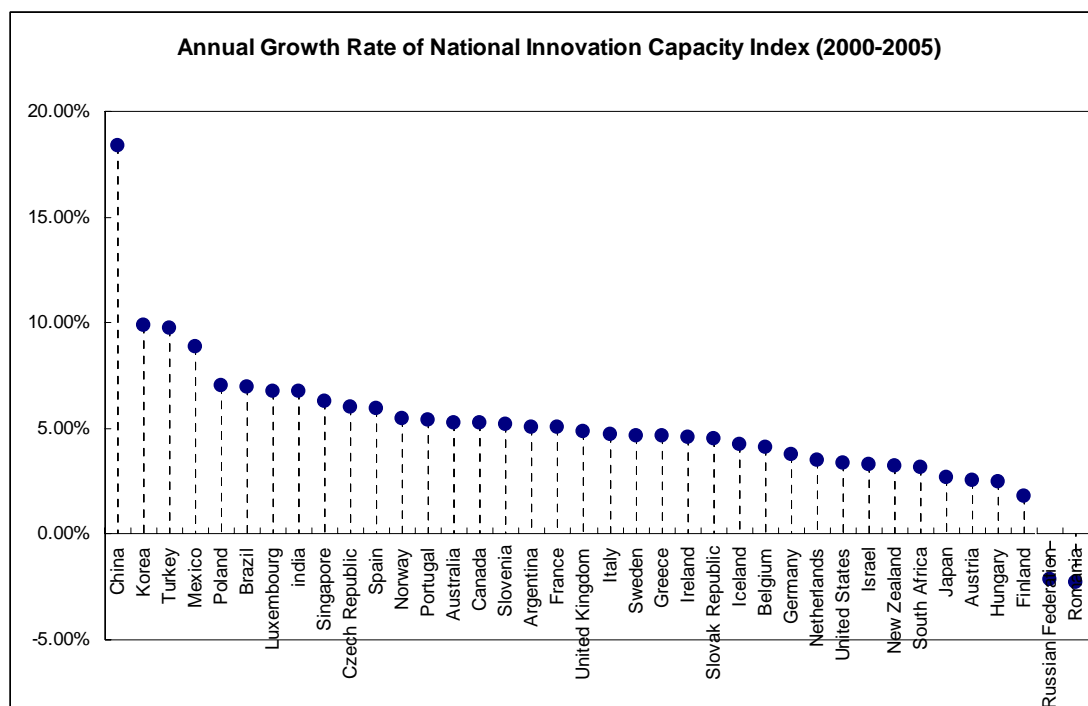


Figure 15: Annual Growth Rate of National Innovation Capacity Index (2000-2005)

In 2005, United States is world superpower in terms of the strength index of national innovation (73.39), while Japan (38.7) and China (22.82) take the second and third place. Germany, Korea, UK, France, Russia, Italia and Canada take the place ranging from 4th to 10th place. During 2000 to 2005, ten countries keep in the top ten places in terms of the strength index of national innovation. The important change is that China takes the 3rd place instead of 4th place in 2000, and Korea takes the 4th place instead of 8th in 2000, as shown in figure 16.

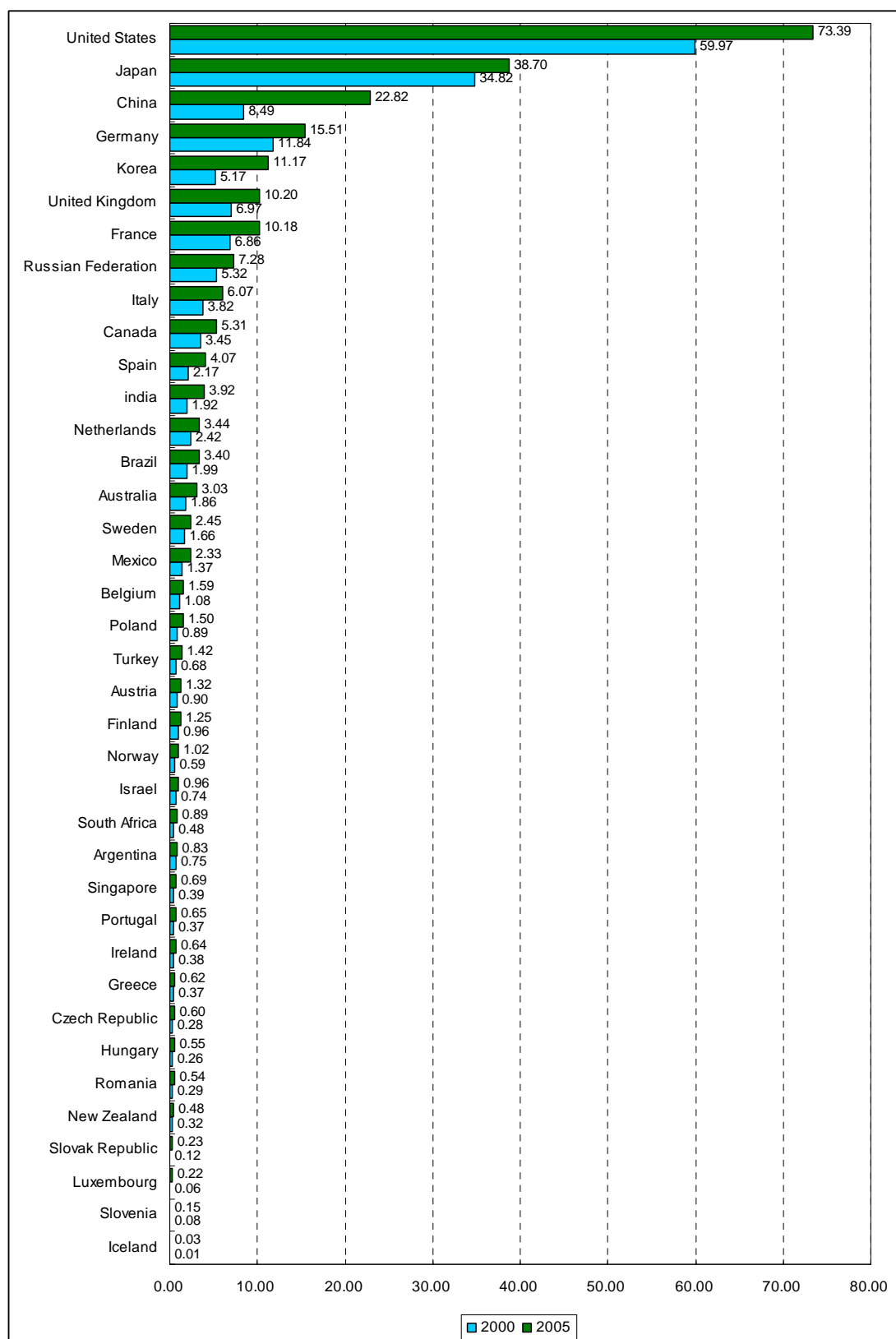


Figure 16: Strength Index of National Innovation in 2000 and 2005

The most fast ten countries consist of Luxembourg, China, Iceland, Korea, Czech, Hungary, Turkey, India, Slovak and Romania in terms of annual growth rate of the strength index of national innovation. The annual growth rate of the strength index of national innovation of China is 21.88% from 2000-2005, as shown in figure 17.

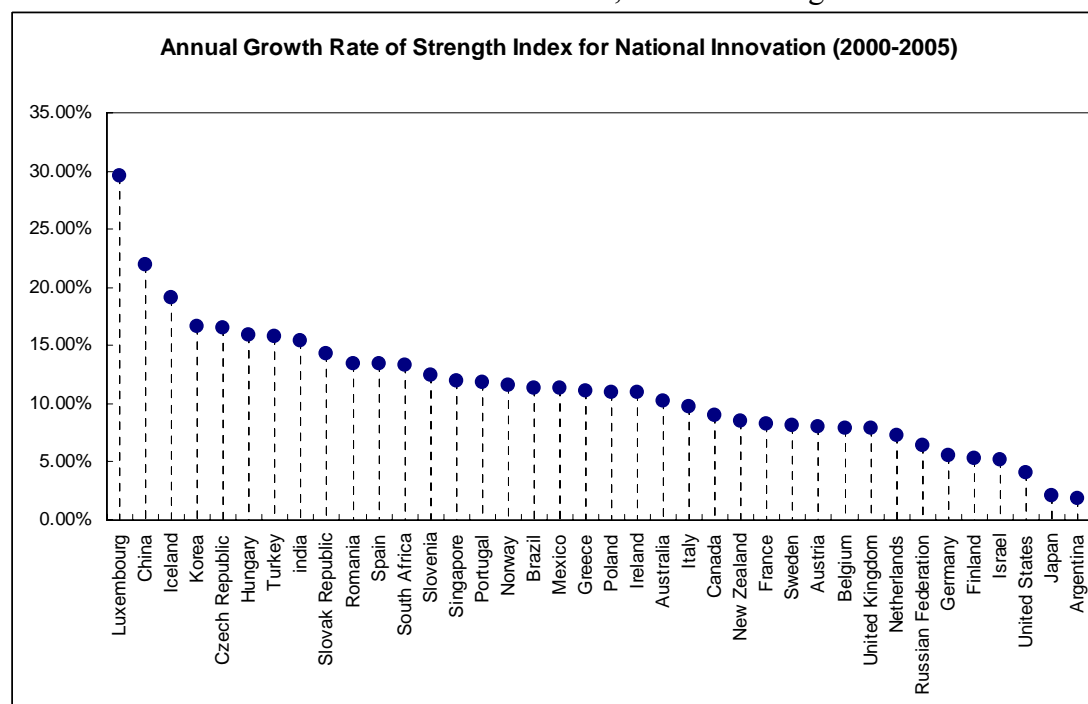


Figure 17: Annual Growth Rate of Strength Index for National Innovation (2000-2005)

In 2005, Sweden, Japan, US and Israel rank the top four in terms of the effectiveness index of national innovation, with the index ranging from 48.29 to 41.84, while the index of Luxembourg, Finland, Korea, Netherland, UK, Iceland, Norway, Germany and France ranges from 35 to 40. The index of Austria, Ireland, Canada, Singapore, Belgium, Australian, Italia, New Zealand, Slovenia and Spain ranges from 21 to 31, while China, South Africa and India take the last three places in terms of the effectiveness index of national innovation, less than 9, as shown in figure 18.

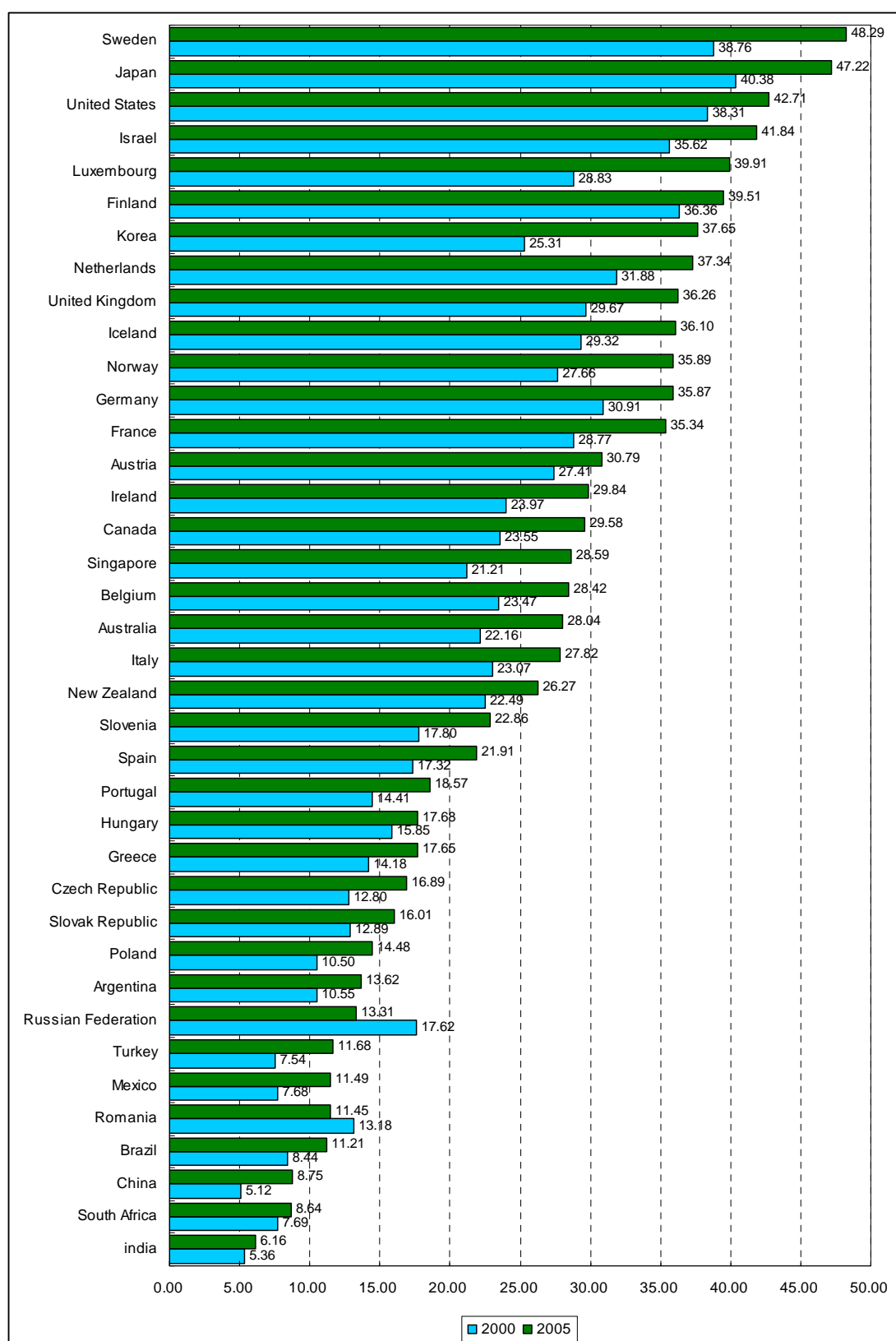


Figure 18: Effectiveness Index of National Innovation

During 2000-2005, China is the fastest growth country in terms of the annual growth rate of the effectiveness index of national innovation, over 11.3%, while the index of Turkey,

Mexico and Korea ranges from 9.13%□8.38% and 8.26%. The index of Luxembourg, Poland and Singapore are over 6%, while that of Brazil, Czech, Norway, Argentine, Portugal, Slovenia, Australian, Spain, Canada, Sweden, Ireland, Greece, Slovak, Iceland, France and UK ranges from 4% to 6%. The index of Belgium, Italia, Israel, Netherland, Japan, New Zealand, Germany, India, Austria, South Africa, US ranges from 2% to 4%, as shown in figure 19.

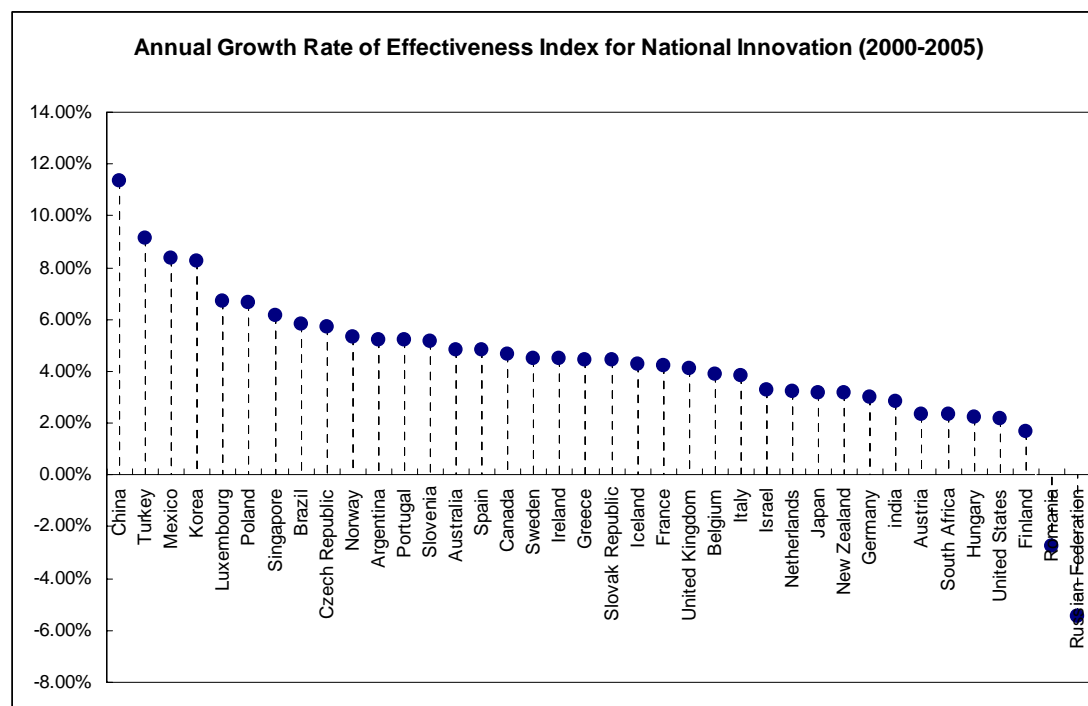


Figure 19: Annual Growth Rate of Effectiveness Index for National Innovation (2000-2005)

IV. Conclusion and Policy Implications

1. National innovative development of China has increased very fast but still far behind the advanced countries.

The national innovative development and the national innovation capacity are two important indicators to monitor the progress in development of innovation- driven China, including the progress in innovative development, and in capacity building for national innovation. The index of national innovative development emphasizes the efficiency and effectiveness and efficacy of innovation activity, especially the efficiency and density of innovation effectiveness.

The international comparative study on national innovative development indicates that China is far behind of developed countries in terms of the level of innovative development, especially the level of industrialization and the level of science & technology and innovation.

Comparing to the average level of 34 countries in 2005, China reaches about 46% in national innovative development, 12.07% in the development index of national science & technology & innovation, 17.31% in the development index of industrialization of China, 76.05% in the development index of education & health of China, 35.47% in the development index of informatization of China, 42.36% in the development index of urbanization of China.

The index of national innovative development of China has increased very fast from 15.26 in 2000 to 19.97 in 2005, with an annual growth rate of 5.77%, much higher than that of the 34 countries (2.94%), which tends to narrow the gap in level of innovative development between China and advanced countries.

The main driving forces for evolution of the innovative development of China are the education and health, the informatization, the urbanization, and the capacity for science & technology & innovation, during the past decades. The industrialization will become an important driving force for innovative development if the new philosophy for development and the related policies, which emphasizes the sustainability of development, have well been implemented.

2. National innovation capacity of China has increased very fast without fundamental improvement in effectiveness of innovation.

The index of national innovation capacity of China has increased very fast from 6.80 in 2000 to 15.79 in 2005. The strength index of national innovation of China has increased very fast from 8.49 in 2000 to 27.42 in 2006, with an annual growth rate of 21.59%, and is main contributor to growth of national innovation capacity index. The effectiveness index of national innovation of China has increased smoothly from 5.12 in 2000 to 9.65 in 2006, with an annual growth rate of 11.14%.

However, there is a big gap in innovation capacity between China and advanced countries. The index of national innovation capacity of China is 27.20% of that in US, 36.76% of that in Japan although China ranks the 17th place in terms of the index of national innovation capacity in 38 countries. There is also no fundamental change in effectiveness of innovation. For example, China ranks still the 36th place in terms of effectiveness index of innovation in 38 countries in 2005.

The main driving forces for evolution of the innovation capacity of China are efficiency and effectiveness and efficacy of innovation activities, especially the density of innovation effectiveness in terms of population, which takes a long time to have a fundamental change.

3. China has made great effort in changing its innovation policy with a view to promoting the innovative development and the capacity building for innovation.

Chinese government has issued its “Medium & Long Term Planning for Science and Technology Development” and supportive policies as well as the detailed rules to implement the supportive policies so as to strengthen national indigenous innovation capacity and to promote the construction of innovation-driven country since 2006. The changing innovation policies concern many issues of finance, taxation, IPR, government purchase, talents, education and training, innovation infrastructure and institutions and related mechanism. Besides, China has proposed the scientific outlook for development (new philosophy for development) and to construct the harmonious society, which may have profound impact on the industrialization, the urbanization, the informatization, and the education & health as well as on the science & technology & innovation. The results of the second survey on the effectiveness of the new innovation policies have shown that increasing more enterprises have benefited the finance and tax policies, and increased their investment in technology development. Meanwhile, regional governments have also issued many documents to implement innovation policies issued by central government, and increased input in the innovation activities.

4. Perspective of Innovative Development and Innovation Capacity of China

Based on the general considerations on factors such innovation input, innovation condition, innovation output, and innovation environment, especially the improvement of innovation policy and environment as well as infrastructure, it is estimated that the index of innovation capacity of China will keep increasing with high growth rate in the future fifteen years, and ranks the top five countries by 2010, the top two countries by 2020. However, the effectiveness index of national innovation of China is still lower than that of many developed countries. With the rapid growth of national innovation capacity, innovation will play increasingly important role in driving social and economic development in China, which may strongly promote national innovative development of China. Therefore, it is estimated that China will rank the 20th to 25th place by 2015, and 15th to 20th place by 2020.

THOUGHTS ON GOVERNANCE AND POWER IN THE WORLD SYSTEM*

Loukas TSOUKALIS**

We have been living through dramatic changes in the global economic environment during the last two decades or more: rapid rates of growth of international trade and foreign direct investment, coupled with much faster growth of financial markets which have become truly global in their operation, if not in their structure of control, as well as major economic restructuring accompanied by the addition of hundreds of millions of workers to the supply of labour in the global economy.

It was good as long as it lasted – and for some better than for others. Those developments were largely driven by a revolution in information and communication technologies, but also reinforced by political decisions and events. The collapse of the Soviet empire, the opening of China to market capitalism, the Reagan and Thatcher revolutions, and the deregulation of financial markets are major examples of ways in which politics largely shaped the new age of globalisation. And the world reaped the benefits of higher rates of growth and lower inflation, while some of the poorest countries were able to take advantage of open trade and the market economy thus pulling large sections of their population out of abject poverty in the process.

However, even during good times, this was far from the whole story. The process of economic globalisation was accompanied by big market failures, large income redistribution and growing uncertainty among those vulnerable to change and economically weaker. They are all factors that provide ammunition for the forces opposing economic liberalism and change.

The environment is surely the biggest market failure of all, and the one likely to play an increasingly decisive role in shaping future models of economic development. On the other hand, the crisis in financial markets has brought to the fore cases of big moral hazard, combined with systemic distortions and inherent elements of instability: a market failure that is already having major negative effects for the economy as a whole. Since global financial markets are a key characteristic of this new age of globalisation, the painful recognition of the weaknesses and risks associated with deregulation is bound to have much broader economic and political ramifications. The prevailing ideology relying on the assumption of efficient markets and perfect information has suffered a severe blow. It looks like the end of an era – and we are still in the transitional phase.

Globalisation has created winners and losers. Inequalities have been growing, more within countries than between countries. In the United States, they have reached levels that had not been experienced for several decades. Rapid change creates uncertainty and anxiety among potential losers, and not only. And it is also often perceived as a threat to local and national identities. Of course, the number of losers has been increasing by the day as negative growth rates hit record levels during the crisis.

* Contribution to the expert group on *The world towards 2025*.

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The old trade-offs between economic efficiency, stability, equity and sustainability are coming back to haunt policy-makers. Some people thought they had done away with them. And politics is coming back as well, though often in forms that still have no clear shape. Political systems in mature democracies are in a state of flux. To the extent that the trend towards economic globalisation remains a function of politics (and of course, it does), it is also reversible. The social and political consequences of the ongoing crisis are only beginning to unfold.

Economic forces have so far provided the vehicle for the advent of a multipolar system in a globalising world. The era of unipolarity that followed the collapse of the Soviet empire will most likely be short-lived. The emergence of new economic powerhouses in Asia, and perhaps tomorrow also in Latin America and Africa, leads to an increasingly multipolar world, in which economic power is being translated into political and also military power. Short of big disruptions, which certainly cannot be excluded, this is likely to be a long-term trend, which gradually brings about a shift in the global balance of power away from traditional centres of Western hegemony. It will not happen from one day to the next. The military superiority of the United States will not be easily or quickly challenged; it will take time. In the process, we are also discovering the limitations of raw power as witnessed in both Iraq and Afghanistan. The challenge to the technological superiority of Americans and Europeans by emerging powers may prove much quicker, and hence more painful to those who used to take it for granted.

Will multipolarity be matched by effective multilateralism that can provide the framework for world governance based on common rules and institutions? And will the emerging new powers become interested in and socialised into such form of governance, instead of simply resorting to unilateralism, which is the more instinctive reaction of those who feel they have more power than others? It is absolutely crucial that the process of socialisation begins when the emerging new powers still think that multilateralism serves their own interest; that is, before they themselves become convinced that multilateralism is the last resort of the weak, which by then they will be no longer. Socialisation should therefore begin today, if it is not already too late.

Effective multilateralism requires the existence of rules and institutions widely accepted and which in turn bear close connection to economic and political realities in the international system. Existing international institutions still reflect the balance of power prevailing in the aftermath of the Second World War. This is certainly true of the Security Council of the UN and its informal younger cousin the G-8, which now looks like being eclipsed by the G-20. The same is also true of the World Bank and the IMF, which had suffered for years from a serious crisis of identity and growing irrelevance and are now being brought back from the dead to help with the crisis. The international monetary and financial scene is now dramatically different from what it used to be when the terms of reference of those institutions were written – and not enough has changed since then. The reform process of international institutions resembles a mountain that has so far given birth to a mouse. It will have to gather soon an accelerated pace if the talk about global governance has any meaning at all.

Emerging new powers in Asia and elsewhere need to be given the role they deserve in international institutions and thus be made to feel as co-owners rather than poor lodgers. And international institutions need to acquire instruments to deal effectively with the level of global interdependence reached, be it in relation to trade, financial markets or the environment. As regulation becomes again a fashionable term, its multilateral dimension

remains very much an open question. International institutional reform is a necessary prerequisite for laying the ground for effective multilateralism in the future. And in this respect, the role of Europe will be crucial. In the last fifty years or so, Europeans have learned the hard way how to jointly manage growing interdependence through common rules and institutions: this is a valuable experience worth exporting to the rest of the world, although admittedly not always easily exportable. Europeans are also the ones to lose most on an individual country basis through a redistribution of power in international institutions. Pooling national quotas together could make such redistribution more palatable, at least for some.

Different forms of world governance are related to different ways in which power is or can be exercised in the international system: all the way from resort to unadulterated means of coercion to different kinds of soft power, be it through moral suasion, diplomatic dexterity, the possession of knowledge or the spreading of standards. Most, if not all, are likely to survive for years to come, although in changing combinations and doses. Unless matched by more effective multilateral institutions, the transition to a multipolar system could be accompanied by growing uncertainty and instability, if not major disruptions. The signs are already there, and gathering. They could be reinforced further in the years to come.

Will regionalism become a feature of an increasingly globalising world? And will national sovereignty, as the key element of the post-Westphalian system, become even more of a relative concept for the lesser mortals in a world consisting of a few superpowers and a multitude of minnows, not to mention failed states? In a world where many non-state actors already occupy the centre stage, and where forces from within and without are increasingly challenging the nation-state? In other words, how will sovereignty manifest itself in a world where states (some, of course, more than others) face growing difficulties in delivering the goods, while politics remains predominantly national, if not local? The gap between economics and politics may become increasingly, if not dangerously, wide.

In this new world, the choice for individual European countries will be between investing in their unity as a means of maximising collective influence in a globalising world where size matters a great deal, and pursuing an independent course of action, which in turn implies trying to maximise benefits by following the leader(s), joining different coalitions or playing the free rider. Such options have been tried in the past with varying degrees of success. The decision to invest further in European unity will depend essentially on whether the perception of a commonality of interests prevails over divergence. Such perception may continue to vary from one policy area to the other. In a world in which Western-inspired institutions and values become less dominant and alliances less steady, Europe's changing relationship with the United States will be a key factor in the transitional phase.

Democratizing the future

Towards a new era of creativity and growth by Josephine Green

PHILIPS

Josephine Green was appointed Senior Director of Trends and Strategy at Philips Design in 1997. She promotes new thinking and new knowledge in the fields of Foresight and Society, Cultures and People Research, and its application to strategic thinking, sustainable innovation and new value creation. Josephine was born in the United Kingdom and studied History and Politics at Warwick University in England. She has lived in England, Italy and the Netherlands.

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Index

Abstract 4

- 1 A change of age 6
- 2 Beyond consumption 8
- 3 Beyond technology 12
- 4 The context economy 14
- 5 New economic value 24
- 6 A socially led approach 28
- 7 Social innovation 30
- 8 The future 34
- 9 Foresight in design 36
- 10 Sense making and making sense 60

References 66

Abstract

Major corporations are often restricted by a too-limited view of the future. This view is based on the western belief that time is linear and that the future is merely an empty space that can be 'colonized' to the present and filled with ever more technology and consumer goods. However, this technology and consumer determinism now threatens to compromise our wellbeing and prosperity.

This paper argues that we need different ways of thinking, being and doing if we are to live well, prosper and safeguard the future. Primarily we need to go beyond the straightjacket of consumer needs and a consumer approach, and also encompass social needs and a social approach. By doing so, we can drive a new era of creativity and growth.

Working with this emerging social space therefore becomes both an opportunity and a necessity. However, we must not only re-invent our social industries, but also our lifestyles and even the very growth models upon which they are based. To achieve this, the new technologies enable more radical innovation through the delivery of more context-based customized services and systems. Such place embedded systems have the potential to deliver sustainable solutions for the 21st century.

Shifting our emphasis from consumption to services and systems, and combining a consumer-led and socially-led approach, means that how we think about and interact with the future will change. This paper explores these changes and examines how we might open up and engage with the future differently, in terms of going beyond:

- a market-led approach, based on consumer research and innovation, to a socially-led approach based on social research and social innovation.
- the act of researching the future to directly engaging with the future through people who are already creating it today.
- closed research and innovation to open co-creation with stakeholders, especially users.
- a linear interpretation of time and the future towards new conceptual models that allow a more imaginative and creative interaction with the future.

In short, we need to shift the emphasis away from technology and the market and more towards people and responsibility through ownership. It is time to democratize the future.

We live in an age
in which we have to
re-invent many of our
social industries like
health, education,
wellbeing, care and
transport

1 A change of age

In many companies there has been a shift in the last decades from a focus on technology research and innovation to a focus on consumer research and innovation. This shift mirrors the realization that technology can drive growth but often fails to be sufficiently in tune with consumers' needs and aspirations. In other words, there have been too many mistakes and too many misses. The shift from technology to consumer also reflects the increasing influence and (purchasing) power of consumers, captured in the oft-repeated mantra; 'the customer is king'. Such a consumer emphasis, however, is now beginning to show signs of weakness. The continuing rise of stress-related mental illnesses, at a time when the average disposable income in the western world has never been higher, undermines the belief that more means better. There is too much 'stuff' and a growing realization that filling the future with more and more consumer-driven technology and marketable goods does not necessarily guarantee higher growth, a better quality of life or even life itself, given the state of the planet. Beneath the surface things are moving.

Converging socio-demographic, technological, economic and environmental forces are transforming and transfiguring our world so that in the space of approximately fifty years, from the 1970s to the 2020s, the world will look and feel a very different place. According to Peter Drucker (1), "Every few hundred years in Western history there occurs a sharp transformation. Within a few short decades, society rearranges itself, its worldview (paradigm), its basic values, its social and political structures, its arts, its key institutions. Fifty years later there is a new world."

Such a dynamic change of age is not served by incremental innovation but by deeper structural change and radical innovation. An example is how we have to re-think and re-invent some of our basic social industries such as health, care, education, transport, and – beyond the social industries – our lifestyles. These are all things that grew out of and were styled around the industrial era but need to be re-invented for the 21st century. As this paper suggests, the more progressive and ultimately more successful companies will progress from a consumer/market-led approach to a people/social-led approach.

To make sense of this we need to identify and understand some of the factors influencing the metamorphosis from a market-led to a socially-led company.

"We are living
in a change of age
rather than
an age of change"

Powerful Times – Rising to the challenge of our uncertain world (2)

2 Beyond consumption

Diversity

Post-industrial society finds itself more and more at a meeting point of cultures, beliefs and behaviors. Individual and more insular views are now confronted by many different opinions, and the world has never been so diverse or seen to be so diverse. A single undeniable truth, from a higher authority, gives way to multiple truths in which people, both as individuals and as groups, walk the path to their own truth. This has increased the number of clashes and conflicts, but at a deeper level, the top-down pyramidal 'command and control' structure of the past is making way for greater personalization of the future and a rich and varied kaleidoscope of personal and collective lives. Our 'way' becomes relative and new 'ways' become feasible and – through exposure and contact – even inspirational. We are left knowing that there are all sorts of people leading all sorts of lives in all sorts of ways.

Creativity

This greater freedom to pick and choose, when matched with new technologies, signals the final demise of the 20th century and of mass consumption, and marks a shift towards mass creativity. Through web 2.0 social networking and community enhancing websites, the consumer is becoming the supplier of content, taste, emotions and goods. "Users move from the back end to the front end of innovation and, through enabling platforms and tools, singularly or together (peer2peer) create their own values and solutions" (3). The notion that this is here to stay is supported by the statistics: 5 million blogs in less than 2 years, with 175,000 added daily; 100 million clips viewed daily on YouTube; 116 million users of MySpace in 3 years; Wikipedia in 112 languages; 150 million users of eBay worldwide. In essence web 2.0 is more "an attitude than a technology". One in which the power of we replaces the power of you. As Charles Leadbeater explores in his forthcoming book to be published in 2007 (4) "They (consumers) do not want to be just passive recipients but players and participants... They do not just want more choice but more say. These are activities of mass participation rather than mass consumption."

However there is also the other side of this increased freedom to choose. Greater self-determination and greater awareness is mirrored by greater complexity and greater responsibility. Life may be freer but it's not easier. So we start to ask: How do we live? How could we live? How do we want to live?

Wellbeing

We are increasingly aware that ever more technology, productivity and efficiency has helped drive the industrial-consumer economy, but to the detriment of the environment, the poor and personal happiness. The costs begin to outweigh the benefits. So what exactly is quality of life? Is it more money, more goods, or something less tangible? As the numerous happiness studies testify, it seems that what makes people happy, over and above a certain basic standard of living, is more intangible than tangible, and that the belief that more makes you happier is a myth rather than a reality. People, therefore, are re-defining their wellbeing not so much in material ways but more in terms of health and wellness, connectedness, personal growth and personal control. Coupled with this is a search for a more sustainable development model based on balancing wealth and wellbeing (5). Contrary to popular perception, this is not just a rich person's issue. Given the search for a more holistic wellbeing and the damage to the biosphere and to health, more sustainable livelihoods and lifestyles makes sense in advanced industrialized nations as well as developing ones.

Greater diversity and creativity and the re-evaluation of wellbeing testify to the fact that we are entering a new era. Consumers who defined their identity and worth through consumption and their lifestyles become producers, who define their identity and worth by creating, individually or collectively, their own content and lives. Consumption is reduced to an aspect but no longer the aspect.



3 Beyond technology

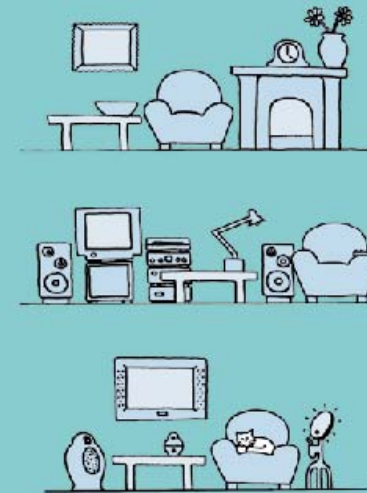
The dematerialization of happiness is matched by the ability of the new ambient technologies to dematerialize benefits. As a new age seeks greater expression and more sustainable wellbeing, new digital technologies offer greater possibilities. More personalized futures are matched by the ability of these technologies to facilitate customization and empowerment. Consider the following scenario.

Imagine you are somewhere in the future. Unlike before, you are now much more concerned with a balanced lifestyle that enriches the mind, the body and the soul. Too much stress, acceleration, performance and Prozac in the past has altered your perspective. You are now more interested in community and friendship, in personal growth and creativity, in wellbeing and in controlling your own path and directions in life. In terms of your everyday you are able to achieve these easily through the interaction of the digital and physical world. Whether at home or in a public space you intuitively and easily interface and interact with information, with friends and with yourself in ways that were unimaginable in the recent past. You now live in an economy based on information, services, experiences and solutions, in and through specific contexts (e.g. the home, the car, the hospital, the hotel). You value being able to customize this in a way that is personal and fitting to you, as an individual or as a group. Living as you do in a context economy, value is based on customization, adaptability and transformation.

4 The context economy

An ecology of people and technology

Through integrated sensors and software our products and environments become smart and it is this assimilation of technology into our everyday environment, that underlies the context economy. As technology merges into our walls, floors and clothes, then we no longer 'consume' technology, but live with it side-by-side as it supports and facilitates our daily living, an invisible helper at the ready. Through this more intimate co-existence our identity becomes less about needs ('what do I want?') and more about activity and experience ('how can I best take advantage of what I want to do in the way I want to do it?'). These take place in the specific context of a home, car, public space, hospital, school or geographical area. Philips' vision of ambient intelligence is about this relational co-existence (6), and by changing the paradigm between people and technology it has the potential to take us beyond consumption as classically understood. In the context economy, value is generated less through the selling and buying of goods and more through an ecosystem of information, services, experiences and solutions. What we value, rather than what we consume, becomes the issue.



The house of the future will look more like the house of the past than the house of today.
Stefano Marzano

In the context economy, furthermore, passive consumers become active producers of their own lives, as they search for and appreciate ways of interacting with, controlling and creating their environments. People co-create their own content and experience and value anything that enables personalization and creativity. How we light up an environment, monitor a health condition or access some information will be up to us. Through speech, gesture or touch we can interface with a display, a hand-held device, or an intelligent wearable garment. What becomes increasingly important is the quality and choice of the interaction. It is about a deep customization, based on a live-in relationship with technology, in which interaction and access are important.

An ecosystem of information, services, experiences and solutions

Our research around value in terms of deep customization has led us to a design strategy of 'open tools' (7). This strategy shifts design away from delivering a finished product or experience towards designing an 'unfinished' or 'open' solution that can be completed and evolved by the user or users. As part of our Design Research program we have created a number of 'probes' or experience demonstrators to explore this territory together with stakeholders. One example is Nebula, in which we moved from designing a new alarm clock to asking the question 'how do people like to experience waking up in the morning?' This led us to develop a simple LCD projector into which the user(s) can download images from the web. Two dots traveling across the ceiling at night meet at the set wake up time, and trigger the projection of images onto the ceiling. Such an 'open' tool allows the users to decide what images they want and in essence to create their own experience. Another such experience demonstrator was developed on the European sixth framework research program, Living Memory (LIME). An interactive 'coffee table' allows users to intuitively access information about their physical community and to simply take out and put in information according to their interests etc. In these and other cases, probes allow us to explore new territory in terms of interfaces, interaction paradigms, materials and systems interactions.



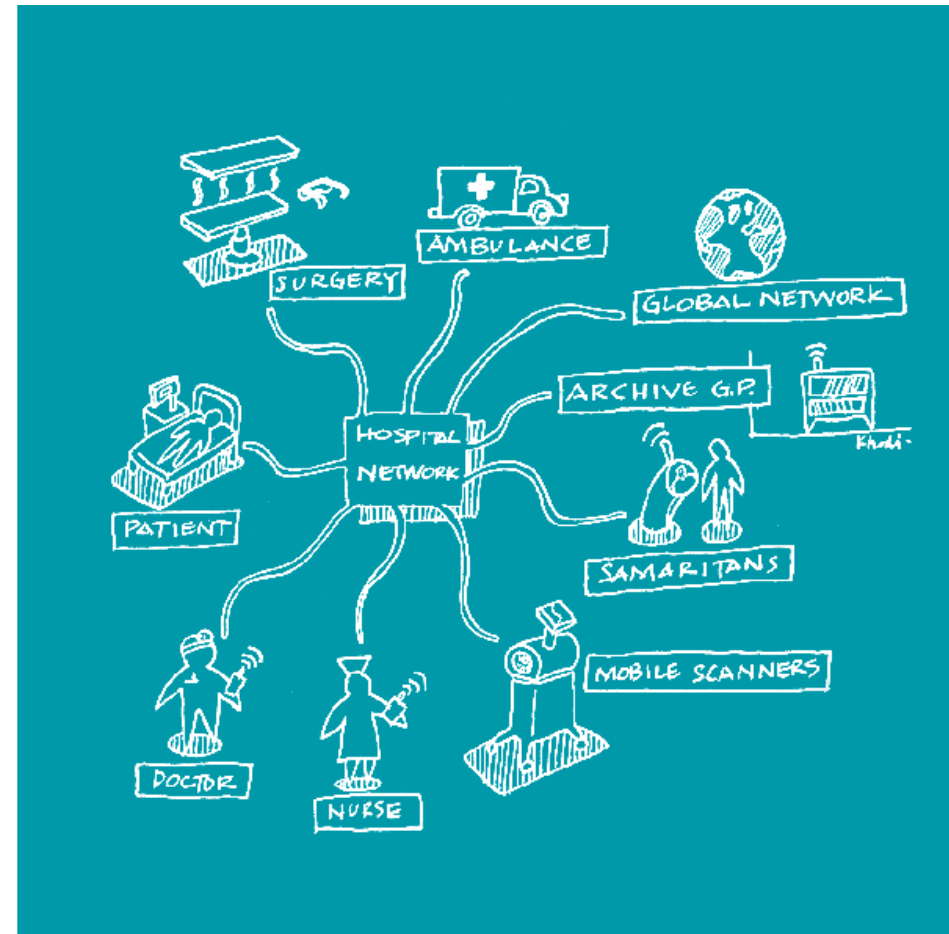
Above: Living Memory (LIME)
Left: Nebula



Connected ecologies

Co-existing with technology in a more intimate way also opens up a more holistic approach to living. Stand-alone products give way to connected and networked environments that enable a more systems-based delivery of value, for example in the area of health. Ambient technologies can enable a home-centered health system in which users are connected to different circles of care, from family/friends to support professionals, expert patients, doctors and the hospital. This more decentralized and user-centered system enables people to intuitively monitor and be aware of their health and wellbeing, whether this is in terms of prevention or disease management. In our research we are looking at how, following a heart attack, patients can gain peace of mind and quality of life through the unobtrusive and constant monitoring of their condition. This could take place for example by means of an intelligent vest that relays any discrepancies to the appropriate medical professionals. Such systems reframe the question from how can we bring people to healthcare to how can we bring healthcare to people! The same question could be asked of education.

Such user-centered systems, based on an intuitive relationship between people and their technology, encourages the full engagement of people as active participants in their health or education, to name two important areas. As Hilary Cottam and Charles Leadbeater point out; "Professionals and users could achieve a huge amount, working together, if they operate within a new framework" (8). Such systems solutions are relevant to both advanced and developing regions, given that the former need to re-invent new ways of delivering benefits and the latter need to leapfrog old solutions. Whether over-stressed or underdeveloped, social services such as education, health or care for the sick or elderly are ripe for new approaches and solutions.



An ecology of growth

An approach based on context and systems also allows us to consider a more sustainable model of development and growth. To quote Prof. Ezio Manzini of the Polytechnic of Milan: "The dream of wellbeing dreamt until now by the few is not sustainable for all. We have to change. We have to learn how to live better while consuming less environmental resources and regenerating the contexts of life" (9). It has been suggested that if everyone were to consume as we do in the west, then we should need 11 planets! With a population of 6 billion and growing we have to consume differently. Given this, ambient technologies and a context economy help us to consume better or differently through new mixes of products, services and solutions. In these mixes, value is less in the stand alone material object and more in the system's intelligence and information. Take for example the television. Will we want a stand alone television in the future or will we want a seamless flow of content through our homes based on new display technologies? Another example is the car: Will we want to own a car or will we want to have access to transport where and when we need it? In these examples, rather than a revenue model based on making and selling a material thing, new business models emerge, based on updating and customizing the systems capabilities. A service and solutions model replaces a manufacturing one and, in so doing, avoids a process of continuous material obsolescence and waste. Such systems evolve over time, growing up rather than growing old, meaning they can be up-dated, not dumped.



However, there is more to the future than better ways of consuming. There is poverty. As Dr. Mohammed Yunus, the founder of the Grameen Bank and the pioneer of microfinance explains, "Business and the market economy have been instrumental in creating wealth and growth globally. But they have also played its part in creating a world where 40% of the world's population controls 94% of wealth, with the other 60% sharing the remaining 6%" (10).

At a deeper level, new growth models can evolve in a context economy. Thinking contextually, in terms of place and activity, encourages more local industries in which local communities, using local knowledge and local resources, create and sustain their own livelihoods. Examples in the West can be found in the Slow Food movement in Italy. What initially started as a protest against imported fast food and the protection of local culture and prose is developing into a bigger European movement based on the generation or re-generation of local economies (11). This decentralized approach to value, rather than global production and consumption, promises to be more sustainable for the future as it offers transparency, a lower ecological footprint, increased diversity and the enhancement of local contexts, communities and livelihoods (12). It also has the power to help us re-think our relationship to time and to experience. Rather than focusing on speed and a superficial experience, it allows us to tap into and experience greater depth based on local environmental and social qualities. Understanding where things come from and how they are produced gives them greater meaning.

Examples of local sustainable livelihoods include the surge in organic produce in the West and traditional medicine in India. Such models and initiatives are important in this change of age, as they signal a different way of being and doing. Another model, complementary to this decentralized and distributed model is the sufficiency model, based on the interesting work of Wolfgang Sachs at the Wuppertal Institute (13). This model is about enough rather than more. It is about a state of mind, one based not on learning how to give and get more but how to take less. It implies re-thinking lifestyles and learning how to live elegantly within limits and in harmony with nature. This, in turn, brings us back to GDP. European growth is around 2.5%, while China is around 10%. The only way we can sustain our lifestyle, so the argument goes, is for us to accelerate our innovation. So, now it is no longer about more and more and faster goods but about more and more and faster innovation. But is it actually about this or is it about re-thinking our lifestyles and our priorities? Is it more about performance or about values?

In the final analysis, a context economy and ambient technologies, whether in terms of personal and collective customization, use-centered social systems or local livelihoods, opens up the possibility of a more sustainable path to prosperity, balance and wellbeing.

5 New economic value

If, therefore, the industrial era was characterized by consumption, the next era will be characterized by context. The context economy is already transforming, or has the potential to transform, economic value at a personal, social or global level.

Personal value

At a personal level, given the drive towards personal growth and transformation, economic value will increasingly be defined not in terms of consumption, but in terms of the delivery of transformation itself. Personal economic value will be less about the act of consuming and more about the act of transformation, as people search individually and collectively for things that help them to grow, experience and transform. As Stephen Dinan expressed it in the *Journal of World Futures*, Jan. 2002: "An increasing amount of economic value exchange will shift to concerns of growth, human potential, spiritual practice and life-enriching experiences. A major area of wealth generation in the transformation age will derive from the systemized delivery of transformation itself".

Social value

At a social level, the ability of ambient technologies to deliver more contextualized and distributed systems, based on and around users and dealing with issues like health, illness and care, will generate economic value. Given the challenges we face, these social 'industries' are set to overtake the industrial industries of the 20th century. In fact, Geoff Mulgan of the Young Foundation claims that the biggest industries of the 21st century will be health, education and wellbeing, dwarfing others like automotive, telecoms, IT and steel. It is estimated that social activities will contribute to 30% of the economy, while the old industries will account for less than 5%.



Global value

At a global level, the need to alleviate poverty and lower our ecological footprint and regenerate the contexts of life implies that we have to generate prosperity through alternative growth models. We need to go beyond a purely growth metric, such as GDP, that measures and pushes towards higher and higher productivity, at the cost of the environment, health and wellbeing. When depression and crime are good for GDP because they sell more anti-depressants and anti-theft devices, then we have a problem. In the future a more varied economy is likely to emerge, encompassing local for local, local for global and global for local. Such models will support the idea of bringing production and consumption closer together, of enhancing and enriching more local/regional contexts and of promoting more sustaining and sustainable livelihoods and lifestyles. It is possible that on this journey developing nations such as China, the first country to talk about a Green GDP in its 11th five year plan, and India may lead the way.

Whatever the model, and whether at a personal, social or global level, we need to free ourselves from the tyranny of ever-higher productivity and the making and consuming of yet more and more 'stuff'. As we re-define quality of life and invent new lifestyles, value needs to be re-defined through a more humanizing economic system of wellbeing and prosperity.



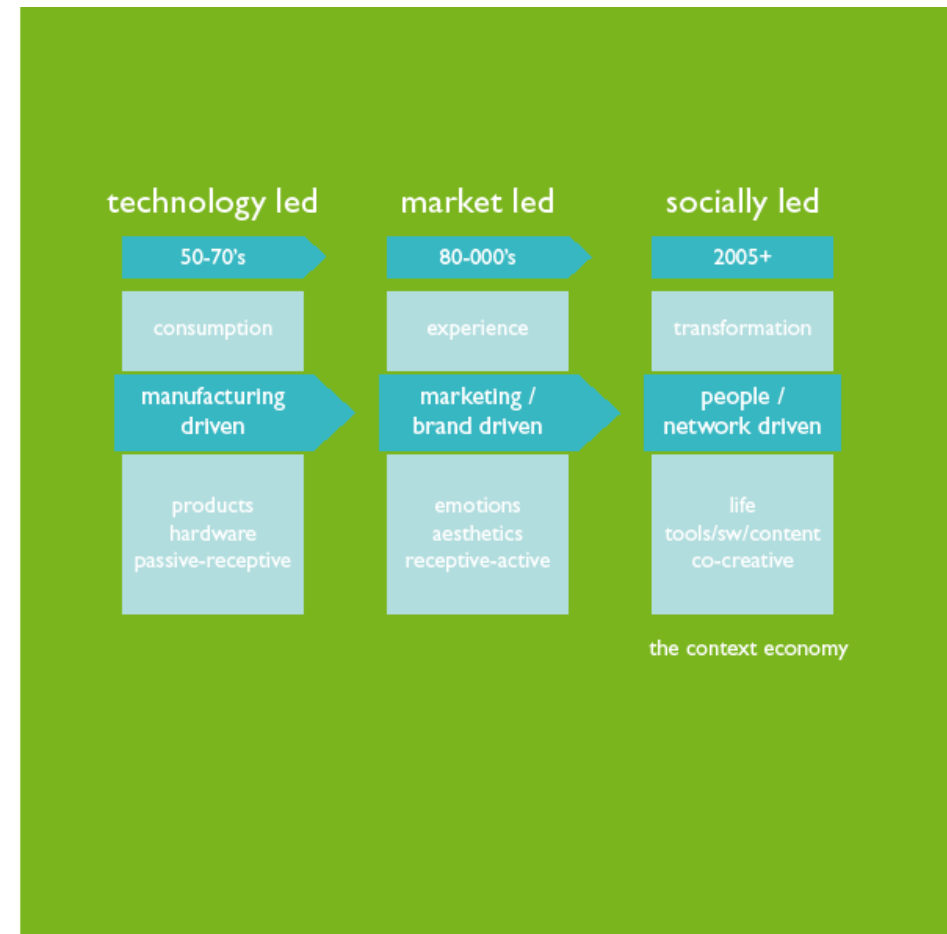
“India’s concern was always with eternity, not with time. We will have to weave the web of a new order guided by the principles of creative freedom for all in order to provide an ethical and modern direction to the wayward movement of science, technology, wealth and power”

J.C. Kapur

Our Future: Consumerism or Humanism

6 A socially-led approach

Perhaps the best way to understand a socially-led approach is by looking at what it is not, i.e. by examining a flawed market-led approach. One such example is the present issue around high rail fares in the UK as outlined in the newspaper, The Independent (14). A rail ticket, for example one from Manchester to London, if not booked well in advance, now costs 214 pounds. The low cost airlines, however, on the same route, cost less, encouraging people to choose planes over trains. Presumably the rail company increased prices because there was a growing demand. While this may make good business sense, the bigger problem is that rail travel uses up only a tenth of carbon emissions compared to flights. Given the fact that the rail companies already receive public subsidies, who exactly is benefiting from these higher rail prices? It's not the passengers, it's not the tax payers and it's not the planet. It is hard not to come to the conclusion that the sacred cows of the market: supply and demand, choice, higher growth and maximizing profits do not in fact ultimately benefit the public and the planet. Far too often they benefit the investors. Socially-led companies need to do it differently, moving beyond neo-liberal economics and a market ideology and away from the deeply ingrained view that there need to be winners and losers. There need to be winners.



7 Social innovation

Given the need to invent new ways of being and doing, together with the pressing need to re-invent many of our social industries, it makes sense to take the next step along the continuum from a technology- or consumer- to a socially-led company. Such a step, however, requires a very different mindset. A technology-led company is based on technology research and innovation, carried out primarily by experts in labs. A consumer/ market-led company is based on market/consumer research and market innovation, also primarily carried out by experts. So how does a socially-led company operate?



The difference lies in the notion of social innovation as opposed to technology or market innovation. Social innovation is based on researching social needs and developing social solutions. Such innovation implies new ways of living and new ways of doing. In the industrial era it was in fact social innovation that created the right conditions for further technology development and economic growth. Throughout the Victorian period in the UK it was the creation of social innovations like schools, libraries, building societies and housing that supported and drove the growth of the industrial era. A more recent example of social innovation is the Open University. A need for a broader access to higher education was identified and then enabled by the emerging technology of television. The relationship between social innovation, technology and economic growth is tightly bound together.

In fact, solutions based more on systems and context, imply less technological innovation and more social innovation. A new health delivery system, for example, will be successful not primarily because of its technology but because it redefines the access and delivery of health and wellbeing in a way that makes sense socially and culturally to the various users. Social innovation and social solutions will be successful if they ultimately enrich and enhance the experience of wellbeing of the users while also serving a social need. A socially-led company of the future, therefore, is not only about social science research to identify social needs but about researching social, cultural and people needs. This is the key to success for the future and for companies who are well positioned to take advantage of this opportunity. In this respect, Philips' history and competencies makes it well placed to combine the know-how of both a technology-led and a consumer-led approach to create a socially-led approach.

Finally, social innovation is not just about researching and creating new solutions for the times, but it is also about how we create them. It is about doing things differently. To be meaningful, social innovation has to engage with the different stakeholders from the beginning through a collaborative and co-creative process, given that the ultimate relevancy and success is dependent on their experience and their participation, especially of the users, themselves (15). In ensuring more relevant solutions, this socially-led 'democratic' process will 'free up' the enabling technologies to truly drive wellbeing and prosperity.

Interestingly, the first International Conference on Social Innovation took place in Beijing, China in 2006 and reflects the growing importance of social innovation as a means towards alleviating major social issues such as health, education and poverty (16).

8 The future

So how do we approach the future, given the growing importance of social innovation, and given the fact that we live in a time when the old system and its worldview is breaking down and a new one is in the making? In other words, if technology and the market no longer determine the future, then what does? Where is the future? Do we need to interact and engage with it differently?

These are some of the thoughts and questions that have fueled our thinking in Philips Design within the area of Foresight and Design Research. We are conscious of the fact that the present space between two worldviews and two consciousnesses offers a golden opportunity to re-imagine and re-humanize the future. The outcome to date is the development of a multi-faceted Foresight in Design approach. This is based on researching, engaging with, co-creating, envisaging and re-conceptualizing the future. This approach opens up the area both conceptually and pragmatically and contributes to finding a way of 'futuring by doing'.

“Means are ends
in the making”

Gandhi

9 Foresight in design

Researching the future

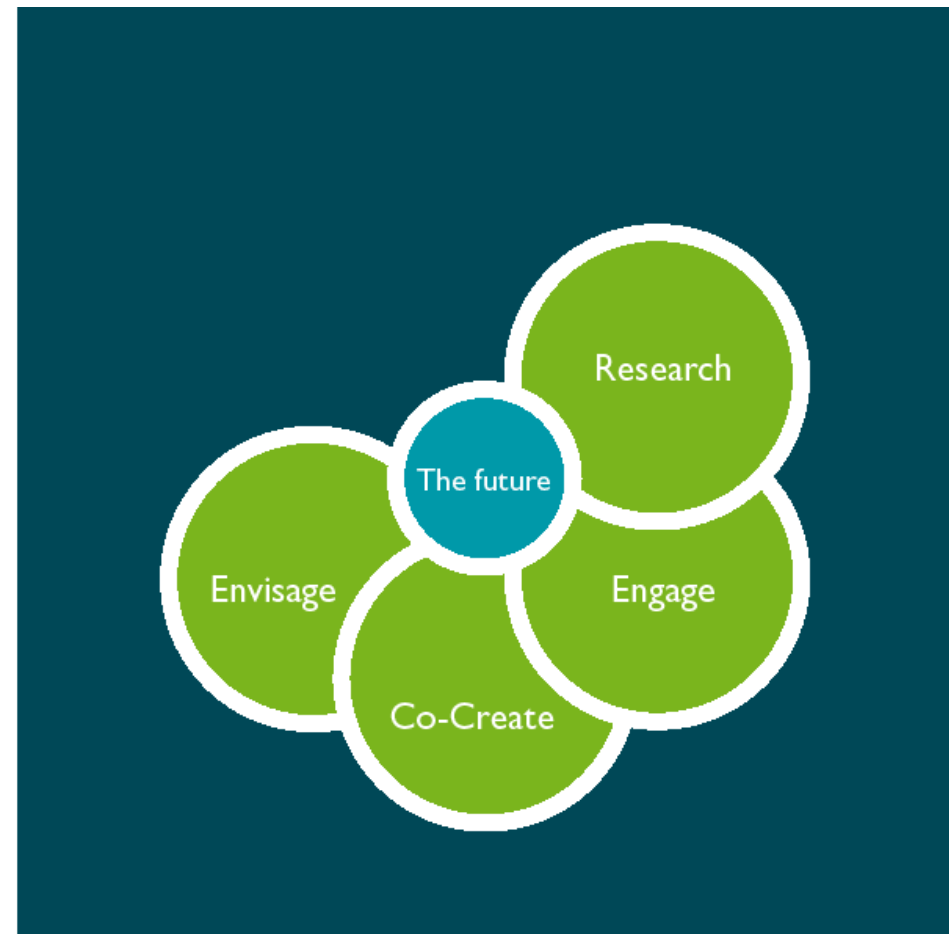
If social innovation is increasingly important, and if we are to go beyond a technology and/or market view of the future, then, as stated above, we need first and foremost to think about the future through a social and cultural lens, researching and understanding socio-cultural contexts and values. This is true whether we are thinking about consumers (as people first and consumers second), about social needs and social solutions, or about both, i.e. users in social solutions.

Philips Design has always taken a more socio-cultural approach to research, exploring beliefs, values, aspirations etc. For more than ten years a diverse team of futurists, psychologists, historians, anthropologists and designers in Design Research and in the Foresight and Trends group have been researching society, cultures and people in terms of:

- the deeper currents in social values and the main drivers shaping tomorrow's world, drawing on futures and social studies.
- the cultural expressions of how these values are manifested, drawing on cultural and design studies.
- the needs and behaviors of people in their everyday lives and activities, drawing on ethnography and the human sciences.

The primary aim of our socio-cultural research and the creative tools that translate this research and make it accessible to others has always been to anchor the future and innovation in terms of people, and to trigger out-of-the-box thinking.

How do we label this research? Is it futuring, foresighting or market research? Actually it is at the interface of these different disciplines and is trying to forge a new qualitative 'human' storytelling into the futures process. Ultimately this more human focus allows us to put people at the center of the future, to explore more meaningful and wellbeing solutions and experiences and to re-introduce a normative approach to the future, meaning to think about preferable futures that make sense both to society and people.



In essence, a socially-led company has to go beyond only market research and consumer research and insights towards more social network research. Building on our experience to date there is a need to:

- refine our social science approach to better identify areas in which social needs require social innovation and social solutions. For example in the areas of the elderly, food and nutrition, chronic illness, mobility, inadequate water and illiteracy.
- combine this research with our socio-cultural research in order to ensure that the social solutions are experiential and enriching.
- research not the single individual but the social network and the interactions in the social system, building on the 'multiple encounter' and 'personas' research carried out by Lucile Rameckers and Stefanie Uh (17).
- research less and involve users more.

Essentially we need to ensure that we are able to identify opportunities, trigger creative insights and ground these in values research, using a network of collaborators, on- and off-line, who are strong in one or more of these different areas.

Engaging with the future

Researching the future gives us deeper understanding of change and of the realities of people in their everyday lives. However it is no longer enough. The distance between researcher and researched, even using the most inclusive ethnographic approaches, still fails to capture so much of the future in the making. So how can we actually touch this future more directly? One way is to engage with those groups of people who are actually making the future today. Such groups emerge more strongly when the world undergoes profound change. When old world meets new world, those who have already crossed over inform us about how the future will be, both through their values and their actions. Whether they are the carriers of new values or of new needs, driven by conviction or frustration, they proactively take the initiative in creating the new world. They are the change agents to the future, giving it its character, its leadership and its social profile.

To engage with the future directly we have identified three different groups. Each of these groups in their different ways and expressions are an interface to the coming future.

Cultural Innovators are the carriers of new values and the emerging mindset. They believe in sustainability, authenticity, personal growth, collective & self determination, and social and community activism. These cultural innovators, and the transformation they represent, are a powerful means with which to engage with the future and offer an effective foresight and insight tool. However the very nature of who they are and what they represent means any engagement has to go beyond more traditional qualitative and quantitative research methods. Our challenge is to engage physically and virtually, with cultural innovators to generate insights both in intellectual and experiential ways. Given this, we are creating a collaborative and ongoing two-way relationship in which, together, we explore and experience emerging values and behaviors, and a more holistic worldview. This connection not only builds more future-relevant solutions but also helps a more sensible future to emerge, based on sustainable and collaborative values and beliefs. The pioneering work of Paul Ray on cultural creatives in the USA serves as an inspiration in this work (18).

Creative Communities are complimentary to – though not necessarily synonymous with – cultural innovators. They are locally-based communities who through grassroots, bottom-up initiatives create new solutions to new problems or needs. In other words an alternative solution to living, but which has at its core an environmental and/or social benefit. Also here, researching and engaging with such communities enables us to identify new future directions and possibilities. Through a European research project EMUDE (19), examples of creative bottom-up solutions were identified, including the production and consumption of locally grown produce, the use of local materials for construction, the recycling and redesigning of old furniture, the promotion of alternative transport, the creation of local green spaces and local provision for the elderly and children. Of course, such self-help community initiatives have always existed, but – as with the cultural innovators – their significance today lies in the timing, given that in this change of age they become meaningful antennae towards an emerging future.

Social Entrepreneurs, examples of which are given above, are another group with which to engage with the future. Social entrepreneurs run businesses based upon a double (financial and social or environmental) or triple (financial, social and environmental) bottom line. In other words, rather than relying on philanthropy or charity or public hand outs, social entrepreneurs embed their social mission in business and reach self sufficiency through earned income. To paraphrase Jerr Boschee, a social entrepreneur is any person, in any sector, who runs a social enterprise. A social enterprise is any organization, in any sector, that uses earned income strategies to pursue a double or triple bottom line, either alone (as a social sector business) or as part of a mixed revenue stream that includes charitable contributions and public sector subsidies (20). As such, social enterprises promote a more varied and mixed system of different partnerships, including public private ones.

Another outstanding example, already mentioned, is Dr Muhammad Yunus of the Grameen Bank, who was awarded the Nobel Prize in 2006. In a speech hosted by the Tallberg Foundation in December 2006 he makes a crucial distinction between profit-maximizing business and social business (10). He explained how business is very good at maximizing profits for those providing investment and how social enterprise leaves profits in the hands of those who need them and has thus proven to be a far superior tool when it comes to bringing people out of poverty. It is in essence the well-known example of the fish and the fishing rod; 'give a man a fish and he will eat for a day. Give a man a fishing rod and he will eat for a lifetime'. The one major flaw in this argument is that the man is increasingly likely to be a woman. Dr Yunus explained how impoverished women possess the innate capacity for innovative business ideas so they can take care of themselves and their families, but that this will only emerge if they are provided with the first financial seed and gentle encouragement. All of which is counter-intuitive to the big banking system that is based on lending money guaranteed by collateral. Such social enterprises often represent an alternative to the centralized socio-economic development model driven by multinationals.

“Like other idealists, social entrepreneurs look at the world through rose-colored glasses, but they never forget the green eyeshades of the accountant-measuring results and finding new ways to scale up their sustainable social impact”

Jeff Skoll, The Skoll Centre for Social Entrepreneurship (21)

To sum up, a vital force for interfacing and interacting with the future is through the very people who are creating it. With a new age come new actors and new leaders and so, as old worldview leaders turn in to followers, it becomes both productive and necessary to engage with the new leaders, be they the cultural innovators, creative community activists or social entrepreneurs. Such engagement offers rich insights and validation into emerging trends, new sustainable lifestyles and new expressions of social innovation and incubation. It also stimulates internal transformation and cultural change. Our challenge is to help enable and scale up social innovation and change.

Given that the future is unfamiliar territory, as is the engagement with these people, there is a need to:

- cultivate opportunities and projects where we can work together as equals.
- help facilitate, enable and incubate some 'experiments'.
- scale up those that are successful in fostering more sustainable lifestyles.
- create a more open and experimental mindset and portfolio so that 'a thousand flowers bloom'.
- explore more partnerships including public private opportunities.

This is a particularly challenging area for large companies who are used to being in the driving seat and behaving in a manner in keeping with their size. It is a challenge, however, that must be met. According to the MP Alan Simpson, "The big idea for the 21st century is that all of the answers are to be found in the absence of bigness. It's a bit of a bummer for today's corporate giants, but tomorrow's solutions will be found in networks and systemic interdependencies, not in global behemoths" (22).

With a new age come new actors and new leaders

Co-creating the future

As we have seen, one way of co-creating the future is to actively engage with those who are making the future. Another way is to drive open and co-creative practices through the company's innovation and development processes. Whether we are thinking about a new health system, a water solution, an interactive home environment, ambient intelligence, enabling systems or open tools, the customization of future technologies is reshaping how we innovate and with whom we innovate.

By working with stakeholders and especially users to create bits of the future, there is a higher probability that the resulting solutions and systems will be relevant, appropriate and therefore more successful. As Van Hippel shows in his book, *Democratizing Innovation* (23), users are one of the most under-used resources. In fact the majority of application innovations are by users themselves who take an original application and change it to their own needs or to something different. One example is the mountain bike which was developed by users who had a specific need.

A paradigm shift is taking place in innovation, which is being democratized with active user roles and open innovation processes, and where the scope is widening from product and services innovation to business model and societal innovation. Different stakeholders are involved from the public sector, the business world (local and international companies), academia and NGOs, in addition to citizens and users. Information and communication technology is a key enabler for mobilizing and aggregating the 'collective intelligence and creativity'. An example and expression of this shift in innovation can be seen in the launch, under the Finnish presidency, of the European Network of Living Labs. The labs bring together users and experts to foster collaborative innovation and are a step towards a European Innovation System based on open co-creative labs for jobs, growth and global competitiveness (24).

The future will
be less about
predicting it
and more about
collaborative
designing it

This again is a challenge to large companies who are hardwired to come up with the perfect finished 'product'. Having users in the innovation and development cycle, especially with ambient and context technologies, means that we may have to think about putting unfinished or even half-realized ideas out there and letting users and experts 'play' with the stuff. Increasingly in the future, through such a process, we shall see a reconfiguration of what exists, putting things together in a different way, rather than waiting for the next big future or for the next big technology invention or the perfect solution. Quite possibly, future innovation will be driven by human-focused insights and inputs, half-realized prototypes and designer/user participation, manifested through an iterative process of creativity and refinement.

This innovation paradigm shift implies a changing role both for research and researchers and for design and designers. One in which they are no longer the researcher or the creative but rather part of one or more networks, to which they bring their 'tool kit' and establish a creative dialogue with the participants. What is required is therefore:

- facilitation of discussion
- extrapolation of ideas to replicate or multiply
- faster prototyping
- supporting, enabling and facilitating users, and working side-by-side with them.

In terms of how we interface and interact with the future, the implication is that it will be less about predicting it and more about collaboratively designing it. The future will emerge through interaction and co-creation. With the democratization of innovation comes the democratization of the future. Furthermore, the need to re-design systems rather than products is in turn profoundly affecting the role of design and designers, who are increasingly engaged in the design of services and systems and who, through the democratization of innovation, are taking on a more facilitating and enabling role.

Future innovation driven by human-focused insights and inputs, half-realized prototypes and designer/user participation, will be manifested through an iterative process of creativity and refinement

Envisaging the future

One way of co-creating the future is to envisage it, in other words to make it tangible. This is quintessentially a design task. Design, which has always been a link between people, technology and the future, is able to give intangible ideas and creativity a form. In so doing it increases the level of debate and interaction and facilitates dialogue, contribution and involvement from stakeholders and, more specifically, users. Under the leadership of Stefano Marzano, Philips Design has for some years now been creating 'memories of the future'. These 'memories' embed possible futures in the present through tangible prototypes. From Vision of the Future in 1995 through to Next Simplicity in 2005/6, these vision projects have built knowledge and know-how, facilitated a discussion with different stakeholders, encouraged a more creative engagement with the future and directed research and innovation. At a time when there was much talk of a very technology-oriented vision, we wanted, through our tangible prototypes, to project and promote discussion about a more intimate, human and humane view of the future. This is one way of re-introducing a more normative approach to the future and to research and innovation. Making preferable futures 'real' will hopefully in turn create more positive 'memories of the future' (x).

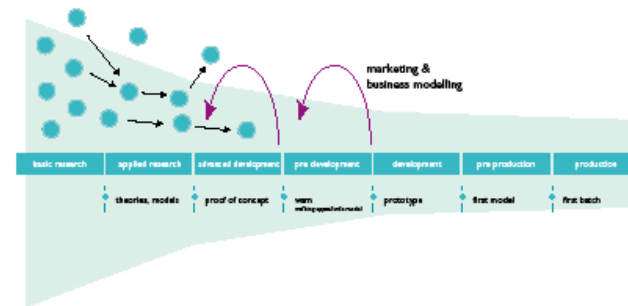


Future Horizons

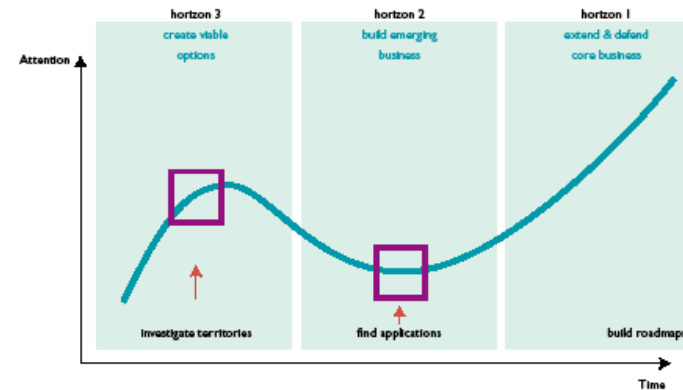
An important issue, however, when engaging with and envisaging the future, is defining exactly which future we are engaging with; near future or far future? To effectively think about and visualize the future we need a pragmatic, holistic and comprehensive framework for building, leading and sustaining innovation in the short-, medium- and long term.

The standard funnel model (fig. 1) of innovation works on the basis that all creative ideas go in at the front end. These are then progressively developed and filtered until a number of feasible propositions come out at the other end. However, this one-size-fits-all model of innovation does not take time into consideration, and also usually means that business takes control of innovation too easily and too early. The consequence is generally that short-term innovation replaces longer-term exploration. The future always seems to be tomorrow, if not today!

Building on a McKinsey model (25), Paul Gardien's design-led horizon innovation model (fig. 2) proposes an elegant framework that enables us to think short-, medium- and long term, and fits with Foresight in Design's more exploratory and flexible approach to the future and innovation (26). By transforming the funnel model into a framework of three different horizons, a more customized and exploratory approach to thinking about the future is enabled, given that horizon 1, horizon 2 and horizon 3, reflect short-, medium- and long-term futures. Horizon 3 is about more radical innovation and transformation, horizon 2 is about the next new business and horizon 1 is closer to business as usual and therefore involves more incremental innovation. Each horizon explores a different time space and therefore needs a different foresight in design approach and input.



Visual of funnel model



Visual of 3 Horizon

In horizon 3, for example, which is longer-term and has a higher degree of uncertainty, we are able to explore and experiment more sustainable futures and socially-innovative solutions. This inherent uncertainty calls for the application of Foresight in Design's more qualitative approaches and methods such as future scenarios, socio-cultural narratives and engagement with cultural innovators, creative communities and social entrepreneurs. Horizon 2, which is more about new business, builds on the input, knowledge and competence developed in horizon 3 but concentrates on users as co-creators of next applications. Horizon 1, which is more about incremental innovation, taps into market research and consumer insights, data mining, segmentations etc. Envisaging the outcomes of the different horizons also differs, from the open experiential visualizations of horizon 3 to the tangible application prototypes of horizon 2 and 1.

The importance of this open and flexible approach to the future is that it allows a richer exploration of different futures, including a more 'blue-sky' longer-term future. In doing this it both adds and re-invents value through generating sufficient creative ideas that support strategic innovation in terms of current and future opportunities. It means that the company can envisage and communicate the different expressions of horizons 1, 2, and 3 to the different stakeholders, including the public. This in turn gives the company license to explore and communicate the not-yet-perfect or the not-yet-finished. As stakeholders become more involved in research and innovation, the degree of presenting the unfinished will increase out of necessity.

Envisaging the future will prove to be truly successful if we supplement our creative juices with stimulating research and inputs. As stated already in this paper, stakeholders and especially end-users also have to actively participate and ultimately co-create the required innovation and, by consequence, the next futures. To achieve this we need to:

- * collaborate more with creative mindsets, artists, musicians, poets, and others 'on the fringe'
- * engage with cultural innovators and creative communities
- * collaborate with social entrepreneurs
- * involve users earlier in the process and throughout the process
- * identify the right level of envisaging and prototyping based on the purpose.

But is this enough? Does it answer the question we asked in the first paragraph: how do we, could we, and perhaps more importantly, should we interface and interact with the future? Does it solve our problem of creating a new, sustainable engagement with the future? We believe our approach of Foresight in Design together with the horizons framework helps towards an answer. It proposes not one but a number of interfaces, through research, engagement, co-creation and envisioning, tailored to the time factor of horizon 1, 2 or 3. As such it offers a more flexible approach and the possibility of a more responsible approach to the future.

Such an approach, however, is still 'trapped' by the idea of time as past, present and future. Perhaps, at the more esoteric and experimental level, in our quest to find the future we have to challenge the very concept of time itself and try to imagine beyond our present straightjacket of linear time.

Re-conceptualizing the future

Each culture, according to its own worldview, makes time and the future its own, and our culture is no exception. Western culture interprets time as past, present and future, and sees the future as an empty space into which we can 'trespass', filling it with more of today and with more technology and marketable goods (27). This automatic 'colonialization' of the future, however, now risks creating more problems than benefits (28). Global warming and the depletion of natural resources, the growing gap between the rich and the poor and the higher personal levels of stress and burn-out all call to us, as a civilization, to re-think our relationship to time and the future. We need to evolve new conceptual models and new metaphors.

New time/future metaphors and images could have the potential to free us from deterministic and mechanistic thinking and allow us to re-integrate a sense of wonder and stewardship towards the future. How we think about the future determines the way we act in the present and new metaphors and a new narrative could allow us to engage more creatively and perhaps more responsibly with our futures.

“What are the alternative imaginations of the future? ... What are the images of the future of those we consider outside history? What are other ways to ‘time’ the world instead of the dominant scientific model, such as women’s, spiritual, or cyclical time...”

Sohail Inayatullah (29)

What if time is more like a spiral, encompassing the old but always adding complexity and evolving the new, or a swirl, simultaneously containing past, present and future? Perhaps the most important thing in this change of age and consciousness is to suspend disbelief, to regain a childlike wonder of the universe and to keep exploring and imagining beyond our fixed notions of time and space. To do this, there is a need to:

- * engage with artists, scientists, academics to explore the space between the creative and scientific disciplines
- * trust in your own subjectivity and that of others as much as you do in objectivity.

What is certain is that we can no longer continue to 'consume' the future and therefore, freeing up time and the future becomes both a necessity and an opportunity.

“Future historians may note that at the same period that technology acceleration was driving the world to operate on fleeting ‘Internet time’, environmentalists were teaching the world the long-term foresight and responsibility of biosphere time. Just when technology was busy making us smarter, environmentalists began to make us wiser”

Stewart Brand (30)

10 Sense making and making sense

To conclude, we are experiencing a change of age, one in which deeply-held beliefs and behaviors are transforming. People are moving from being passive consumers to active producers of their own lives and lifestyles, and the new ambient technologies are re-enforcing and enabling this as well as offering more context-driven solutions on product, service and system level. Such changes facilitate the re-design of our social industries and even of our future development paradigms.

This paper began by stating the need to open up the future, to engage and interact differently with it in order to drive greater prosperity and wellbeing in a period of such transformation. Linked to this, it suggests that the more forward-looking companies initiate a move towards a socially-led approach. It outlines some of the research and thinking going on in Philips Design to support the above, particularly the approach of Foresight In Design. It asks us to open up our hearts and our minds towards new ways of being and new ways of doing, given that the future of our people and our planet are at risk.

“If we are privileged with power or money or knowledge we have to put it to work, otherwise it atrophies and ultimately corrupts us”

Geoff Mulgan (31)

It suggests implicitly that business can no longer concern itself only with making money and maximizing profits and that, given its talent, resources and knowledge, it needs to take a more pro-active role towards a better future. This in turn means thinking about a different purpose and a different role. And nothing stands still. Business knows this. The orthodoxy of today is the heresy of tomorrow. Sometimes it seems that to challenge market capitalism is to utter heresy. Yet market capitalism was not a gift from above and is no eleventh commandment. It is neither inevitable nor necessarily modern, as some would have us believe. Nor does capitalism stand still, and already we can see through the sustainability movement a process of creative destruction. Sustainability is not tame; it is a radical philosophy that, as with the great religions, asks people to change their lives. Like those religions it is about radical change and transformation. A transformation of the way we think and the way we are, a personal transformation, which is often the hardest transformation of all but one that supports all the others. If we don't change ourselves we can't change the world.

“For the first time ever, our enemies are no longer outside us. We’re quite well suited to battles with foreign powers, evil corporations or heartless states. But now we face many challenges where the enemy is us – our desires and our myopias may be what stand in the way of survival”

Geoff Mulgan (31)

This transformation of a worldview, of social models and of more human ways of creating value, is also about a transformation of approaches and practices including new tools, new research and innovation, new leaders, new networks and new partnerships: cross-disciplinary, cross-industry, cross-border and public/private collaborations that will create the industries and markets of the future.

In essence, at the beginning of the 21st century, we have the possibility to enter a new social era, in which an emerging new capitalism transcends market capitalism, the maximization of profits and the cult of the individual. One in which the underlying ethos of sustainability and sustainable development helps to humanize and simplify our lives. It puts people, not technology and not the market, at the center of our future, our thinking and our practice. It means that sense making and making sense of the future lies in understanding how people are evolving, engaging with them on a journey of discovery and exploration, and co-creating and envisaging the future together.

It seems, however, that humankind is capable of anticipating the future but not so good at doing anything about it. Unlike the poor frog, who, when put in cold water boils to death, oblivious of the rising temperature, we are not oblivious but to often continue along the same path anyway! An inclusive approach and a collective engagement in the future and in innovation may help to marry anticipation and action. This is our challenge. The frog is also a symbol of renewal and transformation in mythology and fairy tales. Are we to be the boiled frog or the prince?

If the future is not predictable then it is also about choice and certain choices are just waiting to be made. It's up to us.



“Whatever you can do or dream
you can, begin it. Boldness has
genius power and magic in it...”

Goethe

References

- 1 Peter F. Drucker, *Post-Capitalist Society*, HarperCollins Publishers, 1994
- 2 Eamonn Kelly, *Powerful Times – Rising to the challenge of our uncertain world*, Wharton School Publishing, 2005
- 3 JC Burgelman & D. Osimo, DG Joint Research Council. Institute for Perspective Technological Studies
- 4 Charles Leadbeater, *We-think: The Power of Mass Creativity*, www.wethinkthebook.net
- 5 Stefano Marzano, Flying over Las Vegas, Keynote speech at the 17th World Design Conference of the International Council of Societies (ICSID) in Ljubljana, 1992
- 6 Emile Aarts, Stefano Marzano, *The New Everyday – Views on Ambient Intelligence*, 010 Publishers, Rotterdam, 2003
- 7 A. Andrews, Bueno, Cass: Open Tools Definitions, Internal Paper, Philips Design, 2002, www.design.philips.com
- 8 Hilary Cottom, Charles Leadbeater, *Health-Co-creating services*, Red Paper 01, Design Council, www.designcouncil.org.uk
- 9 Ezio Manzini, Presentation to Philips Design, 2004
- 10 Mohammed Yunus, speech to the Tallberg Foundation, December 2006, www.tallbergfoundation.org
- 11 Slow Food International Association www.slowfood.com
- 12 Slow + Design International Seminar, Milan, October 2006
- 13 Simona Rocchi Unlocking New Markets, Position Paper, Philips Design, 2006, www.design.philips.com
- 14 Wolfgang Sachs, *Globalization and Sustainability*, The Wuppertal Institute, Germany
- 15 Ian Herbert, *Planes, Trains and the Road to Ruin*, The Independent, 2nd January 2007
- 16 The Young Foundation, *Social Silicon Valleys – A Manifesto for Social Innovation*, 2006, www.youngfoundation.org
- 17 International Conference on Social Innovation, Beijing, China, 2006, www.discover-socialinnovation.org
- 18 Lucile Rameckers and Stefanie Un, *People Insights at the Fuzzy Front End of Innovation*, Position Paper, Philips Design, 2006, www.design.philips.com
- 19 Paul H. Ray and Sherry Ruth Anderson, *The Cultural Creatives: How 50 million people are changing the world*, Harmony Books 2000
- 19 Emude – Emerging User Demands for Sustainable Solutions, EU project, 2004, www.sustainable-everyday.net/EMUDE/april
- 20 Promising cases repository, 2005- www.indaco.polimi.it/emude
- 21 Jerr Boschee, *Migration from Innovation to Entrepreneurship*, Encore! Press, Minnesota 2006
- 22 The Said Business School, University of Oxford, The Skoll Centre for Social Entrepreneurship, www.sbs.ox.ac.uk/skoll
- 23 Alan Simpson, *The Long and Winding Road*, Resurgence, September/October 2006, no 238
- 24 Eric van Hippel, *Democratizing Innovation*, The MIT Press 2005
- 25 The Aho Group, *Creating an Innovative Europe and Experience and Application Research*, European Network of Living Labs, www.openlivinglabs.eu
- 26 Merhdad Baghar, Stephen Coley and David White, *The Alchemy of Growth*, Perseus Publishing 2000
- 27 Paul Gardien, *Breathing Life into Delicate Ideas*, Position Paper, Philips Design 2006, www.design.philips.com
- 28 Barbara Adam, *Towards a New Sociology of the Future*, The Futures Project, Cardiff University, School of Social Sciences, www.cardiff.ac.uk/social/futures/
- 29 Z.Sardar, *Colorizing the future: the 'other' dimension of future studies*, March 1993, *Futures*, 25(2), 179-187
- 30 Sohail Inayatullah, www.metafuture.org/Articles/PEDAGOGY
- 31 Stewart Brand, *The Clock of the Long Now: Time and Responsibility*, Basic Books, 1999
- 32 Geoff Mulgan, *The Enemy Within*, Resurgence, September/October 2006, No.238

This paper draws on the accumulated and on-going research and thinking within Philips Design. The final content, however, is my responsibility. I would like to thank Paul Gardien, Steven Kyffin, Nick Price and Derek Brookman for their useful comments. A special thanks to Gary Nudds and Rita Stumpel for their design creativity and Carla O'Driscoll-Silva for her support.

In the twentieth century the future was more elitist. It was primarily a top down concern and, from a company perspective, driven through technology, economics and expertise. However, the emerging meta-themes of mass creativity, social innovation and sustainability are transforming how we think about and how we engage with the future. This book explores this transformation, proposes a more multi-faceted approach to the future and innovation and offers some thoughts around the resulting democratization of the future.



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The World in 2025

Economic projections with the MIRAGE model

Final report – 21 October 2009

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For the Commission of the European Union – Directorate-General for Research

Executive summary

Long term prospective exercises are delicate tasks. This is especially true in this beginning of the 21st century, as the fast integration of the world economies creates global instability, reinforced by the emergence of new risks: financial uncertainties, the long-run rising prices of energy and commodities, the threat of climate change, the pressure of migration and the spectrum of terrorism. To tackle these challenges, governments need to conceive long term programs, which require a good vision of the main economic trends. For this purpose, long run projection scenarios are a requisite for developing a well-informed outlook on the fast mutating world. The objective of this exercise is to propose a scenario for the world economy until 2025, based on central assumptions and shedding light on the heterogeneous dynamics of world growth, on the evolution of the international distribution of production across countries, and significant relative price evolutions. Our approach is to rely on some reference projections for crucial variables like GDP or population and to illustrate their implications with the computable general equilibrium model MIRAGE. The interest of using a model for such a prospective work is to take into account linkages between the main economic drivers, within a consistent economic framework and relying on a strong microeconomic description of agents' behaviours (consumers, firms, investors).

Structuring drivers for the changes in the next century will be population and economic growth. First, with around 1.5 billion extra inhabitants expected in 2025 (+23%), the world will face unprecedented challenges: 97% of the increase will take place in developing countries and 95% in cities. These changes will accelerate migrations and raise issues of development and security in some parts of the world. As developed countries will have their active population decrease, new regions will progressively represent sources of dynamism and growth.

Second, the period 2005-2025 will see the world economic relations definitely shift from the Triad domination (USA, Europe, Japan) to a larger network of nations, grounded on regional partnerships and centred on the Indian and Pacific Ocean. The US and the European Union will be challenged by new competitors: China, India, Brazil, and Russia. Japan will lose its influence in a dynamic area centred on China, Korea, Taiwan and ASEAN and representing a market of 2.3 billion consumers in 2025. Transnational companies will play major roles, boosting capital mobility and international trade. In developing countries, a large class of more than 1 billion well-off consumers should benefit from the new created wealth, but inequalities will explode in many areas, especially Africa, because of overwhelmed cities and new constraints on resources.

Increase in population and economic growth will subsequently lead to dramatic increase in demand to which supply will respond more or less easily. The situations will be very different from one sector to another. In particular, as the tension between stocks and demand for natural resources becomes more sensitive, the scarcity of some commodities will be one of the significant issues in the next decades.

Following the increase in demand and aspiration of many people to new standards of living, production capacity will be challenged and markets will regulate gaps between supply and demand through price reactions, which should lead to various evolutions depending on the sector considered.

As a first example, the recent food crisis has reminded us how far we are from food security in large parts of the world. The next twenty years will require a huge increase in production both to lift millions of people from undernourishment and to allow a shift from staple food to a diversified diet in emerging countries. Such increases occurred in the past, but new constraints have appeared: biofuels create a competition between food and energy production, and natural resources degradation (land, water...) hinders agricultural yield increase.

However, all natural resources, whether renewable or not, are concerned by potential supply problems. The ever increasing demand from emerging countries, and especially China, makes it difficult to respond at the present pace to the sustained demand growth. Indeed, most commodity prices have soared during the last two years. The fish market was not an exception. On the contrary, the timber market is presently in a singular situation, trapped between the falling American construction market and the strong Chinese demand.

After more than 15 years of relative stability at a level close to 20 \$ per barrel, oil price also illustrates this rising threat for the global economy. It has more than tripled from the beginning of 2002 until mid-2006. During a year, the market seemed to have reached its equilibrium, but the rise resumed and prices more than doubled again until mid-2008. This last movement has been cancelled however in the last few months. Innovation may help avoiding the exhaustion of natural resources at an ever growing pace, but resource scarcity may also affect certain economies, especially of emerging countries. As an illustration, a two-fold increase in the oil prices in contrast with our baseline scenario would reduce world GDP by 1.75%. But the main effect would be a huge redistribution of consumption from oil importing to oil exporting countries. In order to pay their energy bill, oil importing countries would have to devote an increasing part of their production to exportation. Developing countries, which are often more energy intensive, would be the more severely adversely affected.

Such constraints on the commodity markets will challenge the capacity of the world economies to secure a sustainable growth and to widely spread development.

1. Introduction

Long term prospective exercises are delicate tasks. This is especially true in this beginning of 21st century, as the fast integration of the world economy creates global instability, reinforced by the emergence of new risks: financial instability, the long-run rising prices of energy and commodities, the threat of climate change, the pressure of migration and the spectrum of terrorism. Whereas the world economy is more and more governed by short term considerations, general orientations and international coordination are more than ever necessary to face these challenges. Some multilateral initiatives such as the Kyoto Protocol or the Millennium Goals try to curb economic trends and to design appropriate policies in relation with possible futures. Similarly, democratic governments need to conciliate current aspirations of their voters with a coherent long vision program, which requires a good understanding of the main economic trends. For this purpose, long run projection scenarios are a requisite for developing a mature outlook on the fast mutating world.

The objective of this exercise is to propose a scenario for the world economy until 2025, based on central assumptions and shedding light on the heterogeneous dynamics of world growth, on the evolution of the international distribution of production across countries, and significant relative price evolutions. Our approach is to rely on some reference projections for crucial variables like GDP or population and to illustrate their implications with the computable general equilibrium model MIRAGE. The interest of using a model for such a prospective work is not to get a definitive path, but to take into account linkages between different parameters, through a consistent economic framework and relying on strong microeconomic description of agents' behaviours (consumers, firms, investors).

The first part of this report will focus on the two main structural drivers for the world future: population dynamics and economic growth. The second part will present possible evolutions of consumption trends and implications for prices in a world of limited resources.

2. Towards new balances in the world economy

The beginning of the 21st century will be the time for a progressive reshaping of economic pre-eminence of nations, in the context of a more and more deeply integrated world. This evolution will be driven by shifts on structural determinants, among which population increase and migrations, capital movement and economic growth. All these factors will significantly influence the new strategic balance between already developed economies and emerging economies.

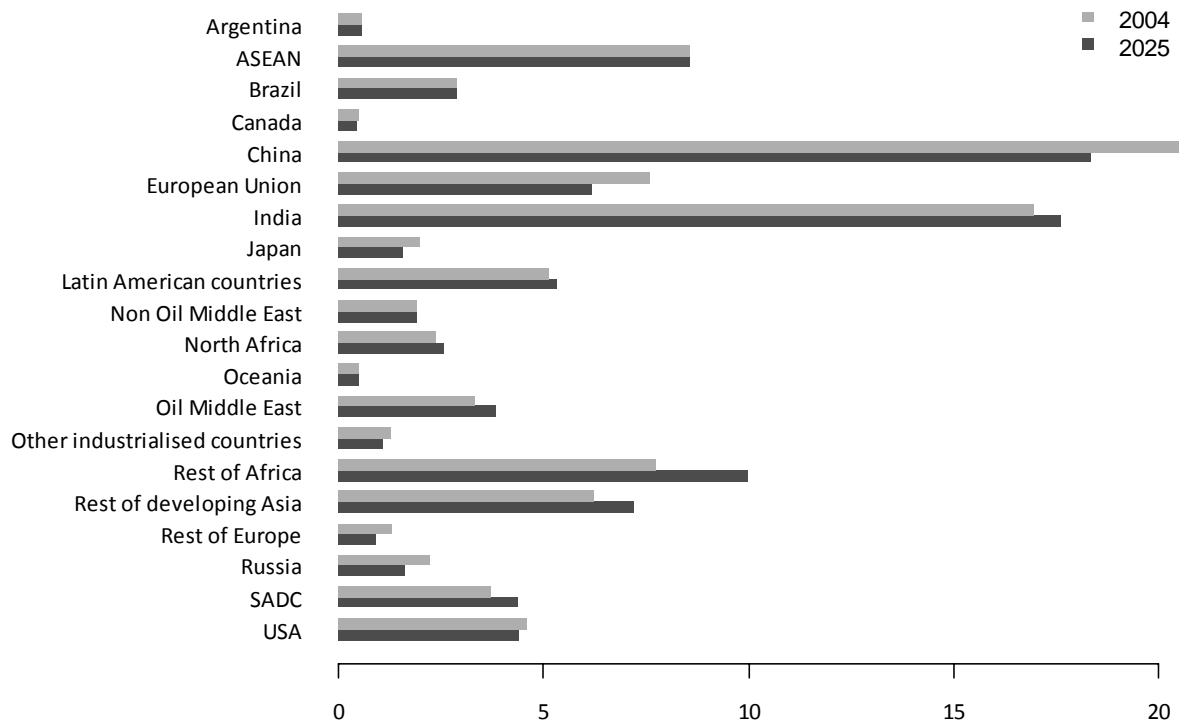
2.1. Perspectives for the world population

With around 1.5 billion extra inhabitants expected in 2025 (+23%), the world will face during the next two decades unprecedented challenges: 97% of the increase will take place in developing countries and 95% in cities. These changes will accelerate migrations and raise issues of development and security in some parts of the world. As developed countries will have their active population decrease, new regions will progressively represent sources of dynamism and growth.

Debates have been harsh since the Limits to growth report (1972) concerning the population the planet would have to carry in the long term. Last estimations from the United Nations (World Population Prospects, 2006) forecast a global population ranging from 7.8 to 10.8 billion in 2050. On the horizon of 2025, the medium variant from the UN leads to a total of 8,010 million people (+/- 440 million), which represents a 23% increase from the population in 2005. This increase (1,496 million) is much faster than the one expected for the 2025-2050 period, which is anticipated to be around 15% or 1,180 million.

Such growth will be very unevenly distributed. Poorest regions, which have not been far through demographic transitions, will keep high – albeit decreasing – fertility rates, in a context of a diminution of child and adult mortality. As a consequence, the current developing world will host around 6,752 million inhabitants in 2025 (+27% from 2005) whereas developed countries will weight 1,245 persons (+2% only). Africa will experience the greatest increase in population, followed by South-East Asia, India and Latin America. Relying on ILO's projections, we present on Figure 1 and Figure 2 the evolution of populations growth rates in selected regions: Africa (composed of North Africa, SADC and Rest of Africa) should gain 404 million extra persons, followed by India with 267 million extra persons, Asia (without China and India) with 264 million extra persons and China with 144 million extra persons. China's increase may appear limited when compared with its current total population. However, the single child policy will induce for this country a very specific demographic inflexion: unlike most developing countries, China is very advanced in the demographic transition, and will soon face the challenges of a significant population aging, which usually affects developed economies (and countries from the former Soviet bloc). As illustrated in Figure 2, China's active population will therefore start decreasing over the period of this study: it should reach a maximum in 2015 at around 830 million persons and drop to 809 million by 2025.

Figure 1: Shares in the world population (%)



Source: Authors' calculations based on ILO projections

As the repartition of the world population does not match the distribution of wealth, this evolution will increase inequalities and intensify migrations. Larger movements of population are to be expected, from rural areas to urban areas and from poor countries to wealthier regions.

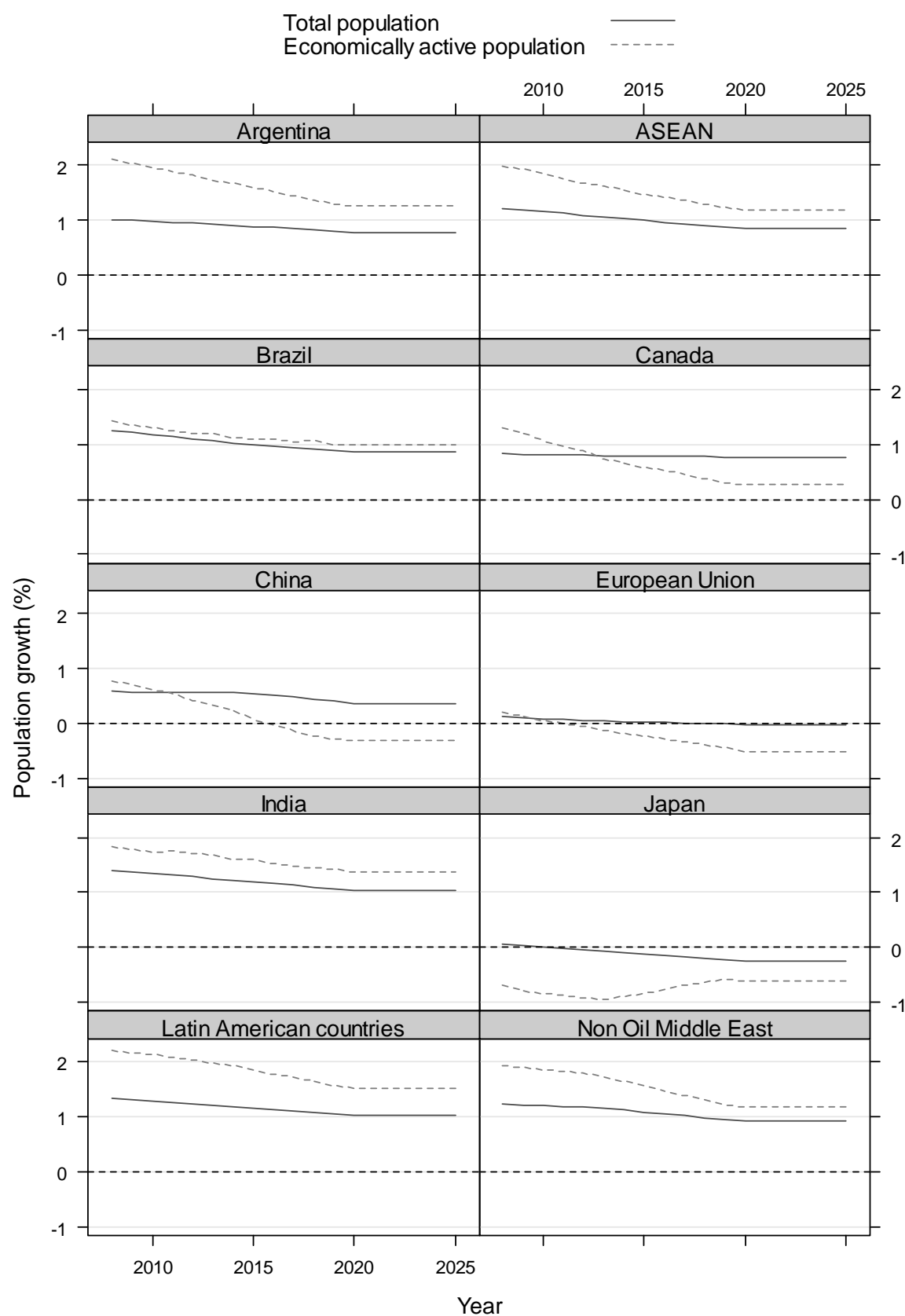
Cities will grow in a considerable proportion, with a 45% increase (1,419 million extra persons) on the period 2005-2025 (World Urbanisation Prospects, 2007). As migrants from rural areas will leave for cities, the rural population will only increase by 76 million. UN projections even forecast that rural population in the world should come back in 2050 to its 1983 level. In developed countries, urban population will increase by 11% (95 million) whereas in developing economies, 1,325 million new persons will be reported in cities (+58%). The number of cities of more than 10 million inhabitants should rise, for developing regions, from 13 to 21 and cities of more than 1 million from 263 to 421.

Inequalities between regions should foster migration between regions of the world. Although projecting movements of population is delicate, observed past trends lead to anticipate high flows of migrants not only from the South to the North but also within the North (more qualitative than quantitative with the *brain drain* phenomenon, which, however, also affects developing countries) and also within the South. Migrants have doubled in the North during the last two decades, rising from 54 million to 115 million people between 1985 and 2005 (UN Trends in the World Migrant Stock, 2005). During the same period, the migrant population to the South increased from 57 million to 75 million. If these trends were to continue, the world should count in 2025 around 250 million migrants, 65% of which would be settled in developed countries. Migrants would then represent 13% of the population in developed economies.

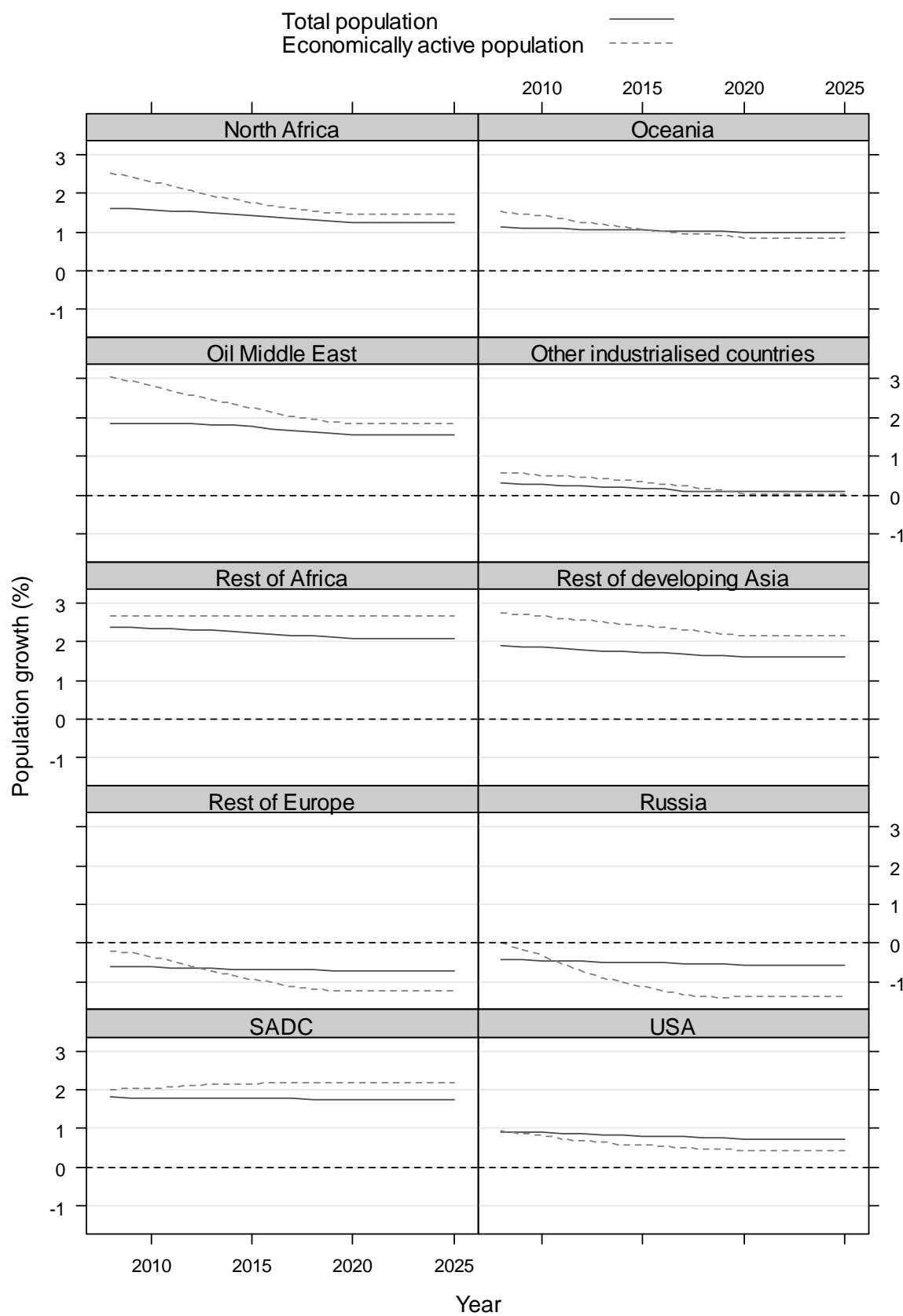
Migrations will however hardly counterbalance the aging of many developed economies and of less advanced regions such as China or Russia. From a general perspective, changes in fertility level and life expectancy will make the global population become older. The median age will shift from 28 years in 2005 (World Population Prospect, 2006) to 33 years in 2025.

For developed countries, it will shift from 39 to 43 years and for developing countries from 26 to 31 years (from 23 to 28 excluding China). This population aging will have consequences on the dependency ratio, as the population will be composed by more and more elderly people. The number of people over 60 will nearly double from 2005 to 2025 from 673 million (10.3% of world population) to 1,201 million (15% of world population). In developed countries, the ratio will reach 27.3% in 2025 with 36% in Japan, 30% in Western Europe and 24% in the USA. In developing regions, the proportion will jump from 8% to 13% with significant changes for some countries (from 11% to 20% for China). In addition to the reorganisation of society that these changes will require, some consequences will also occur concerning financial balances across countries.

Figure 2: Growth rate of economically active and total population



Source: Authors' calculations based on ILO projections

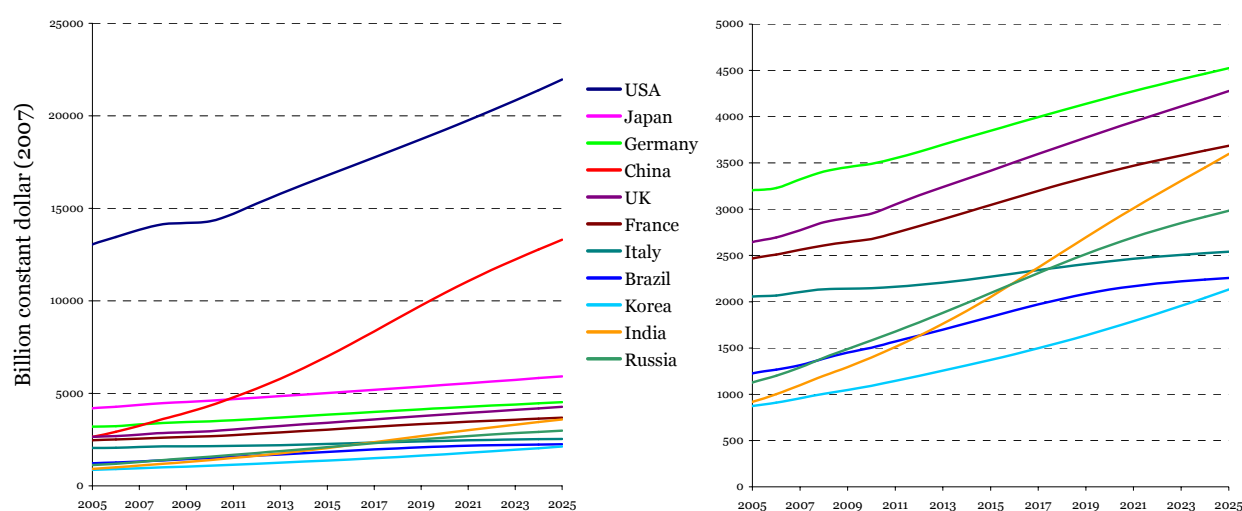


Source: Authors' calculations based on ILO projections

2.2. The reconfiguration of economic relations

The period 2005-2025 will see the world economic relations definitely shift from the Triad domination (USA, Europe, Japan) to a larger network of nations, grounded on regional partnerships and centred on the Indian and Pacific Ocean. The US and the European Union will be challenged by new competitors: China, India, Brazil, and Russia. Japan will lose its influence in a dynamic area centred on China, Korea, Taiwan and ASEAN and representing a market of 2.3 billion people in 2025. Transnational companies will play major roles, boosting capital mobility and international trade. In developing countries, a large class of more than 1 billion well-off consumers should benefit from the new created wealth, but inequalities will explode in many areas, especially Africa, because of overwhelmed cities and new constraints on resources.

Figure 3: Evolution of GDP for selected regions

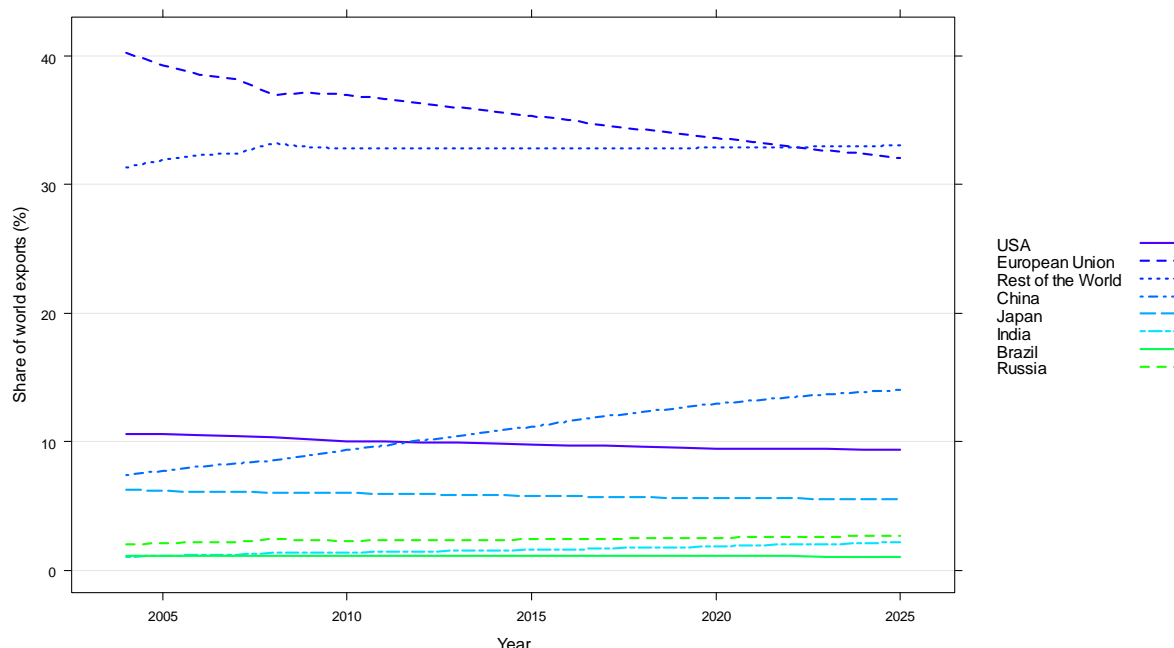


Source: IMF, CEPII and authors' calculations

From 2005 to 2025, the world economy size should almost double (+93% for the world GDP from our forecasts – see Appendix 1 for methodology). The distribution of weights among nations will be curbed in favour of some emerging economies. Developing countries, which represented 20% of the world GDP in 2005 in current \$, should reach a share of 34% in 2025. China should become the second world economy by 2017, with a GDP equivalent to the US one in 2000. In terms of GDP, China will weight 68% of the EU27 in 2025, and 53% of the US. India will become the sixth world economy by 2023, in front of Italy and just behind France. Italy will be challenged by Russia, and Brazil will rank between Italy and Korea. This new order will induce new strategic relations, even if the USA will keep the economic leadership.

Trade relations will be rebalanced as the South will export 43% of the world merchandise in 2025 against 33% today. Asia and Europe positions as world trade leaders will be inverted. As illustrated in Figure 4, EU27's export, which represents around 39% of the world value in 2005, will drop to 32% in 2025, whereas Asia's export (China, ASEAN, Japan, Taiwan and Korea) will rise from 29% to 35% of world exports. China will especially become the first exporter in the world by 2012 and will represent around 14% of world exports by 2025.

Figure 4: Evolution of world export shares for selected regions



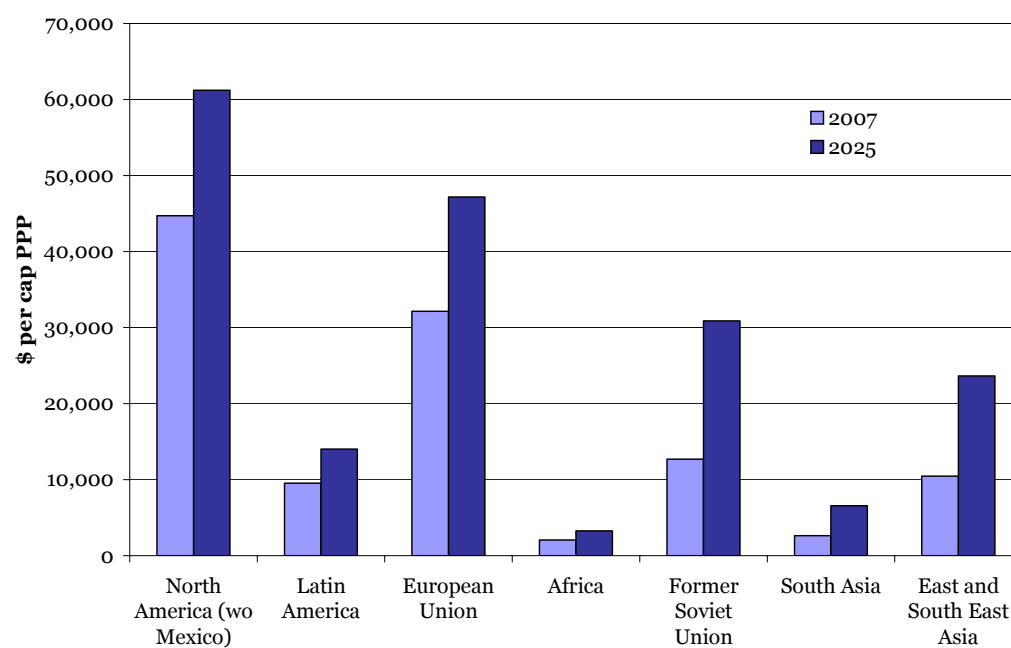
Source: Authors' calculations based on the MIRAGE model

The expansion of the world economy will be shaped in the future by the mobility of investments. Foreign Direct Investments (FDIs) have increased dramatically over the last two decades, benefiting more and more to developing economies. In twenty-five years, they have been multiplied by almost 20 (\$55 billion in 1980 and \$916 billion in 2005). This movement is particularly remarkable for regions such as South, East and South-East Asia where they represent more than 10% of gross fixed capital formation (World Investment Report, 2006).

The aging of population across the world will also affect macroeconomic evolution. As elderly people consume their savings, regions such as Europe and Japan will experience a large degradation of their current account due to aging (-9% of GNP for Japan in 2025 and -3% for the EU decreasing to -8% by 2040; World Economic Outlook, 2004). Aging will diminish saving rates and developing countries will have less access to investment (-3.5% drop in saving by 2025 due to aging).

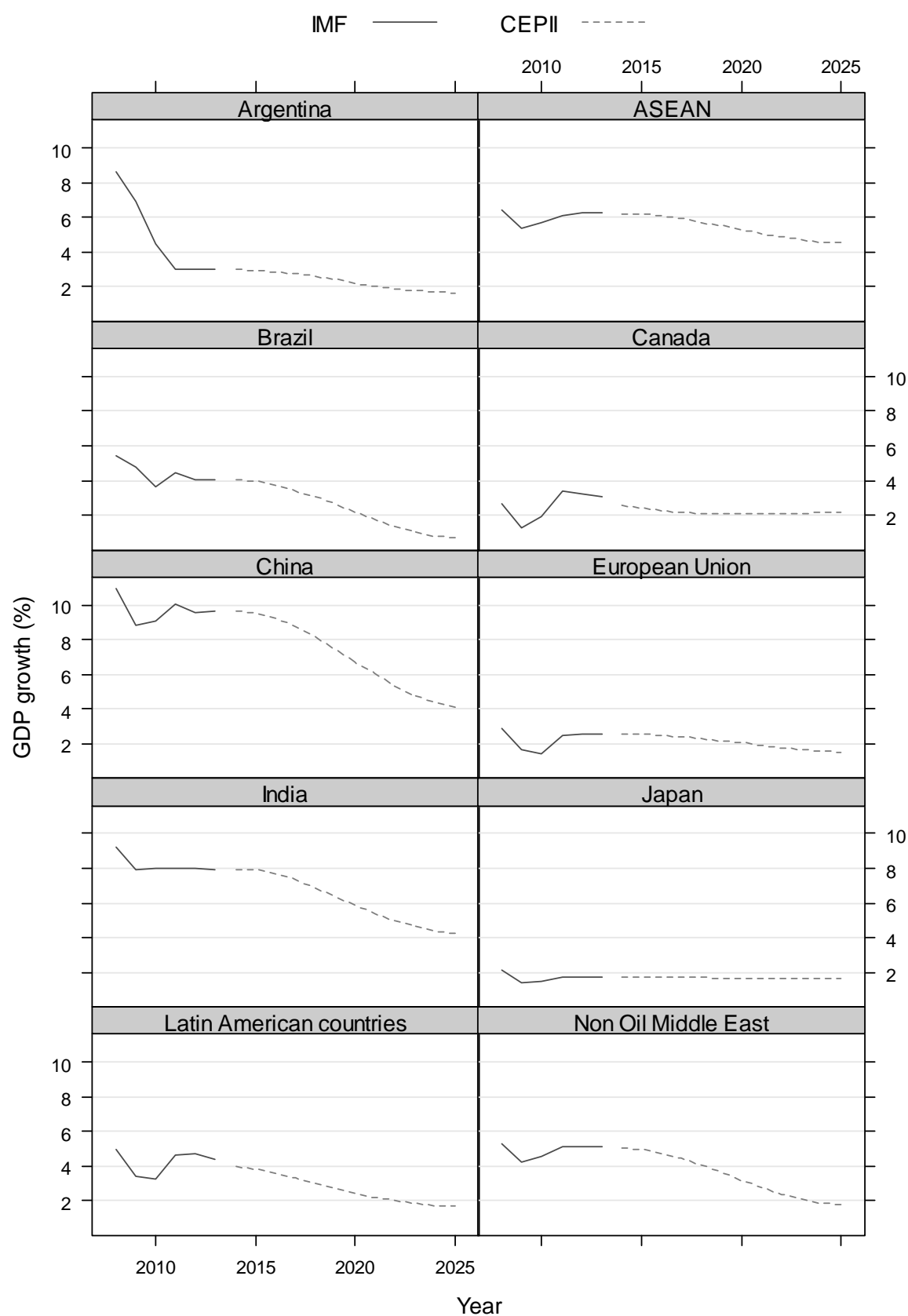
The world upcoming in 2025 will also be marked by increased inequalities within rich and poor regions (see Figure 5). Using micro-simulations tools, the World Bank estimates that a "global middle class" representing 16% of the world population will enjoy a modern way of life in 2030, against 7.6% in 2000 (GEP 2007). This class will amount to 1 billion people in developing countries. However, as suggested by historic trends, if average income will increase, a large share of population should remain trapped in poverty, especially in Africa, where Millennium Development Goals are currently failing. Middle class consumption needs, expanding cities and climatic events will put pressure on natural resources and increase tensions on markets. More vulnerable poor populations will be the most severely stricken by inflation periods related to scarcity.

Figure 5: Evolution of GDP per capita with purchasing power parity for selected regions

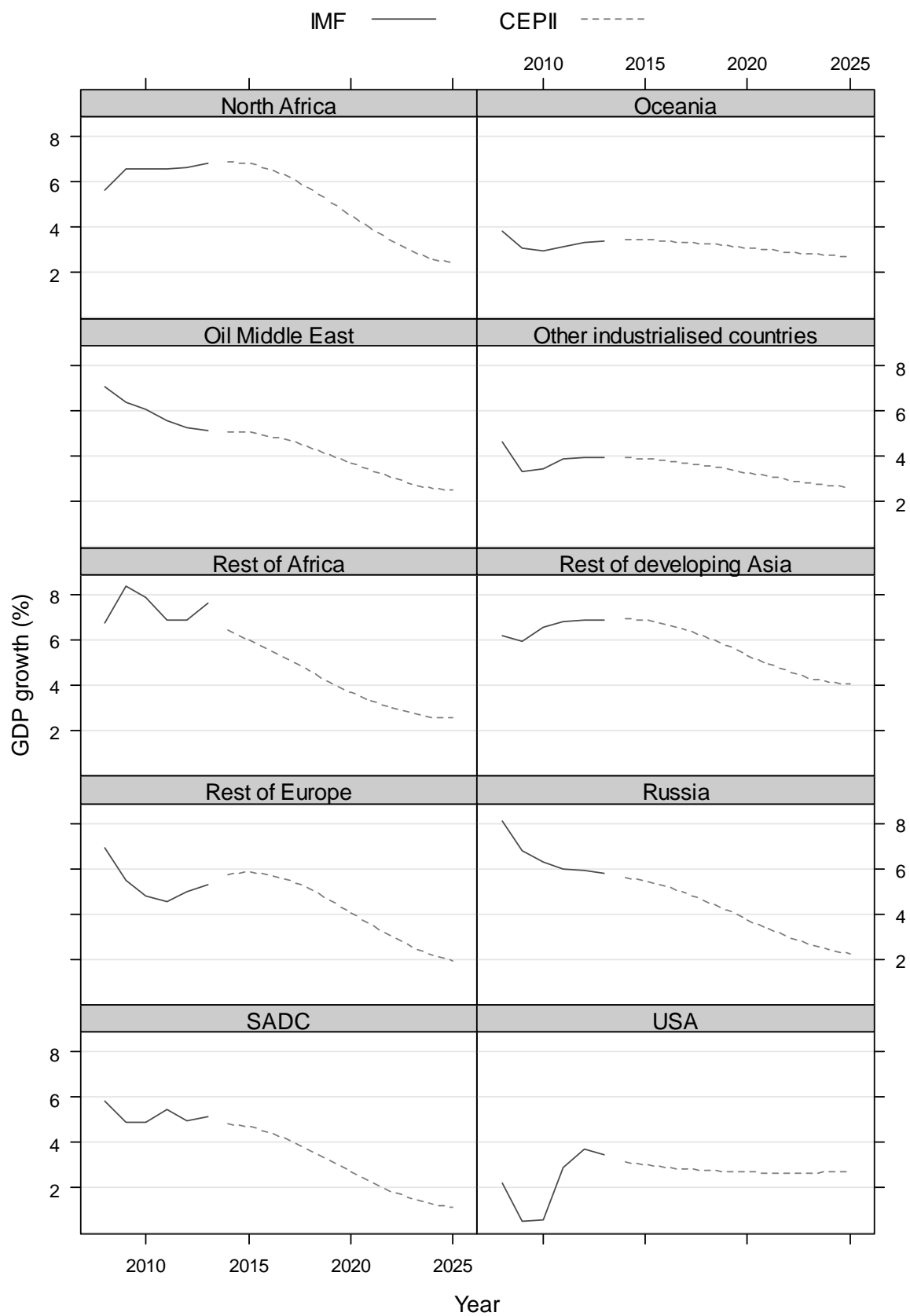


Sources: IMF, CEPII for GDP, WB for PPP, and authors' calculations for projections

Figure 6: GDP growth rate



Source: Authors' calculations based on MIRAGE model



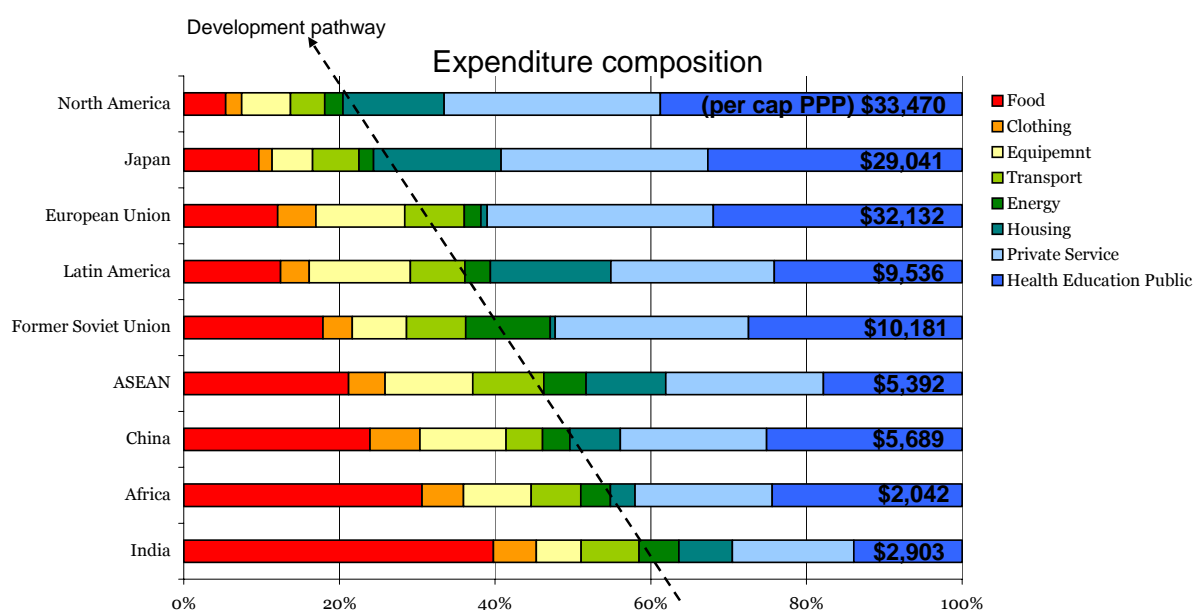
Source: Authors' calculations based on MIRAGE model

2.3. A strong increase in world demand

Increase in population and economic growth will lead to dramatic increase in demand to which supply will respond more or less easily. The situations will be very different from one sector to another.

Between 2007 and 2025, global consumption (in volume) should increase by 84% (MIRAGE model forecast). But it will not be evenly distributed between sectors. In rich countries, food consumption does not augment any more with income, but only with population. Consequently, all new income should be spent in manufactured goods and, above all, in services. It is not yet the case in poor countries. Their consumption of food should rise with income, even if not as fast as for manufacture and services. Figure 8 shows the ratio of sectoral world consumption and aggregated world consumption. For each sector, a value above unity designates a consumption increase larger than the average consumption growth.

Figure 7: Change in expenditure composition with income

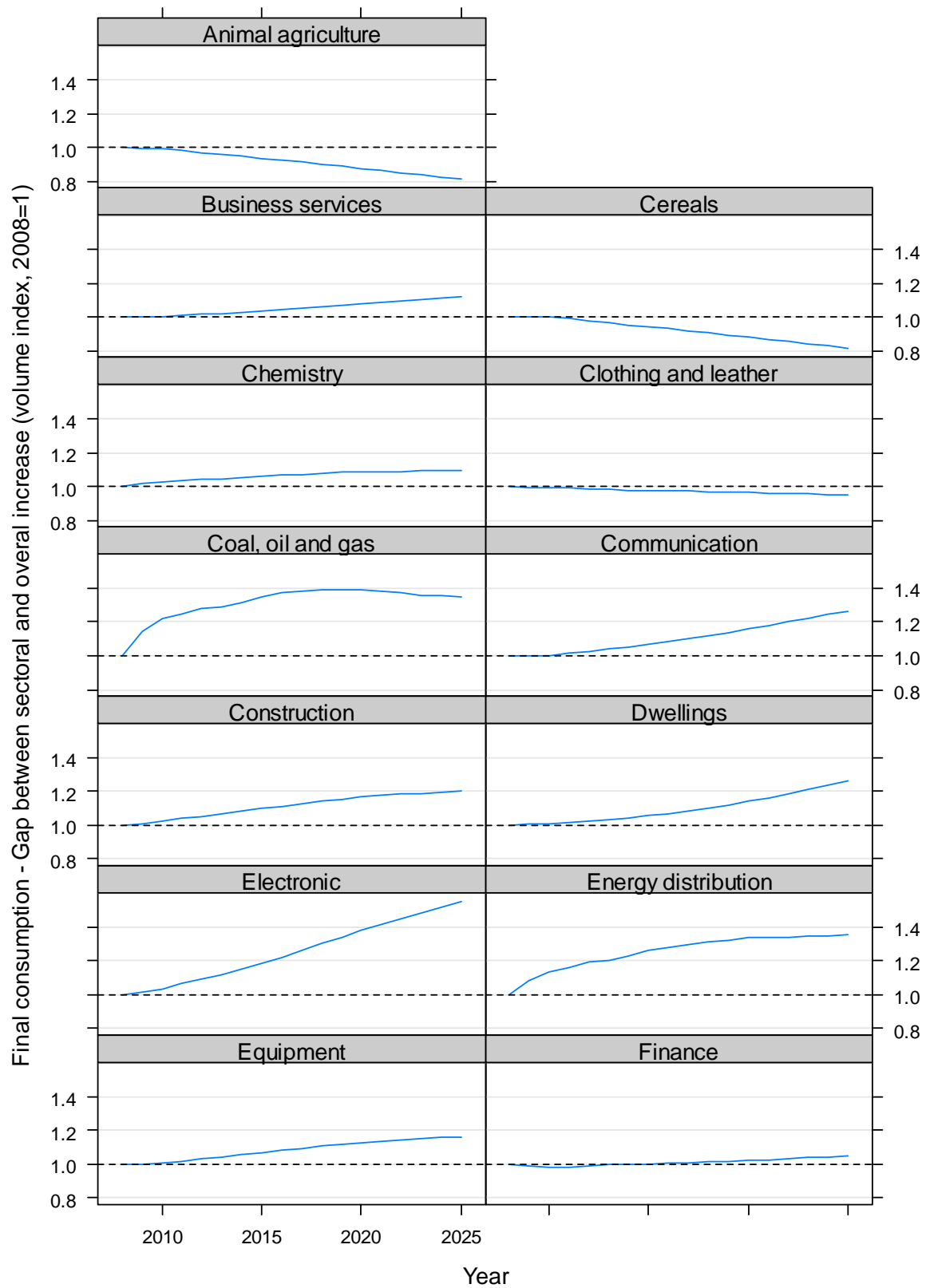


Source: WDI, GTAP database and authors' calculations

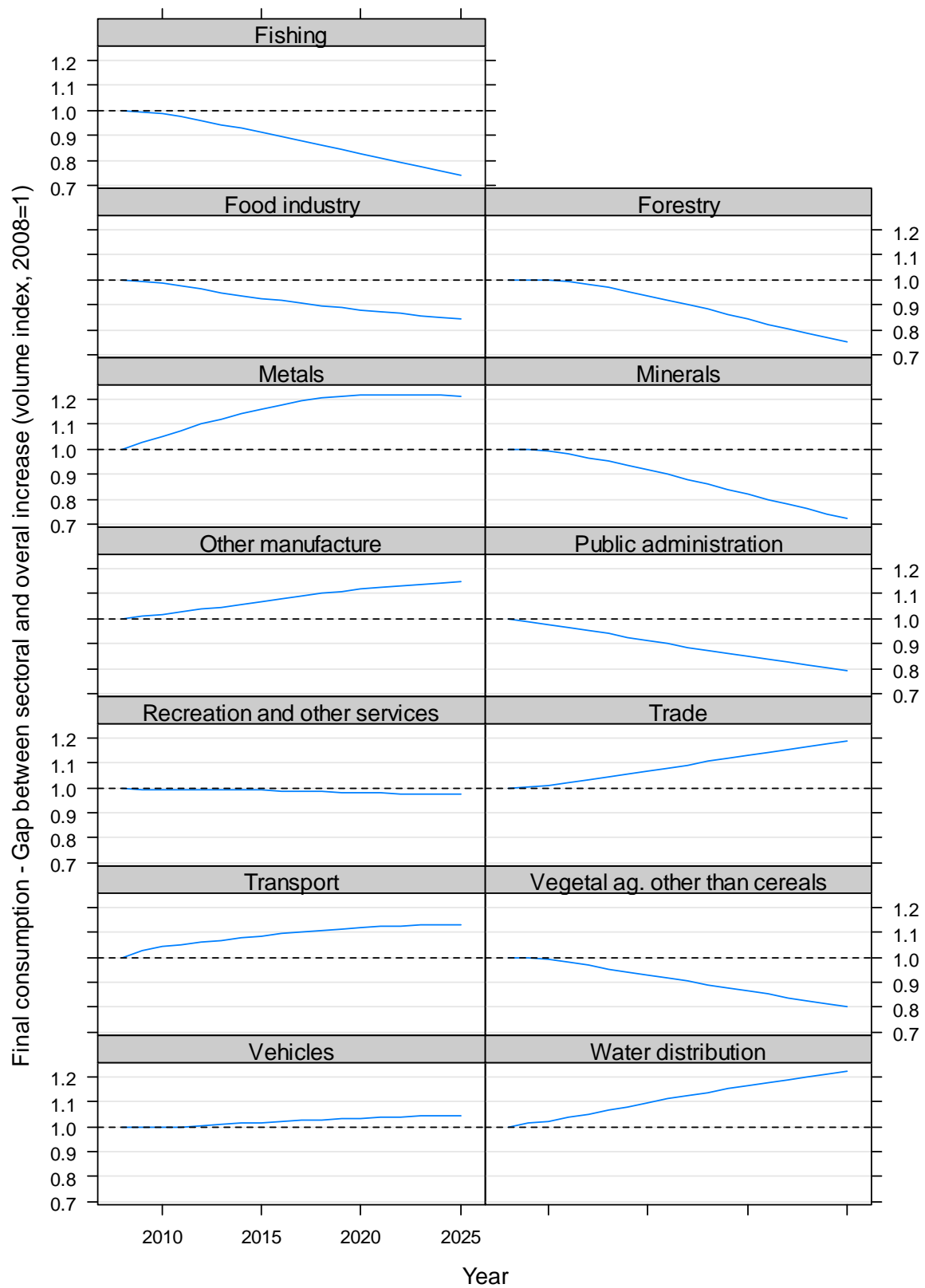
As a consequence, the consumption of food products increases slower than for other goods. This trend is also observed for fishing and forestry products that are represented in the model with limited stocks. Indeed, we assume in the present exercise fixed use of renewable resources, forestry and fishing. This implies that, with wealth and population growing, demand will grow but supply will remain inelastic.

Projections of production show quite different profiles from consumption ones, mainly because the distribution between intermediate and final consumption is not the same across sectors. For example, 84% of the Forestry sector output is used as an input in other production processes: as a consequence, final consumption reflects very partially the real dynamics of production for this sector.

Figure 8: Evolution of the world final consumption



Source: Authors' calculations based on MIRAGE model



Source: Authors' calculations based on MIRAGE model

3. A world returning to scarcity?

The recent events on the world commodity markets are interpreted by some as the beginning of harder times. Since 2000, supply has shown difficulties to satisfy the ever increasing demand for basic commodities. We would have left a world of cheap food and energy to enter an area of tangible limited resources. Similar pessimistic predictions have revealed wrong in the past, as they consistently neglected the innovative potential of the world economy. However, strong uncertainties on the future equilibrium of some fundamental markets arise and one can legitimately wonder on the consequences of some potential constraints that the world could have to cope with in a close future.

In the present section, we do not affirm that the price of basic commodities will hit higher levels than it did recently, but we explore the possibilities, potential drivers and consequences of consecutive years of high prices.

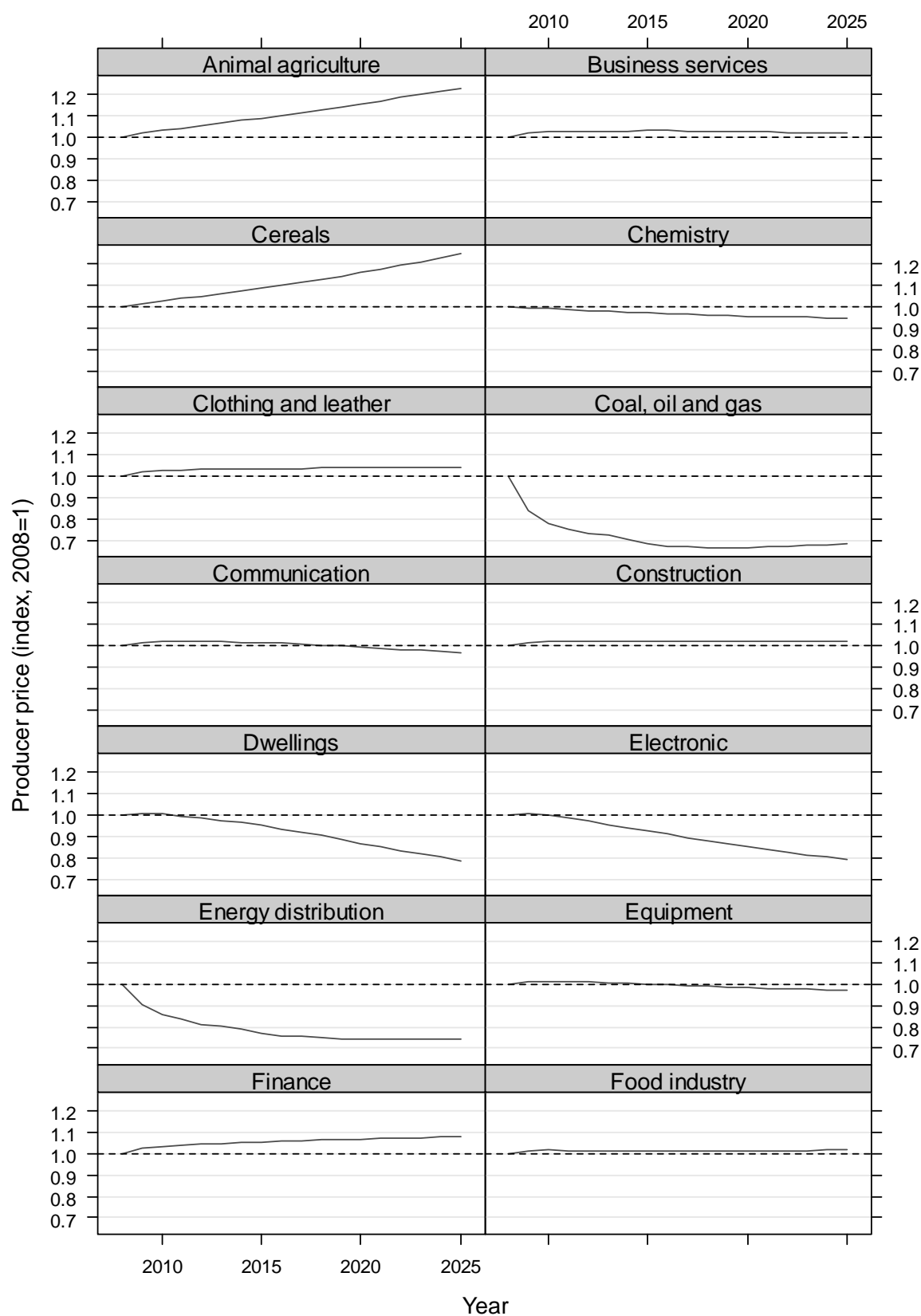
3.1. General trends in world prices

Following the increase in demand and aspiration of many people to new standards of living, production capacity will be challenged and markets will regulate gaps between supply and demand through price reactions, which should lead to various evolutions depending on the sector considered.

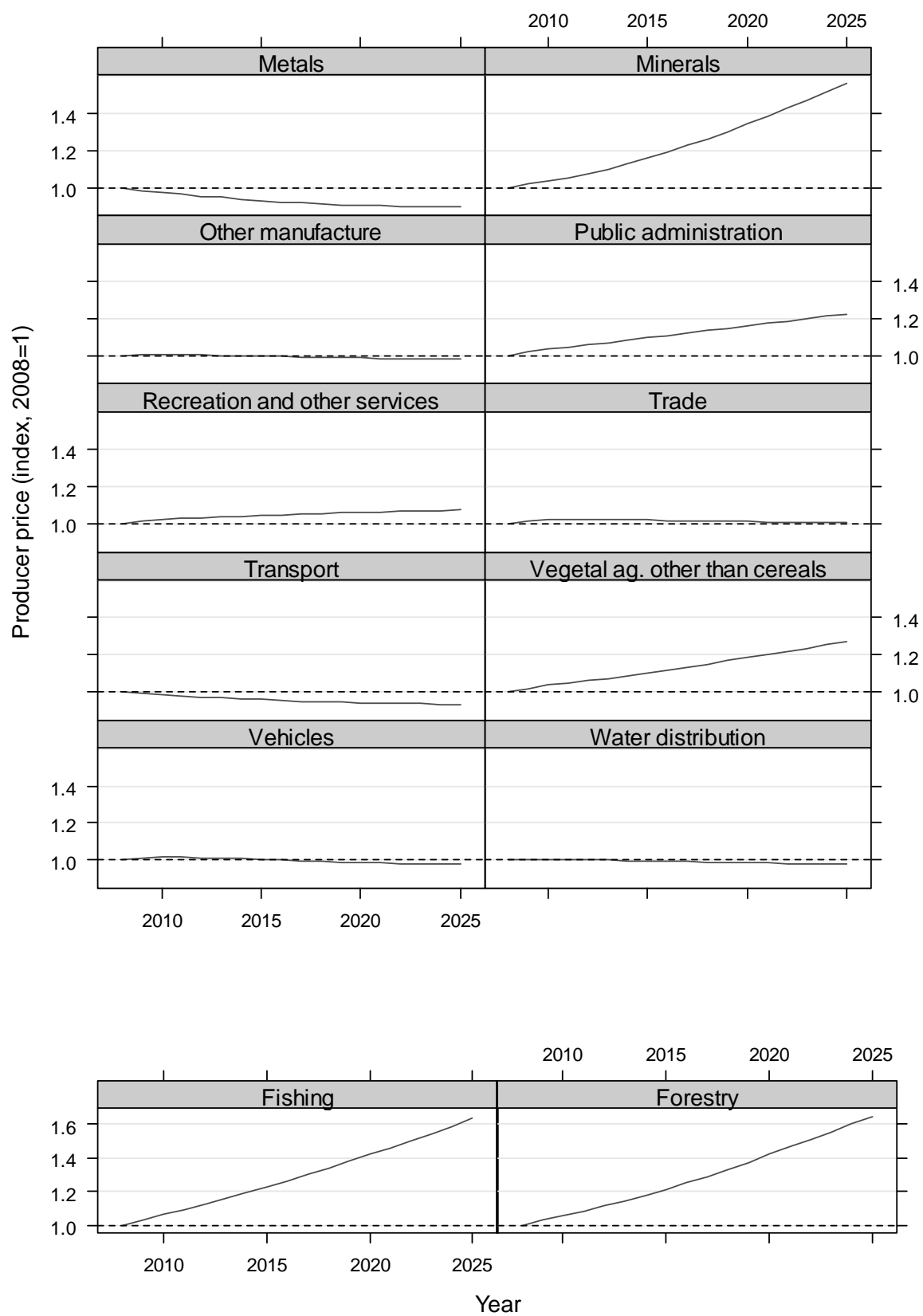
Before entering the specificities of some specific markets, it is important to understand the main mechanisms underpinning the results presented in this part. The evolution of sectoral relative prices is the result of the trends in demand and the possibility of sectors to satisfy this demand. However, it is important to keep in mind that a general equilibrium model represents price evolutions in real terms and relatively to a world price index used as reference. Inflation and monetary policy effects are not taken into consideration. That is why we will present our result relatively to a unity index rather than in current dollar value.

Producer prices are represented on Figure 9. We can distinguish three kinds of price trajectories. First of all, sectors that rely on the exploitation of limited natural resources appear as experiencing the most significant price increases. It is the case for agricultural products that use land in the production process or forestry. An exception is the price of primary energy (coal, gas and oil) which decreases slightly according to the official IEA scenario that we took as reference. Secondly, capital intensive sectors see their price decrease significantly. Indeed, huge saving rates in developing Asia should allow important accumulations of capital in the future, leading to a decrease in the interest rate and consequently in prices of goods produced by capital-intensive sectors. Finally, although we assume the same productivity growth in services as in other sectors, the tension between an increasing demand for services and the scarcity of labour relatively to capital lead to an increase in the most labour intensive services (e.g. Public administration or Recreation and other services).

Figure 9: Evolution of world producer prices



Source: Authors' calculations based on MIRAGE model



Source: Authors' calculations based on MIRAGE model

3.2. Agriculture – Feeding the world at reasonable prices?

The recent food crisis has reminded us how far we are from food security in large parts of the world. The next twenty years will require a huge increase in production both to lift millions of people from undernourishment and to allow a shift from staple food to a diversified diet in emerging countries. Such increases occurred in the past, but we now face new constraints. Biofuels create a competition between food and energy production and natural resources degradation (land, water...) hinders agricultural yield increase.

Agricultural prices have been at the heart of the recent commodity crisis. The current level of food prices and the subsequent food riots have brought the fears of the end of cheap food.²⁰⁴ Indeed, most specialized institutes forecast agricultural prices remaining steady in the next years (FAPRI, 2008; OECD/FAO 2008). This would be a new environment after more than a decade of low and stable commodity prices. However, concluding from such trends that we will not be able to feed the world in 2025 constitutes a notable shortcut. Already today, undernourishment affects a significant part of the world population (825 million people according to FAO) but pertains mainly to the unequal distribution of wealth and local productive capacities, not to a physical limit. Nevertheless, it is true that, if food prices are to remain high, some net-food importing countries will undeniably lose several years of development benefits.

Agricultural production is determined by the evolution of acreage and yield. The evolution of acreage is strongly constrained by the land availability. In most developed countries, economically profitable lands are almost all farmed except in case of environmental conservation or set-aside policies for quantitative management. Remaining land suitable for agriculture is mainly available in developing countries of recent settlements (Latin America), in former Soviet Union countries, in low density regions (Africa). Part of this land is, however, in tropical forests that deserve consideration for biodiversity and carbon storage reasons. In the past century, the agricultural production increase stemmed mostly from yield increase. Croplands expanded by 50% during the 20th century.²⁰⁵ In the same time, population increased by four. The additional food supply has therefore been mainly provided by yield increase.

Historically, cropland was quite evenly distributed, as people settled more in fertile regions. The twentieth century saw important evolutions in the distribution of cropland per capita. The total cropland base diminished from 0.75 ha per person in 1900 to 0.35 ha per person in 1990 (Ramankutty et al., 2008). Because of the uneven population growth during the past century, cropland is now quite badly distributed with South Asia and China being much less endowed in cropland per person than former Soviet Union countries or USA. Inequalities will not lessen in the future years with lands deteriorating in China and an increased pressure of urbanisation. Consequently, land scarce countries will need to rely more on international trade than before.

In the MIRAGE model, we assume that the total area of crop can change because of available lands. We classify the regions in two broad sets: those abundant in land and those scarce. Accordingly, total acreage cannot change much in scarce-land regions, while it can adjust more significantly in other regions. Regions that still have a lot of land are Africa, Latin America and former Soviet Union countries. This hypothesis will greatly determine the pattern of agricultural trade in the following years because the increase in production will not take place in the countries needing the larger part of this food.

²⁰⁴ “The end of cheap food” was noticeably the front cover title of The Economist issue on 8th December 2007 when the debate arose.

²⁰⁵ But some croplands were abandoned in Europe and in the eastern part of North America.

In modern times, agriculture is known to have experienced a bigger productivity growth than other sectors (Federico, 2005). However, recent years have seen a slowdown in yield increase in some production (wheat in the EU or rice in China; see European Commission, 2008). Considering the fundamental uncertainty regarding future yields evolution, we make the simple assumption that agricultural total factor productivity will evolve in the same way as in other sectors.

These considerations will induce changes in the future configuration of the world agricultural market. Developed countries where food demand is stagnant will devote their increased production to export. In our projection, Canada and the USA are to gain 2% of world cereal market share each.²⁰⁶ In other crop sectors (mainly oilseeds), it is the USA and Brazil who will supply the world. Their market shares should increase by 50%.

Biofuels

Among the various causes of the current food crisis, our model neglects two main factors: biofuels and weather events. MIRAGE being aimed at studying medium-term issues, weather events cannot be properly addressed in the framework of this exercise. Biofuels recently proved to be a new structural cause of agricultural markets. What has precluded us to include them in the present analysis is that modelling biofuels issues is a complex subject and a new field of research. At the present time, it is delicate to predict what could be the role of this sector at the horizon of a few decades. It is, however, interesting to put in perspective a few qualitative facts on biofuels expansion.

Biofuels production represents a new strong demand for agricultural products (namely cereals, oilseeds and sugar). It implies that production and price estimates in this work constitute a lower bound. Nowadays, biofuels production requires the use of 4.5% of world cereals and 7.6% of oilseeds (F.O.Lichts, 2008). These quantities can be even higher for specific markets: 30% of US corn is transformed in ethanol. 40% of European oilseeds go to biodiesel production. Regarding the European Union, biofuels production tends to deepen further the current deficit in oilseeds (Europe is the first world importer of oilseeds, with China tending to catch up very quickly). In the next years, the impacts on world market are likely to increase. Global ethanol and biodiesel productions are projected to increase respectively two-fold and five-fold between 2007 and 2017 (OECD/FAO, 2008).

By 2025, second generation biofuels might be available and allow to produce biofuels from biomass without competition with agricultural products used for human food. This would lessen the pressure on agricultural prices. The USA and the European Union place the conversion from first generation of biofuels to second generation at the heart of their energy plans at the horizon 2025. Consequently, the exclusion of biofuels from our quantitative analysis may induce a bias that is well within the uncertainty inherent to any such prospective work.

Who will feed the two Asian giants?

Until now, the two largest Asian emerging countries, China and India, have been able to feed their population without relying on massive imports. They have both developed self-sufficiency policies that were quite efficient until today. However, these policies have recently seemed close to reaching their limits. China became a net agricultural importer in 2003 with huge import increases of soybeans and cotton, but partially compensated by a large growth of fruits and vegetables exports (European Commission, 2008a). This evolution is in fact consistent with Chinese's natural comparative advantages: importing land-intensive commodities and exporting labor-intensive commodities and goods. It should not mask, however, some more serious structural constraints: scarcity and degradation of land, and shift in diets leading to an increase in meat demand. India is still a net food exporter. As China,

²⁰⁶ Calculated excluding intra EU27 trade.

India has become a leading importer of vegetable oils, but its exports have increased in the same proportion in rice, beef and soybean meal. China and India have not, for the moment, been major shifters of world agricultural market, except for vegetable oil. This situation might change in the close future, depending on their capacity to increase their production as fast as their consumption. They still have strong potential for increased productivity, but concerns about land and water degradation temper such optimism.

In our simulations, Chinese and Indian export shares of world agricultural and food markets shrink, because the two countries cannot supply the rest of the world and satisfy demand from their own population. They are important producers (they are in fact first world producers for many products), but not significant exporters. Chinese cereals exports decrease from 2% of world total²⁰⁷ in 2004 to 0.3% in 2025. In other vegetable agriculture, it drops from 4.3% to 1.3%. In breeding and food products, the diminution observed is from 6.6% and 3.5% to 1.9% and 3.3%. The situation is quite identical in India. The main difference stems from imports. Indian agricultural commodities and food imports increase moderately. Their shares in the world market double, but from a low initial point. On the contrary, China becomes the first food importer in 2025. This situation is well illustrated by what happened in the last 15 years on the soya markets. From close to self-sufficiency in the mid-1990s, China started suddenly to import and now absorbs almost half of all the world soybean exports. For cereals, the main suppliers of China should be Australia, Canada and the USA. In other crops, Argentina, Brazil and the USA will produce 75% of Chinese imports.

What consequences for Europe?

These different points (biofuels, Chinese and Indian demand, yield stagnation...) support the idea that we are entering a high food price period.²⁰⁸ Regarding agricultural policies, it could imply an adaptation of the modalities of support to European farmers. The intervention price mechanism is already idle for a lot of productions, because intervention prices are below world prices. The European Commission has suspended the compulsory set-aside land. If this situation is bound to stay, other adjustments to the PAC will be needed.

3.3. Other natural resources

All natural resources, whether renewable or not, are concerned by potential supply problems. The ever increasing demand from emerging countries, and especially China, makes it difficult to respond at the present pace to the sustained demand growth. Indeed, most commodity prices have soared during the last two years. The fish market was not an exception. On the contrary, the timber market is presently in a singular situation, trapped between the falling American construction market and the strong Chinese demand.

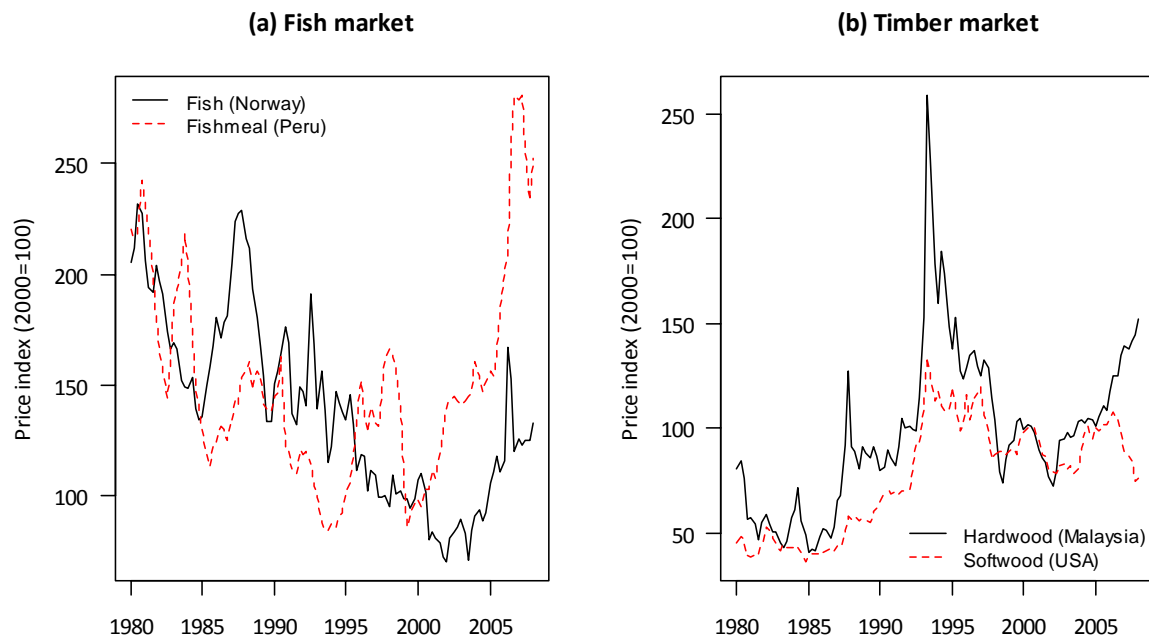
Fish market

Along with other commodities, the fish market has been on an upward trend since 2000 (Figure 10 (a)) both for fish and fish meal. Although this is good news for producers, especially in developing countries where 250 million people depend directly on the fishing sector, one can wonder on the sources of this increase.

²⁰⁷ Excluding intra EU27 trade.

²⁰⁸ This point is confirmed in OECD or FAPRI projections until 2017.

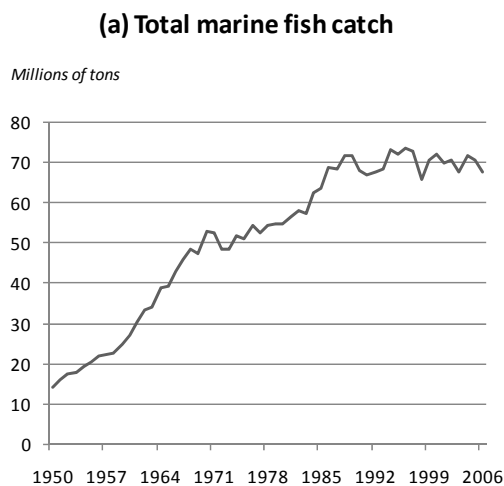
Figure 10: Prices on the fish and timber market



Source: IMF, *International Financial Statistics* (May 2008)

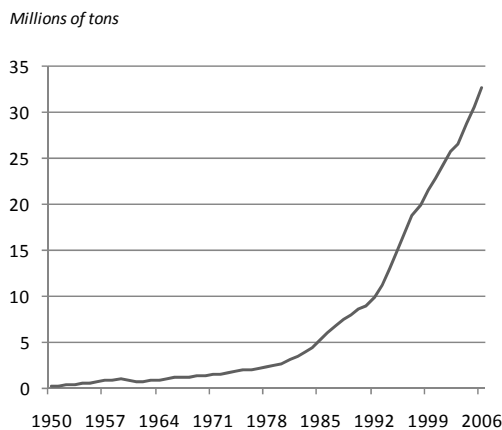
This price increase, surely partly driven by fuel cost, may also be the sign of the increased pressure on marine resources. The increase in demand, the technical innovation and the lack of appropriate regulations have caused an important pressure on fish population and their ecosystem. The marine fish catch stagnates since the mid 1990s. It has been complemented by huge increase in aquaculture production.

Figure 11: Total fish production



Source: FAO, *Fishstat* database.

(b) Total aquaculture fish production



The marine habitat and population are increasingly damaged by overfishing and environmental stresses. Without signs of improvements, some have even predicted a possible almost complete depletion by 2048 (Worms et al., 2006). This prediction is likely overly pessimistic, but even in a developed country like the USA, 26% of fish stocks have revealed overfished. So the prospects of fish stocks in countries with rising food demands and bad fisheries regulation announce bad. Emerging countries are currently shifting their diet from staple food to animal protein (of which fish provides around 20% in the developing world). And their demand for fish products will rise with income. The per capita fish consumption in developing countries being now half the one of Western Europe, the potential increase in demand is huge.

Timber

The timber market is not as bullish as other commodity markets (Figure 10 (b)). It has even shown a marked slowdown in 2007 and 2008 in North America, where prices have been at their lowest levels since 1991. Indeed, the United States housing construction sector is in a recession with a decreasing number of new constructions. And since 90% of the housing construction market is of wood-frame, the difficulties of this sector have a direct impact on the wood market.

However, these circumstances should not overshadow the structural perspectives. The rise of the fossil fuel price encourages people to rely more on woodfuel. And this natural economic substitution comes along with an increasing public support toward renewable energy. On the one hand, biofuel policies could concern, in the medium term with second generation biofuels, cellulosic ethanol. The US Department of Energy initiated a program to make it competitive as soon as 2012. On the other hand, the support for woody biomass for energy use increases, although already existent for decades, with policies aiming at raising the share of renewable energy like the European target of 20% of renewable energy by 2020.

In addition, like other commodity market, the timber market starts to be affected by the pace of Chinese demand and competition. China forest products imports increase strongly both because of its dynamic domestic furniture market and in order to re-export finished or semi-finished products like plywood, exports of which have increased seven-fold in four years.

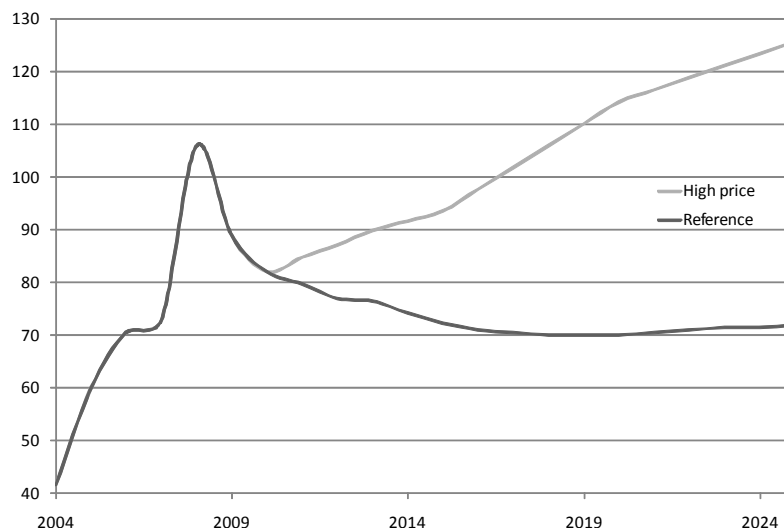
Therefore, despite strong uncertainties for the upcoming years with the economic downturn and the housing crisis in the USA and some European countries, the timber market presents good perspectives that should maintain its price at a good level.

4. World resources under stress: focus on energy prices

After more than 15 years of relative stability at a level close to 20 \$ per barrel, oil price more than tripled from the beginning of 2002 until mid-2006. During a year, the market seemed to have reached its equilibrium, but the rise resumed and prices more than doubled again until mid-2008. This last movement has been cancelled however in the last few months. For many years, the cheap price of this non-renewable commodity led to use it at very large scale: almost 100 million barrels of oil are used every day by the chemical industries and as an energy source. The future of this market has therefore strong implications in the evolution of the world economy in the next decades.

Like other commodity markets, oil market is subject to a strong volatility and is uneasy to forecast. The steady increase in oil prices between 2002 and mid-2008, after a period of more than 15 years at around 20 \$ per barrel, can lead to various interpretations. Like previous oil shocks in 1974 and 1980, it may be a sudden adjustment of market anticipations about the true equilibrium between supply and demand following the emergence of some developing economies. The inevitable adjustment to this new demand has been triggered and sustained by various geopolitical events in oil producing countries. According to the main interpretation at the basis of our baseline scenario, it would be followed by a period of stability after the short overshooting episode that we have lived in 2008. Prices would then return to their 2007 level, and remain stable until 2025. However, the sustained price increase over several years, contrasting with previous oil shocks in 1974 and 1980, lead to the idea that oil market may as well be actually entering a new era characterized by a continuous price increase. Even though recent price evolutions tend to confirm our base assumption, this alternative hypothesis cannot be completely ruled out. It would lead to significant structural adjustments that have been simulated with the MIRAGE model as a variant from our main simulation (Figure 12 shows the assumptions at the basis of the two energy simulations).

Figure 12: Oil price hypotheses (\$/barrel)



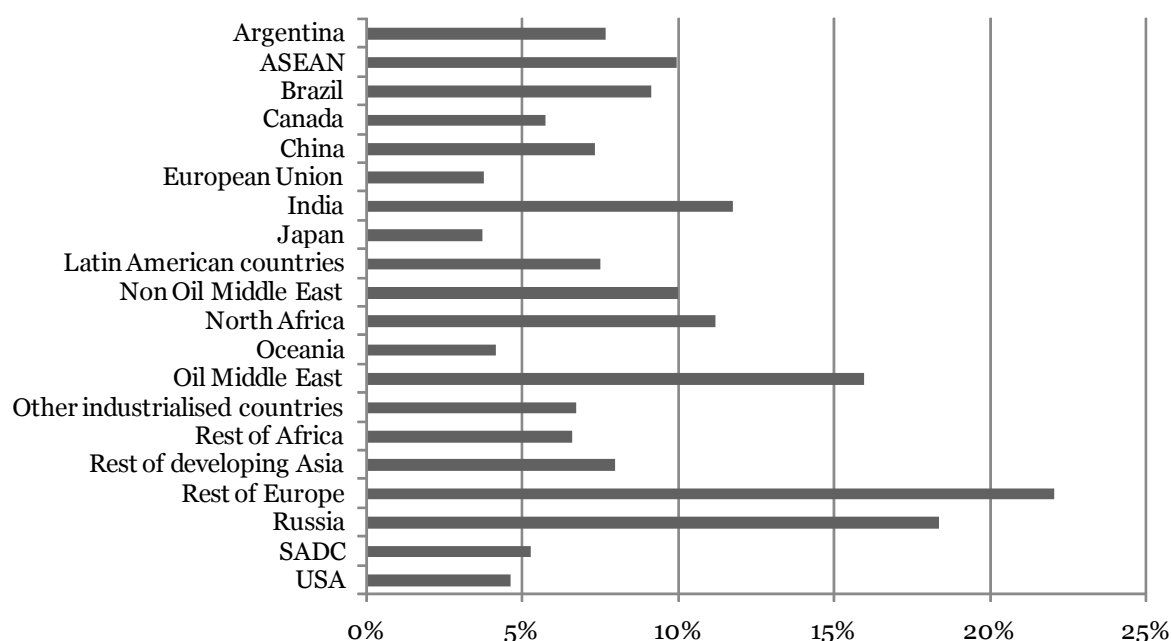
Such exercise allows to identify how oil price impacts other economic variables. Before discussing such simulation, it is fundamental to describe the precise nature of the exercise. Oil prices are the result of the equilibrium between supply and demand in the oil market. Setting them at different values requires making assumptions about other economic variables; the choice of the chosen oil price driver is everything but indifferent; on the contrary it strongly determines how economies are affected. High oil prices can either result of a faster expansion of emerging countries, or be the consequence of a production shortage. In the latter case, it

can be a decision of oil producing countries to maintain high prices through self-limitation, or be the result of technical or political difficulties that restrict production. Undoubtedly, a faster growth of emerging countries and a shortage in oil production may have the same impact on oil prices, but they would have very different consequences on the world economy, even though some patterns would concern both scenarios (increase in transportation cost for instance). The driver that is at the basis of our variant is a reduction of production capacity that identically affects all producers, as is described in the technical appendix.

Oil shocks are often associated with recessions. A rise in oil prices decreases real income and so final demand. Because it affects sectors diversely, it induces a change in relative prices. The subsequent demand adaptation drives reallocations between sectors, but fixed capital and short term frictions leads to idle productive capacity and costly factor reallocation. Moreover, depending on agents' expectations, second round effects can generate inflation. All these short run effects are neglected in our work. Here, we abstract from transition costs to focus on effects taking place after all reallocations. We, however, do not consider any technological break. The economy adapts using existing technology. Our estimated cost must be considered as an upper bound, since new technologies could arrive and lessen the constraints. The modelling of energy demand is presented in appendix.

Unsurprisingly, such reduction of oil production imposes a strong constraint on the world economy and adversely impacts most regions in the World. The reduced availability of primary energy sources negatively impacts production, leading to GDP reduction in most countries (in volume terms), and in particular the most energy-intensive ones (Figure 14 presents all country-level results: GDP, terms of trade and welfare). Many oil producing countries also suffer from a reduced GDP volume: the easier access to energy has led them to adopt energy-intensive production structures and technologies. This also concerns oil-poor countries of the former Soviet Union and Eastern European countries, due to their historical access to cheap energy (see Figure 13). In addition to these countries, India also appears as quite energy-intensive, because of its specialisation in low-technology manufactures. GDP impacts do not exactly follow the energy intensity patterns however: in countries benefiting from abundant energy resources, the additional revenue brought by high oil prices boosts their investment capacities and mitigates the adverse impact of energy shortage on their GDP in the long run. Eventually, India appears as the most severely affected country by a high oil price scenario: its GDP would be reduced by more than 8% as compared to the central scenario. By contrast, in the best-endowed regions like oil-rich Middle East, the investment increase is even sufficient to overcome the negative impacts by 2025.

Figure 13: Share in total consumption of fossil fuel and final energy



Source: GTAP

Even though GDP is often considered as a first order indicator of regional welfare, this is far from being true in this particular case. GDP evolution in volume terms measures the production capacities of a country, while welfare reflects its consumption capacity. Both variables can diverge as a consequence of terms of trade variations. An energy-importing country has to pay more in export for the same energy bill. So its consumption will decrease more than its production, because a bigger part of production is devoted to exports. A high oil price scenario would have strong terms of trade implications for oil producing countries: while many of them suffer from GDP losses in volume terms in the high oil price variant, oil-rich countries benefit all of welfare gains.

Industrialised oil-poor countries like Japan or the EU are characterized by low energy intensity. They are consequently less affected by high oil prices than many developing countries. This is also true for oil-rich industrialised countries, which furthermore benefit from increased revenues. Globally, as industrialised countries still represent a significant share of world GDP, the reduction is limited at the world level: world GDP would be 1.75% smaller in 2025 in the high oil scenario. The reduction would concern all identified regions with the exception of oil-rich Middle East and Africa. As terms of trade effects add up to zero at the world level, welfare variation are of the same magnitude at the world level, but features a much stronger dispersion. Some energy-intensive economies actually don't benefit from significant energy endowments. This is the case for India and even more for Eastern Europe. These countries would suffer from a reduction of their production and a deterioration of their terms of trade. On the contrary, while very few countries benefit from GDP increase, terms of trade gains boosts consumption capacities of some of them, by almost 20% in the case of oil-rich Middle-East.

High oil prices increase international transportation costs by 7.8%, leading to a decrease of international freight by 2.7%. Even though we assume a fixed link between transportation freight and the quantity of traded items, this reduction translates into a slightly smaller reduction of international trade, by 2.6%, due to a composition effects: freight cost increase affects international trade of products with high transportation costs more than trade of other

products. Trade of primary goods is reduced by 8.8%, trade of industrial goods by 1.6%, while trade in services is not affected (+0.1%).

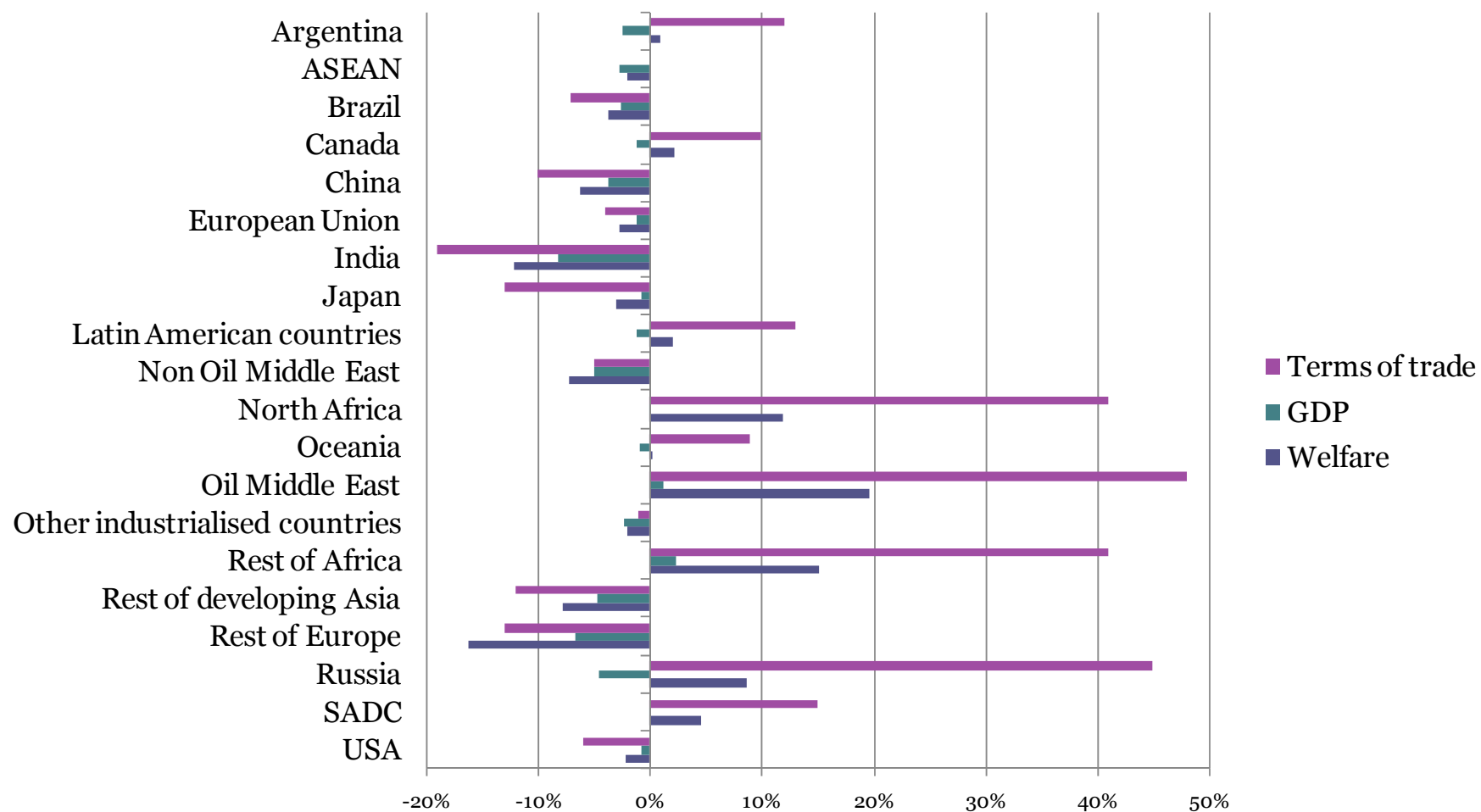
This exercise leads to a very pessimistic conclusion about the consequences of a high oil price scenario. It has to be reminded however that we did not assume any dynamic adaptation to higher energy costs. Furthermore, the benefits in terms of CO₂ emissions and climate change are not taken into account. Conversely the political implications of such strong reallocations of revenues and rents do not enter the analytical framework used for this study, but may be of great magnitude and have economical implications. This variant shed some light, however, on the a priori winners and losers in this scenario. Eastern Europe and India would face a significant challenge to adapt to such situation, while Europe and other industrialised countries would be only marginally affected in comparison.

Conclusion for point 4

Price evolutions for the future let anticipate some tensions on markets of basic commodities, which could affect other sectors in the economy. However, as reminded by OECD and FAO (2008), the best remedy for high prices is high prices. High prices moderate demand and stimulate supply, controlling inflation cycles by themselves and helping transitions when supply tend to diminish. We have already seen some of these reactions. The high agricultural prices have triggered the use of more acreage like set-aside land in Europe. The European wheat harvest is thus 16% higher than in 2007, helping to bring the prices down. Because of high oil prices, people have started to reconsider their car purchase and cut their travels, whereas governments think about ambitious programs of renewable energy. Moreover, the increasing concerns over growth perspectives have triggered recently a fall in all commodity prices.

However, because price increases are related to structural breaks, these reactions will probably not be sufficient in the long run to come back to low prices. Cereal prices will hardly go down again while input costs, oil and chemicals, are high. Oil prices are expected by energy institutions to remain above 60 dollars, putting economies under stress and leading to a competition on land between food and energy crops.

Figure 14: Country-level effects of a high energy price scenario



Source: Authors' calculations based on MIRAGE model

5. Conclusion

Providing good insights into the next future may appear as an unattainable challenge when one considers that even short term forecasting is a difficult task for conjuncture experts. However, longer term predictions allow to ignore short term turbulences and concentrate on some well-known trends and behaviours that affect patterns to the future of the world economy.

The world population in 2025 is already projected with a good precision. This is even truer with active population as most of it has already been born. The evolution of skills can already be inferred from present information as most of it will be the result of education efforts made by countries today. Beyond short term fluctuations, factor productivity growth presents a regularity that provides insights of the future sizes of national economies. Last, changes in consumption preferences will explain a part of new needs for fast developing economies. We used MIRAGE, a dynamic computable general equilibrium model, to build a central scenario based on the most likely assumptions. However, despite all the knowledge that we already have about the next two decades, many uncertainties remain about how humanity will face its new challenges, since technical and institutional innovations to tackle them are still to be invented.

One major challenge illustrated by the results is the risk of scarcity of natural resources. Price evolutions for the future let anticipate some tensions on markets of basic commodities, which could affect other sectors in the economy. However, as reminded by OECD and FAO (2008), the best remedy for high prices is high prices. High prices moderate demand and stimulate supply, controlling inflation cycles by themselves and helping transitions when supply tend to diminish. We have already seen some of these reactions on several commodity markets. The high agricultural prices have triggered the use of more acreage like set-aside land in Europe. The European wheat harvest is thus 16% higher in 2008 than in 2007, helping to bring prices down. Because of high oil prices, people have started to reconsider their car purchase and cut their travels, whereas governments think about ambitious programs of renewable energy. Moreover, the increasing concerns over growth perspectives have triggered recently a fall in all commodity prices.

Will these reactions be sufficient in the long run to prevent the trend towards higher prices of commodities? Cereal prices will hardly go down again while input costs, oil and chemicals, are high. Oil prices are expected by energy institutions to remain above 60 dollars, putting economies under stress and leading to a competition on land between food and energy crops. There is little doubt about the continued emergence of some large developing countries that will compete in size with current advanced economies. However, tensions on natural resources will challenge emerging economies adaptation capacities, as they rely on commodity markets even more heavily than advanced economies.

References

- Decreux, Y. & Valin, H. (2007), 'MIRAGE, Updated Version of the Model for Trade Policy Analysis Focus on Agriculture and Dynamics', Working Paper 2007-15, CEPII research center.
- European Commission (2008), 'High prices on agricultural commodity markets: situation and prospects', working document DG for Agriculture and Rural Development, July, Brussels.
- European Commission (2008a), 'China: Out of the Dragon's Den', *MAP: Monitoring Agri-trade Policy* 01-08.
- FAPRI (2008), *U.S. and World Agricultural Outlook*, Iowa State University and University of Missouri-Columbia.
- Federico G. (2008), *Feeding the World. An Economic History of Agriculture, 1800-2000*. Princeton University Press.
- IEA (2007), *World Energy Outlook 2007. China and India Insights*, OECD Publishing.
- IMF (2004), *World Economic Outlook, September 2004*, Washington, DC.
- IMF (2008), *World Economic Outlook, April 2008*, Washington, DC.
- OECD/FAO (2008), *OECD-FAO Agricultural Outlook 2008-2017*.
- Meadows, D.H. ; Meadows, D.L. ; Randers, J. ; Behrens, W.W. III. (1972), *Limits to growth*, Potomac Associates, Washington, DC.
- Poncet, S. (2006), 'The Long Term Growth Prospects of the World Economy: Horizon 2050', Working Paper 2006-16, CEPII research center.
- Ramankutty, N.; Foley, J. A. & Olejniczak, N. (2002), 'People on the Land: Changes in Global Population and Croplands during the 20th Century', *Ambio* 31(3), 251--257.
- United Nations (2007), *World Population Prospects: The 2006 Revision*, Department of Economic & Social Affairs, Population Division, United Nations
- United Nations (2008), *World Urbanization Prospects: The 2007 Revision*, Department of Economic & Social Affairs, Population Division, United Nations
- UNCTAD (2007), *World Investment Report 2007: Transnational Corporations, Extractive Industries and development*, United Nations Conference on Trade and Development
- World Bank (2007). *Global economic prospect: Managing the next wave of globalization*.
- Worm, B.; Barbier, E. B.; Beaumont, N.; Duffy, J. E.; Folke, C.; Halpern, B. S.; Jackson, J. B. C.; Lotze, H. K.; Micheli, F.; Palumbi, S. R.; Sala, E.; Selkoe, K. A.; Stachowicz, J. J. & Watson, R. (2006), 'Impacts of Biodiversity Loss on Ocean Ecosystem Services', *Science* 314(5800), 787-790.

APPENDIX 1: The MIRAGE model

MIRAGE is a computable general equilibrium (CGE) model initially dedicated to the assessment of the impact of trade policy. It relies on a neoclassical framework providing strong theoretical coherence and widely acknowledged by the scientific community. This type of model, standing on Leon Walras theoretical foundations and Arrow and Debreu's analytical framework, is usually used for long term projections. Indeed, this kind of models describes the different markets of goods (primary products, manufacture products, services) and factors (labour, capital, land, natural resources) present in an economy. It represents the way demand for good by households of each country affects production of firms, trade and factor allocation, through changes in relative prices and substitution between goods and factors. Economic agents (firms, households) are represented through national representative agents who make economically rational decisions (maximising welfare for households and profits for firms). The model also incorporates imperfect competition behaviours in most sectors with profit margin and increasing return to scale.

The model relies on three main categories of settings:

- 1) Exogenous macroeconomic variables, such as population growth, GDP projection, available labour, productivity of sectors... These parameters control exogenously the model and come from estimations by reference research of institutional sources.
- 2) Behavioural elasticities that describe how agent react to a change in prices of goods and factors. For example, a high elasticity in supply of capital will reflect that more capital can be easily mobilised if return rates increase; a low elasticity in demand of fuel will represent the fact that consumers will go demanding high quantity of fuel even if prices rise. Elasticities are drawn for most of them from econometric studies (GTAP, USDA).
- 3) Shares of consumption for each good are provided through the reference year data. Our model is calibrated on version 7 of the GTAP database, describing the world economy in 2004. The general equilibrium background implies that agents are considered as having optimised their utility function for the reference year.

In the following paragraphs, we propose to describe the main features of MIRAGE relevant to this prospective exercise.

1. Demand

Demand in MIRAGE pertains to the choices of consumers,²⁰⁹ firms and investors. They all react to change in relative input and output prices in a way that is economically rational. Final consumers and firms make two successive choices: they first allocate their budget between goods depending on their prices. As domestic goods and goods on the international markets can have different prices, they then choose the origin of products, locally produced or imported, and, in this latter case, from which region. Investors choose to distribute the new capital saved by households and governments across sectors depending on the different rates of return on capital.

Final consumption is represented by a non-homothetic demand function, which allows to represent the change in consumption pattern with income increase.²¹⁰ Indeed, an increase in

²⁰⁹ The representative consumer represents both final consumers and state.

²¹⁰ To account for this property of final demand, MIRAGE relies on a LES-CES function for the top-level utility function. It is calibrated to fit with USDA estimates of income elasticities by products in various countries.

the budget, for a given set of prices, implies a change in the structure of demand, with generally less first necessity products and more consumption of services. This is a known characteristic of demand, which matters particularly when rapidly growing countries are considered with long term projections. Firms are assumed having low substitution possibilities in their inputs and no possible substitution between inputs and factors (see Supply part below).

Intermediate inputs are distinguished between energy inputs and non energy inputs. In each of these categories, some flexibility is considered possible for the production, depending of relative prices of goods, but replacing energy inputs by non energy inputs is constrained. More precisely, this is modelled through a two-tier CES demand function. Sectors have first to allocate demand between energy and non-energy inputs; then they choose inputs within each category. There is very little flexibility at the first level, with an elasticity set at 0.1. The elasticity within various non energy inputs is assumed larger, at 0.6, allowing for some technology changes when prices vary. Such flexibility is reduced in agricultural sectors with an elasticity set at 0.2. Within energy inputs, the elasticity is set at 0.4, which implies that firms may change their energy source. However this elasticity has been reduced at 0.1 for energy and chemistry sectors, to prevent the possibility of producing oil products or some oil-based chemicals with nuclear energy instead of crude oil.

The new capital used for production is also composed of different type of goods with some possibility of substitution depending on the level of prices.

2. Supply

Production of firms requires the combination of intermediate inputs and factor services. Intermediate input demand has been described in the previous subsection. The GTAP database additionally allows to identify a maximum of 5 factors: 2 types of labour (skilled and unskilled), capital, and, for some specific sectors, land (agriculture), and natural resources (forestry, fishing, mining). Almost all production sectors needs the first three factors, with the exception of the sector “Dwellings” which accounts for accommodation rents.

Stocks of both kinds of labour are assumed to grow exogenously, at the same pace as active population, defined as population between 15 and 65. Skilled labour is assumed to be perfectly mobile across sectors, while unskilled labour is perfectly mobile across sectors within two subgroups, the first one comprising agricultural sectors and the second one all other sectors. Mobility between the two subgroups is possible but sluggish, in order to reflect urban-rural duality of economies.

Capital is specific to each sector and evolves through investment and depreciation. This implies that capital returns can vary over time and determine its expansion relatively to other sectors.

Agriculture and commodities sectors can also require land and natural resources. Natural resources are sector specific and exogenous, while land is imperfectly mobile across productions and varies with land returns. The introduction of these additional factors implies that returns to scale regarding the other factors are decreasing: production of agricultural goods and commodities faces physical constraints that limit its expansion.

These income elasticities are applied to per capita income, computed as total income divided by total population forecast, which differ from active population used to compute labour force growth.

3. Dynamics

Dynamics is sequential: each year is computed based on current and historic economic variables. This means that agents are not assumed to be forward-looking. Dynamics in the model is then driven by the exogenous evolution of the following parameters:

- population growth
- labour force available
- total factor productivity growth
- evolution of natural resources

Capital accumulation is another driver of the dynamic evolution. It differs from the other determinants above however, as it is endogenously computed by the model. Regional savings determine total investment by region, which is then distributed across sectors on the basis of current return rates.

Population projections come from the ILO's Economically Active Population Estimates and Projections (EAPPEP) database.²¹¹ We consider two kinds of population: total population and economically active population. Total population is used in the model to determine final demand. Indeed, consumption depends on current prices and income per capita. Consequently, when population increases with fixed income per capita, consumption is just inflated to a new level matching the extra demand. However, when income increases for a given population size, the structure of consumption changes towards more services and less food consumption. Economically active population is used to infer the evolution of labour supply. As EAPPEP do not provide any information about skill acquisition, we rely on GTAP projections to split EAPPEP data into the two MIRAGE labour categories.

As MIRAGE is not best-fitted to provide growth forecast either in the short or in the long run, we rely on external sources for this information, and total factor productivities by country are computed to match such forecast. GDP growth rates are based on IMF forecast (April 2008) until 2013 and Poncet (2006) longer term projections until 2050. Both sets are combined to propose a medium term projection until 2025 that exactly matches IMF forecast until 2013 and converges to equilibrium growth rate by 2025. These projections are less conservative than usual “business-as-usual” projections as we do not consider that emerging countries growth rates will remain as high in the future. Technological catch-up, savings constraints, and skilled labour availability should lead to a slow-down of these economies in the medium run.

Natural resources are a specific production factor for some sectors. The use of natural resources is assumed fixed over time for most sectors, with an exception: considering that energy prices were fundamental in a projection exercise and that a standard CGE model was not best fitted to provide any such forecast, we relied on external sources to determine the path of energy prices. This implies that natural resource use was computed endogenously for this commodity.

²¹¹ Available at <http://laborsta.ilo.org/>.

INDICATIVE SCENARIOS

SCENARIO 1: The power of the Big Ones

More public regulatory role + conflicts + economic performance

A) Demography-migration-urbanisation-intercultural dialogue

If the hypotheses are verified, in terms of demography, the world in 2025 is

- **the public regulatory and investment capacities hold some of the expansionist tendencies in world population under control e.g. through continued women education - a major stabilising factor for keeping the family size within limits. The good economics in this scenario also provides the means.**

If the hypotheses are verified, in terms of migration, the world in 2025

- **Because the economics is rather good the reason to move is limited. The regulatory capacity also provides means to find orderly ways to regulate migration streams. But if the conflicts are not only in a fierce economic competition domain but also spills over into political conflicts there might be an increase of political refugees.**

If the hypotheses are verified, in terms of urbanisation, the world in 2025

- **Strong growths of urban sprawls because the economic good times provides the capacities. The regulatory capacity makes it possible to develop these urban areas under some sort of environmental and social constraints**

If the hypotheses are verified, in terms of intercultural dialogue, the world in 2025

- **The conflicts between the hegemonic big centres of power breeds tension also in the intercultural dialogue e.g. on human rights issues. So on one side the blockages are there but also an increased need for intercultural dialogue (a parallel could be the need for international negotiations on the arms race within the tense cold war period: the tension is there but it also drives organised dialogue)**

B) Macro economy-growth-employment-trade-services

If the hypotheses are verified, in terms of macro economy growth, the world in 2025 is

- **The economics goes well in a fierce great power economic battle, including vast investments e.g. in the defence and space domains. So employment is up and so is partial alliance internal trade of global reach (as in the old east-west tension in the cold war times with both sides operating in competition in the global geography weaving political and economic alliances together). Now the tension field is multi-polar.**

If the hypotheses are verified, in terms of employment, the world in 2025 is

- **booming**

If the hypotheses are verified, in terms of trade, the world in 2025 is

- **booming but within the world hegemony alliances (as with Rome and Cartago in ancient times)**

C) Environment-health-climate change-energy

If the hypotheses are verified, in terms of environment, the world in 2025 is

- **The public governance strength holds the worse environmental damages under control. However the economic boost also creates damage to the environment and the hegemonic conflict drives priorities to be set on political security grounds rather than environmental. And some of the conflicts spills over to damage to the commons as the oceans**

If the hypotheses are verified, in terms of health, the world in 2025 is

- **A healthier place than 2008 as the economic capacity provides health for all investments**

If the hypotheses are verified, in terms of climate change, the world in 2025 is

- **The economic boom puts pressures on the climate although somewhat curbed by public regulatory interventions – when priority setting is directed to such issues as the climate. (Compare the Stern report). To some extent the climate change has been regarded as a major security issue internally in the major alliances which has given impact effects already in 2025. However the overriding global conflict between the major powers have created difficulties to make global common institutions work, as the UN. They are there, but only used when the big powers want some specific actions not destroying their capacities to keep their hegemonies.**

If the hypotheses are verified, in terms of energy, the world in 2025 is

- **Using very much more energy than in 2008. To some extent strong technological development supported by the economic boom has made it possible to expand on sustainable types of technologies. This is also strongly driven by the fierce competition globally on technology markets. The public regulatory capacities also provide huge home based markets for this. The conflict character of this world has also driven the nuclear option strongly ahead in combination with the path in climate handling moving away partially from the carbon path in relative terms.**

D) Technology-innovation-research-education-information

If the hypotheses are verified, in terms of technology, the world in 2025 is

- **Huge boom. But the conflict frame drives also a specific security angle to the research and innovation paths (as during the cold war times). Education is high on the list as it is a competition measure.**

If the hypotheses are verified, in terms of innovation, the world in 2025 is

- **See above on research. Huge boom.**

If the hypotheses are verified, in terms of education, the world in 2025 is

- **See above. Huge boom especially in the technology fields rather than in social science and the humanities**

If the hypotheses are verified, in terms of information, the world in 2025 is

- **Selectively booming within the ideologies in the respective big competing blocks. Especially it is important to have your own population with you “on your line of thinking” i.e. strong tendencies for nationalistic moods encouraged from the top**

E) Economic governance - international financial system - access to resources

If the hypotheses are verified, in terms of governance, the world in 2025 is

- **Fine within the huge global alliances and strongly ordered by the governmental regulation spirit (as in the empire of Rome) – but not between them. This realm is also part of competition so there are competing centres of stock exchange etc for global transactions. China, Japan, India, Europe and the US heavily competing through partial alliances.**

If the hypotheses are verified, in terms of international financial system, the world in 2025 is

- **See above**

If the hypotheses are verified, in terms of access to resources, the world in 2025 is

- **Fierce competition over global resources. Problems for “Common type” resources such as the oceans. A new wave for the “tragedy of the commons”. But the efficiency of technology has boosted so the efficiency factor has gone up very much in terms of the use of the resources. Much more function for “one ton of steel” could now be had due to technology advancements.**

F) Defence-security-safety

If the hypotheses are verified, in terms of defence, the world in 2025 is

- **A more worrisome place. Defence issues are high on the agenda and it draws huge investments based on the booming economy**

If the hypotheses are verified, in terms of security, the world in 2025 is

- **Stable within a within a wider connotation of unstableness - a little like the cold war period but now multi-polar in kind which breeds the instability of the situation, including the nuclear threats having increased lately.**

If the hypotheses are verified, in terms of safety, the world in 2025 is

- **A richer place but with unsolved long terms political instabilities -sometimes up to micro war situations (a parallel could be drawn from pre first world war conditions when the major colonial empires competed also in pre military actions and alliance making)**

SCENARIO 2: ORDERED COMMON WORLD

More public regulatory role + consensus + economic performance

A) Demography-migration-urbanisation-intercultural dialogue

If the hypotheses are verified, in terms of demography, the world in 2025 is

- **The demographic transition in the nice way is held under the arms. The world is stabilising**
- **Population size will not stabilize, but continue to grow although on a slower pace, towards 10 billion by 2050 and 12 billion by 2100; it is accompanied by substantial population ageing, also in Africa**
- **TFR will slow down/regulated to slightly above replacement level while life expectancy will increase**

If the hypotheses are verified, in terms of migration, the world in 2025

- **Not big problems. The migratory streams are well regulated in consensus at high political world level**
- **International migration will significantly increase, specifically to booming economic regions**
- **Better educated migrants are in favour**

If the hypotheses are verified, in terms of urbanisation, the world in 2025

- **Continues to boost due to the economic good times. The way of the urban expansion is done is regulated – even at world level**
- **Urbanisation will continue as economic performance will concentrate there**

If the hypotheses are verified, in terms of intercultural dialogue, the world in 2025

- **Strong good spirited consultations in the “Common world ideology”**
- **More convergence, less heterogeneity, as people will realise that economic development is more important than having conflicts**

B) Macro economy-growth-employment-trade-services

If the hypotheses are verified, in terms of macro economy growth, the world in 2025 is

- **Fine in principle. The increased public regulatory capacities have had its advantages but put some restraint to earlier boom economies especially in the earlier developing countries that now not any longer are of that character**
- **Better off since economy is more oriented towards needs**
- **Less superfluous production due to costs of climate change and environmental protection**
- **Correction of world imbalances**
- **Savings are channelled towards capital scarce countries**
- **Exchange rate stabilise**
- **Stability and long term visibility encourages investments in infrastructure**

If the hypotheses are verified, in terms of employment, the world in 2025 is

- **Fine**
- **Unemployment lowers as all who can work will share the labour to be done, also because of population ageing**
- **High labour participation**
- **Productivity gains**
- **Labour mobility within regions**

If the hypotheses are verified, in terms of trade, the world in 2025 is

- **Fine, but heavily regulated and negotiated. A “Pax Romana” feeling provides a fertile ground for “good times”**
- **Trade will be regulated by WTO rules in order to become non-superfluous and cost-energy efficient**
- **Doubling of world trade at this horizon**
- **Rebalancing of trade flows in favour of Africa and Latin America**
- **Limited protectionist tensions and liberalisation of trade in services**

C) Environment-health-climate change-energy

If the hypotheses are verified, in terms of environment, the world in 2025 is

- **Much better taken care of than in 2008. The consensus provides the frame for what has to be done – also strict measure – and the public regulation capacity provides strong means.**
- **Getting worse as economic performance still dominates over environmental sustainability**

If the hypotheses are verified, in terms of health, the world in 2025 is

- **much better than before**
- **Slightly better off; life expectancy increases as the battle against major (early) threads/killers is successful**
- **However this battle is extremely costly, i.e. economic considerations prevail**
- **Health differences between subpopulations tend to disappear**
- **Some new illnesses develop, related to climate change**

If the hypotheses are verified, in terms of climate change, the world in 2025 is

- **Still in a worrying expansion in terms of temperature increase etc. But the new global consensus capacities provides strong hope for the future**
- **Deteriorating; economic performance prevails, CO2 emissions have not diminished**

If the hypotheses are verified, in terms of energy, the world in 2025 is

- **Expanding, but less in open carbon cycle terms, nor in nuclear terms. More renewables like solar and wave energy**
- **Fragile; large concerns about how to continue due to scarcity; rich countries buy the remaining energy**

D) Technology-innovation-research-education-information

If the hypotheses are verified, in terms of technology, the world in 2025 is

- **strongly expanding under a directionality of global consensus with strong environmental components**
- **Advanced; technology is still perceived as the solution to all problems**

If the hypotheses are verified, in terms of innovation, the world in 2025 is

- **Strongly expanding but within an agreed directionality. Maybe this puts a restriction to the ultra new expansion possibilities as the directionality of innovation will constantly be negotiated at several layers.**
- **Stimulated as new (sustainable) technology should be developed**

If the hypotheses are verified, in terms of education, the world in 2025 is

- **a much better place than earlier**
- **More widespread than before; even developing countries profit**

If the hypotheses are verified, in terms of information, the world in 2025 is

- **More transparent, although sometimes alternative and critical voices can feel that they cannot penetrate the global discussion platforms easily. This may serve a degree of global stability and “directionality” (e.g. with regard to environmental needs) at the expense of strong dynamism**
- **Better off; access to info is omnipresent; but it is difficult to see the wood for the trees**

E) Economic governance - international financial system - access to resources

If the hypotheses are verified, in terms of governance, the world in 2025 is

- **doing quite well**
- **A new body has emerged trying to let environmental and climate issues prevail over economic performance**
- **Primacy of the rules**
- **Reform of the WTO**
- **Creation of the WEO**
- **Decreasing influence of the IMF transformed in a sort of OECD-bis**

If the hypotheses are verified, in terms of international financial system, the world in 2025 is

- **overviewed by international consensus oriented institution with quite some punch**
- **More globalised and better prepared to counterbalance financial crises**
- **Regional monetary and financial integration in Asia and in Latin America**
- **Stability of the financial sphere**
- **Threats of financial crises in emerging economies are limited**
- **“Accidents” are limited in scope and easily managed at the regional level, without resorting to the IMF**

If the hypotheses are verified, in terms of access to resources, the world in 2025 is

- **Well ordered regulatory frame**
- **A new global body has emerged focussing on exploiting natural resources from (ant)arctic regions**

F) Defence-security-safety

If the hypotheses are verified, in terms of defence, the world in 2025 is

- **Defence postures have calmed down and the investments can go elsewhere**
- **Characterised by a decrease in the number of conflicts**

If the hypotheses are verified, in terms of security, the world in 2025 is

- **Better place**
- **Existing conflicts are small scale and very local; moreover there is a new body immediately active when conflicts start trying to get the opponents around the table**

If the hypotheses are verified, in terms of safety, the world in 2025 is

- **Better place, but this safety can be eroded from within. So there is a need to be watchful for corrupting factors.**
- **Better prepared to guarantee security, to offer a safe heaven to citizens, to always have special feeler antennas for danger**
- **Some small groups still try to bring the world out of balance**

SCENARIO 3: A world green party time

More public regulatory role + conflicts + sustainable development

A) Demography-migration-urbanisation-intercultural dialogue

If the hypotheses are verified, in terms of demography, the world in 2025 is

- **Reduction of the fertility rate but small increase of the world population.**

If the hypotheses are verified, in terms of migration, the world in 2025

- **Regional demography stabilized by migration.**
- **Significant increase of regional migration (migration is compensating demographic gaps).**
- **"Conscious" global migration. Shared approach on migration among citizens and governments.**

If the hypotheses are verified, in terms of urbanisation, the world in 2025

- **Attempt to control urbanization and to improve living conditions but it is a failure.**
- **Reduction of urbanization for quality of life reasons.**
- **Networking of middle-sized cities.**

If the hypotheses are verified, in terms of intercultural dialogue, the world in 2025

- **"Convergence".**

B) Macro economy-growth-employment-trade-services

If the hypotheses are verified, in terms of macro economy growth and employment, the world in 2025 is

- **Reduction of economic growth due to the costs of climate change and protection of environment.**
- **Development of local / decentralized economy with new system of production. Economies of scale are lost, less production with a given amount of resources. Less income to be distributed. Increasing conflicts over repartition of the value added.**
- **Reduction of economic growth due to the costs of emissions abatement and protection of environment. Relocation of activity (see below) also contributes to efficiency losses and put a brake to economic growth.**
- **Development of local / decentralized economy with new system of production.**
- **Increased international currency competition**

If the hypotheses are verified, in terms of trade, the world in 2025 is

- **Freight transport is reduced due to higher transport externalities ("relocation"). Regulations imposed on carbon content of traded products imposing, to some extent a relocation of activity in the vicinity of the consumer**
- **Services could increase because harmonisation of rules and less negative impacts on environment.**
- **IMF and WTO rules increase.**

- **IMF and WTO roles increase. Generalisation of trade conflicts linked to property rights, sanitary and environmental regulations, domestic subsidies. Dispute Settlement Body becomes the main activity of the WTO. Multilateralism is weakened and the big “Rounds” are abandoned.**

C) Environment-health-climate change-energy

If the hypotheses are verified, in terms of environment and climate change, the world in 2025 is

- **Better environment and Climate.**
- **Developed countries and large NGOs impose environmental and climate regulations to the others, therefore conflicts.**
- **Strong indicators systems watch.**
- **Public regulatory role changes the structure of mega-cities.**
- **Disruptive factor: Risk of collapse of a mega-city.**

If the hypotheses are verified, in terms of health, the world in 2025 is

- **Better public health but globally more expensive.**
- **Improvement of world health situation due to committed public coherent effort at global-level.**
- **Social policy makes progress (equal access to housing, health services...).**

If the hypotheses are verified, in terms of energy, the world in 2025 is

- **"Sober" access to fossil fuel resources due to the increasing of price.**
- **Conflicts over land-use (renewables, agriculture, water,...).**
- **Common values on the protection of the earth but risks of conflict for the access to resources.**

D) Technology-innovation-research-education-information

If the hypotheses are verified, in terms of technology and innovation, the world in 2025 is

- **Several techno-economic alternatives available.**
- **Globalisation has stopped creative destruction at its best – A 1930 crises is possible.**
- **Strong competition among regions and countries to control environmental technological development on the market.**
- **Very much changed production and consumption systems.**
- **Global R&D challenges.**
- **Well-developed and disseminated environmental technologies but difficulties to finance innovation due to lower economic growth.**
- **New earth observation systems including for urban circulation and behaviours (self sustainability)**

If the hypotheses are verified, in terms of education, the world in 2025 is

- **Strong environmental and sustainable development components in the education system.**
- **Developed countries and Russia: more problems in universities (finance, number of students, less attractive).**
- **In developing countries, universities will decline.**
- **In BRICS (except Russia), university system will expand.**

If the hypotheses are verified, in terms of information, the world in 2025 is

- **Fight for supremacy.**
- **Information oriented towards sustainable development.**
- **More transparent world information system and easier access to information.**

E) Economic governance - international financial system - access to resources

If the hypotheses are verified, in terms of governance, the world in 2025 is

- **A new world environmental organisation is settled. . The hierarchy of norms between ILO, WTO and WEO is clarified, at the expense of the WTO.**
- **Different (localized) interpretation of the "good governance" and democracy.**
- **Environmental and social clauses are included in international trade regulation. This jeopardises the main pillars of the GATT. Commercial dispute spread between North and South. Large developed countries threaten to leave the organisation as they are condemned for their practices.**
- **Through regulation and if needed, by force, imposing the views on environment and climate change.**

If the hypotheses are verified, in terms of international financial system, the world in 2025 is

- **Financial globalisation (and crises) is reducing.**
- **Decreasing role of sovereign wealth funds (SWF) due to world regulation.**
- **Inflation increases.**
- **Development of ethical and green finance in some regions.**

If the hypotheses are verified, in terms of access to resources, the world in 2025 is

- **Bilateral agreements on access to natural resources.**
- **Conflicts due to inequalities also coming from Climate Change impacts.**

F) Defence-security-safety

- **New missions for military (environment, deforestation, infrastructure ...).**
- **Global security is improved but counter forces disrupt its implementation.**
- **Risks of environmental refugees.**
- **Better safety but risks in the information systems.**

SCENARIO 4: The Blue-print scenario

More public regulatory role + consensus + sustainable development

The disruptive point of this scenario is the real capacity of society to implement all the needed capacities of this scenario

General characteristics:

- Change in behaviours
- Change in structures
- Transparency
- Scenario "in process"

A) Demography-migration-urbanisation-intercultural dialogue

If the hypotheses are verified, in terms of demography, the world in 2025 is

- **Population size is stabilized at around 10 Billion by 2050**
- **The objective of the millennium are fully implemented, reducing the proportion of poor people at world level by 30%**

If the hypotheses are verified, in terms of migration, the world in 2025

- **An important education plan is financed to develop education in Africa and limit emigration from Africa**

If the hypotheses are verified, in terms of urbanisation, the world in 2025

- **Huge programme of public works and housing regeneration is launched to improve the energy efficiency in the cities and the quality of life**
- **Decentralized economic policy favours the development of network middle sized cities at regional scales**
- **Effective land use policies and institutional arrangements between local authorities and actors make possible the control of urban sprawl.**

If the hypotheses are verified, in terms of intercultural dialogue, the world in 2025

- **Optimal intercultural dialogue.**

B) Macro economy-growth-employment-trade-services

If the hypotheses are verified, in terms of macro economy growth, the world in 2025 is

- **Saving the recession through huge coherent investments (Marshall plan for global environment) new frame for accounting the GNP**

If the hypotheses are verified, in terms of employment, the world in 2025 is

- **Increased employment in some sectors linked to sustainable development like energy saving technologies.**
- **Increased mobility of workers, especially at regional level.**
- **Significant labour shortages in Europe.**

If the hypotheses are verified, in terms of trade, the world in 2025 is

- **Slight reduction of international trade.**
- **Information on the products concerning the energy and GHG included.**
- **Consumption of high energy included products reduced as a consequence of high priced.**

C) Environment-health-climate change-energy

If the hypotheses are verified, in terms of environment, the world in 2025 is

- **Industrial and research policies are coordinated between the different world regions to accelerate the transition towards a new industrial paradigm.**
- **A system of free access to patents is set up.**
- **A new environmental international organisation is set-up.**
- **Biodiveristy is better protected.**
- **The "gardening approach" of the planet becomes a shared goal.**

If the hypotheses are verified, in terms of health, the world in 2025 is

- **Health is improved thanks to the reduction of pollution in big cities.**
- **Health education has so much improved that obesity has been largely reduced.**

If the hypotheses are verified, in terms of climate change, the world in 2025 is

- **The new "Marshall plan" has curbed the increase in temperature to 2° expected around 2050**
- **After several climate events most countries accept the objective of reducing by factor 2 their GHG emissions and by factor 4 in the developed countries. An international tax is implemented to finance a Marshall plan for climate change**

If the hypotheses are verified, in terms of energy, the world in 2025 is

- **More solar energy**
- **Investment in energy saving and new forms of energy**
- **The demand of energy will rise**
- **The sustainable development strategy allows more efficiency and control in the use of energy**
- **Huge investment in research and innovation for renewable and energy saving**
- **But already industrial implementation of this new strategy has started and we are half way of this transition**
- **Anyhow, this strategy and transition will be very expansive and will imply innovation in financing services**

D) Technology-innovation-research-education-information

If the hypotheses are verified, in terms of technology, the world in 2025 is

- **A new techo-economic paradigm oriented towards sustainable development is emerging.**
- **Research attracts talented young people.**

If the hypotheses are verified, in terms of innovation, the world in 2025 is

- **Systems of innovation are installed composed of highly innovative global firms and highly effective NGO's working for the common good**

If the hypotheses are verified, in terms of education, the world in 2025 is

- **Higher education has been redefined as education of the diverse elites**
- **The scenario implies a more global and interdisciplinary approach at all levels of education, the core of the system is addressing concrete challenges and problems of the society**

If the hypotheses are verified, in terms of information, the world in 2025 is

- **New type of internet**
- **Open access**
- **Open society**

E) Economic governance - international financial system - access to resources

If the hypotheses are verified, in terms of governance, the world in 2025 is

- **Role of WTO and IMF increases. The roles of the different institutions are enlarged and redefined**
- **Europe – used to "consensus" - becomes a major actor on the international scene and puts the means to achieve it.**
- **The transition is difficult to overcome for Europe and provides the basis for a deep metamorphosis**
- **Consensus may imply some weak agreements which could in the long term weaken this scenario**

If the hypotheses are verified, in terms of international financial system, the world in 2025 is

- **International currency competition increases, and financial globalization continues.**
- **Financial crisis diminish as a result of increased regulation**
- **Greater inflationary pressure, due to the lack of adaptation of food supplies to the resource constraints.**
- **Emergence of ethical and green financing.**

If the hypotheses are verified, in terms of access to resources, the world in 2025 is

- **Restrictions on primary commodities production, also contributing to inflationary pressure.**

F) Defence-security-safety

If the hypotheses are verified, in terms of defence and security, the world in 2025 is

- **Better control of conflicts through negotiation**
- **UN transformed ; new security Council enlarged**

If the hypotheses are verified, in terms of safety, the world in 2025 is

- **Food security is reasonably improving giving a reasonable chance for the long term, the transition phase has been difficult but achieved**

SCENARIO 5: "Scramble"

Actual regulatory mode + conflicts + economic performance

General characteristics:

- Negotiations at international level will remain broadly of the same nature, similar regulatory framework.
- World becomes however more and more diverse: local conflicts will increase but not lead to major crises because of economic growth.
- It is a market force driven economy so there is progress; an economy driven by global enterprises with social unrest.
- Emergence of new powers (BRIC) will not be translated in more regulatory framework at global level but ad hoc decisions in interaction with enterprises that are in the system.

Disruptive factors:

Few because of nature of scenario, primarily:

- Local conflicts spread out and become global conflicts and even war.
- Social conflicts due to higher inequalities that become unsustainable
- Financial crises develop and transform in economic crises

A) Demography-migration-urbanisation-intercultural dialogue

- Medium variant/scenario of the UN (10 billion, stay above replacement, population growth substantial but directed towards stability, etc.)
- International migration has increased significantly because of economic pressures (growth, ageing); also increased South-South migration.
- Urbanisation and mega cities more important
- Intercultural conflicts increase primarily at the local level also as a result of dual local economy: more conflicts within nations internally. Very heterogeneous conflicts, no convergence, also as the result of migration.

B) Macro economy-growth-employment-trade-services

- Uneven growth such as today, emerging countries continue to grow more than rich countries. More global economic convergence but local duality. Dual economy phenomenon becoming global.
- World employment will increase very rapidly (doubling labour force as in Richard Freeman), leading to increased income duality associated with skills, employment in tradable or non-tradable activities. How this increased inequality will be translated in each region in the world in terms of social conflict, income stability.
- Significantly increased trade flows with enterprises will count much more than the States because of their global outsourcing: a world of control of operations

is more difficult to the State and easier to enterprise (linked to relatively low transport costs due to technological and organisational change).

- Only big countries have any power vis-à-vis global enterprises.

C) Environment-health-climate change-energy

- How market instruments will impact on the environment in case of degradation? Global enterprises are becoming the leaders in introducing environmental sustainable production because of transparency. Environmental regulation being used to distort competition is used by rich countries to favour their own industries (Denmark)
- Increased costs everywhere...
- Increase in health mistakes in treatment with as a result increased legal costs (welcome to the US)
- Increased in mental health (economic stress, conflicts)
- Life expectancy will still increase but not QALE; increase in hospitalisation and treatment of the 80+

If the hypotheses are verified, in terms of climate change, the world in 2025 is

- Continuing climate change with no authority controlling and free riding across the world.
- Adaptation to climate change through economic opportunities: (large cities in Siberia), movement away of people from climate poor regions, growth in seasonal living.
- Water use being priced.
- Ocean fishing disappeared, only aquaculture.

If the hypotheses are verified, in terms of energy, the world in 2025 is

- Access to energy will become more difficult; struggle for resources, prices will increase. Bilateral deals between governments: conflicting world.
- At too extreme levels, including expectation of price of energy will further influence the development of energy saving technologies and development of new energy fields.

D) Technology-innovation-research-education-information

If the hypotheses are verified, in terms of technology, the world in 2025 is

- Transport costs will remain low thanks to substitution (Internet, dematerialised economy, services) and technological change in transport technologies

If the hypotheses are verified, in terms of innovation, the world in 2025 is

- How will technology disseminate in this scenario, outside of the world of the big enterprises, to local national economies? Global large companies will be dominant in technology, including appropriation, raising issues about local governments attempts at local innovation enhancing growth. Increased legal disputes on IPR.
- Innovation will nevertheless further increase through increased opportunities, R&D more result oriented

If the hypotheses are verified, in terms of education, the world in 2025 is

- **More higher education (universities) also funded/organised by companies (more MBAs than philosophy degrees)**
- **Global fight on excellence, more flexible education systems and more diversified education organisations**

If the hypotheses are verified, in terms of information, the world in 2025 is

- **Global transparency will increase, will feed social unrest and local conflicts**
- **Western view of democracy and human rights will increasingly become questioned and “diversified” at global level. Individual rights depending on relationship with authority (link with cultural/religion)**

E) Economic governance - international financial system - access to resources

If the hypotheses are verified, in terms of governance, the world in 2025 is

- **Dominance of global countries and firms, creating conflicts with local population; social unrest will increase. Link between politics and the markets, taking further of the markets with only big countries as providing countervailing power. Regional governance more closely linked to local population support increases in power and provides basis for political conflicts.**

If the hypotheses are verified, in terms of international financial system, the world in 2025 is

- **Bubbles and busts as before but frequency and size will increase**
- **Voluntary agreements, self-regulatory adjustments**

If the hypotheses are verified, in terms of access to resources, the world in 2025 is

- **Market dynamics (water prices) will be introduced more systematically with respect to water access.**

F) Defence-security-safety

If the hypotheses are verified, in terms of defence, the world in 2025 is

- **Disruptive factor: multiplication of local conflicts. Economics does not always prevail over politics (P. Krugman)**
- **More room for manoeuvre for terrorism, particularly within failed States**
- **Local conflicts will occur primarily in areas which are economically not important; there is a feedback of such local conflicts on global economic performance (capital flight)**

If the hypotheses are verified, in terms of security/safety, the world in 2025 is

- **Increase global security, less personal security depending on the region where one lives/visits**

SCENARIO 6: Laissez-faire

Actual regulatory mode + consensus + economic performance

A) Demography-migration-urbanisation-intercultural dialogue

If the hypotheses are verified, in terms of demography, the world in 2025 is

- **Follow-up of the current situation (some regions largely increase while others stabilize or decrease)**
- **Total fertility rate stays above replacement although it declines in developing countries.**
- **Population and life expectancy increase and ageing population continues. Longer working life.**

If the hypotheses are verified, in terms of migration, the world in 2025

- **Current trends on migration with more pressure although framed by multilateralism.**
- **Borders are opened and migration/ immigration raise.**

If the hypotheses are verified, in terms of urbanisation, the world in 2025

- **Continuous urbanization with some economic specialization.**
- **Tensions remain in the cities (overcrowd, stress, mobility, pollution).**
- **The distinction between urban and rural areas is more and more difficult.**
- **Latent suburban guerrilla limited by auto-control mechanisms (mafias)**

If the hypotheses are verified, in terms of intercultural dialogue, the world in 2025

- **Intercultural dialogue convergence.**
- **More intercultural dialogue.**

B) Macro economy-growth-employment-trade-services

- **Getting more complicated.**
- **Decreasing role of WTO and IMF.**
- **Growth of economic "bubbles".**
- **International labour forces movements and delocalizations.**

C) Environment-health-climate change-energy

If the hypotheses are verified, in terms of environment, climate change and health, the world in 2025 is

- **Environment is more and more damaged and climate change is speeding-up.**
- **"Everyone withdraws to its own corner of the world".**
- **No increasing consciousness about sustainability: large developing/emerging countries continue with low pollution control policies and industrialized countries did almost nothing about transport and urban planning.**

- **Strong climate change impacts. Catastrophic IPCC scenarios become reality (cf. droughts, floods, desertification, rise of oceans, risks for coastal areas, health problems...).**
- **People adapt themselves to fluctuations in the oil prices (car-sharing, new transport, ...)**
- **Strong competition for land and best locations.**
- **Loss of biodiversity.**

If the hypotheses are verified, in terms of energy, the world in 2025 is

- **With the energy issues, the terms of trade is balancing in favour of energy producer countries, which may put EU in difficulties.**
- **Coal is used more intensively implying higher greenhouse gas emissions.**

D) Technology-innovation-research-education-information

If the hypotheses are verified, in terms of technology and innovation, the world in 2025 is

- **Innovation is coming from the former third world, especially for computer artificial life.**
- **Knowledge economy is strengthening as well as education.**
- **Breakthroughs in bio and nanotechnologies favour the development of environmental technologies.**
- **An IPR regime is agreed at the world-level.**
- **Highly innovative groups are imitated everywhere.**

If the hypotheses are verified, in terms of education and information, the world in 2025 is

- **Better education in the rich countries and worse in the poorest countries.**
- **More self-training through Internet.**
- **Information is largely expanding but not necessarily in a transparent way.**
- **Highly centralized information system around few and large corporations.**

E) Economic governance - international financial system - access to resources

- **The current approach to governance continues and is accepted more widely. Worldwide agreement about the central role played by the market in the economy and the society.**
- **Increasing of international currency competition and financial globalisation.**
- **Increasing role of sovereign wealth funds (SWF).**
- **Cooperative regional systems ("à la carte").**
- **Most of the public services are privatized or sub-contracted to the private sector.**
- **Large multinational companies from emerging countries enter the world market.**
- **Economic governance is necessary and implemented at the world-level.**
- **Informal and non monetary economies take a larger place.**
- **International resources are exploited to exhaustion.**

F) Defence-security-safety

- **Reinforcement of USA and China, the two countries that benefit most from globalisation.**
- **The negotiations are made under multi nuclear threats.**
- **Less secure and safe world.**

SCENARIO 7: The power of the richest
Actual regulatory mode + conflicts + sustainable development

A) Demography-migration-urbanisation-intercultural dialogue

In terms of **demography**, the world in 2025 is

- **The “good” demographic transition is promoted**

In terms of **migration**, the world in 2025

- **Continued problems with increasing streams of economic and political refugees**

In terms of **urbanisation**, the world in 2025

- **More urbanisation but in sustainable forms**

In terms of **intercultural dialogue**, the world in 2025

- **Dialogue continues but the conflict aspect in the world makes it difficult to get final consensus on many important issues**

B) Macro economy-growth-employment-trade-services

In terms of **macro economy growth**, the world in 2025 is

- **Some restraint on economic growth, but the new sustainability paradigm having gained overriding policy preference also means that the economic sphere is not miscalculating side effects to the economy from bad environmental behaviour**

In terms of **employment**, the world in 2025 is

- **Muddling through and variations between regions**

In terms of **trade**, the world in 2025 is

- **Muddling through**

C) Environment-health-climate change-energy

In terms of **environment**, the world in 2025 is

- **Much better shape than before. The sustainability paradigm has gained dominance**

In terms of **health**, the world in 2025 is

- **OK**

In terms of **climate change**, the world in 2025 is

- **Better than before, but the way how the sustainability needs are translated into the economy as assets and not as problems of cost is handled differently in a world of conflict. No total global consensus governs the outlook**

In terms of **energy**, the world in 2025 is

- **Energy needs are still going up but the sustainability frame puts constraints on the way how this need is met, i.e. less open carbon flows and restraints on nuclear options**

D) Technology-innovation-research-education-information

In terms of **technology**, the world in 2025 is

- **Sustainability directed technology development**

In terms of **innovation**, the world in 2025 is

- **Sustainability directed innovation**

In terms of **education**, the world in 2025 is

- **Sustainability directed education supports both the general ethos but also professional capacities to implement SD**

In terms of **information**, the world in 2025 is

- **Very much discussion on SD and all its implementation needs at various practical levels. Strong availability of SD solution (e.g. for resource efficient buildings and urban designs etc)**

E) Economic governance - international financial system - access to resources

In terms of **governance**, the world in 2025 is

- **Muddling through**

In terms of **international financial system**, the world in 2025 is

- **Reasonably ordered**

In terms of **access to resources**, the world in 2025 is

- **The conflicts in the world have to some extent resource access backgrounds. But the way these issues are handled are still very much along the line of SD as every one – despite other conflicts – do understand that this is necessary**

F) Defence-security-safety

In terms of **defence**, the world in 2025 is

- **Due to the conflict between a few major blocks (multipolar) the defence spending go up and also the high tech that goes with it.**
- **But it draws lots of resources from the other top priority i.e. that of SD now seen more and more in strategic security terms.**

In terms of **security**, the world in 2025 is

- **The security concept has widened considerably since 2008 and now climate and related issues are high on the list.**

In terms of **safety**, the world in 2025 is

- **In a sense safety has gone up as seen with SD eyes as this topic is so high on the priority list. But the general multi-polar political conflicts in the world has destabilised many issues of “common global concern”. SD measures are thus taken mostly inside the major alliances of states rather than expressions of global generally agreed commitments.**

SCENARIO 8: The "Davos" scenario

Actual regulatory mode + consensus + sustainable development

A) Demography-migration-urbanisation-intercultural dialogue

In terms of **demography**, the world in 2025 is

- **Stabilising the projections of the world for 2100 according to the “good” demographic transition**
- **Population continues to increase to around 10 billion by 2050 and even larger beyond that moment, which goes together with a century of (heavy and world wide: also in Africa) population ageing; population sustainability will not be reached unless by new regulation: people tend to have more than 2 children in a nice world/garden**
- **Disagreement on how to reach world wide sustainable population trends**

In terms of **migration**, the world in 2025

- **Lesser pressures of “desperate kinds”. Many of these issues have been settled by global agreements and generous north – south transfers of capacities that makes it less urgent to migrate from poor conditions. To the extent the migration still is of interest it is done within the frame of commonly agreed regulation**
- **International migration (of mainly higher educated migrants) has intensified in order to offset economic effects of population ageing; however that aggravates ageing issues in sending countries**

In terms of **urbanisation**, the world in 2025

- **Is more urbanised. Yes. But the strong SD emphasis has over two decades streamlined the character of this development in a very SD fashion**
- **Urbanisation will continue as the most profitable economic performance will concentrate there**
- **In EU the rural population is extremely ageing**

In terms of **intercultural dialogue**, the world in 2025

- **Strongly increased and shows also sign of success as the intercultural period in early medieval times in Spain. “Live and let live”.**
- **More convergence, less heterogeneity, as people realise that economic development is more important than having conflicts; conflicts obstruct prosperity and so sustainable development**

B) Macro economy-growth-employment-trade-services

In terms of **macro economy growth**, the world in 2025 is

- **The consensus times have also been good for economy and the SD pressures has meant a boom for SD oriented technologies at all sorts of levels and with strong international exchanges of solutions**
- **Slightly more sustainable; economy is more oriented towards needs and less superfluous**

In terms of **employment**, the world in 2025 is

- **Fine due to the “good times”**
- **Unemployment lowers as all who can work will share the labour to be done, also because of population ageing**

In terms of **trade**, the world in 2025 is

- **Fine. The SD considerations have also penetrated the agreements on trade and their rules e.g. with regard to waste trade etc.**
- **Trade will be regulated a little more by agreed upon WTO rules, also because climate/environmental sustainability is more on the agenda which orients on producing goods on the spots where needed**

C) Environment-health-climate change-energy

In terms of **environment**, the world in 2025 is

- **Much better place than two decades ago**
- **Getting more sustainable as environmental issues start to prevail over economic performance**

In terms of **health**, the world in 2025 is

- **Better than in 2008 but the existing shifts in climate change has resulted in some of the shifts of e.g. malaria now being visible. Thanks to the strong regulatory and SD direction of policy these problems are handled with high priority**
- **Better off; life expectancy increases as the battle against major early threads/killers is successful**
- **However this battle is extremely costly, and paradoxically leads to population unsustainability (as the increasing life expectancy leads to extra population growth and ageing)**
- **Health differences between subpopulations tend to disappear**

In terms of **climate change**, the world in 2025 is

- **Much warmer than in 2008 etc. but there is trust and hope that the vigorous measures applied and the international consensus to do so is starting to make an effect**
- **Deteriorating as CO2 emissions are still too high**
- **The existing governance is not capable of making real progress towards sustainability in this respect**

In terms of **energy**, the world in 2025 is

- **Energy use has still expanded, but the SD measures on efficiency and the directionality of energy technology has greatly improved the situation providing strong hopes for 2040.**
- **Fragile; large concerns about its scarcity; large investments in research on and experiments with clean (solar, wind) energy and with nuclear energy**

D) Technology-innovation-research-education-information

In terms of **technology**, the world in 2025 is

- **Strongly advancing especially with regard to SD driven research**
- **More advanced; technology is still perceived as the solution to all problems**

In terms of **innovation**, the world in 2025 is

- **Strong SD advancements on many fronts e.g. in the transportation and building sectors**
- **Stimulated as new (sustainable) technology is further developed**

In terms of **education**, the world in 2025 is

- **Strongly advancing in SD education but also in general cultural types of education corresponding to the global dialogue sentiments**
- **More widespread than before; specifically developing countries make a profit here, as they are in need of a better educated population; however the most brilliant shares of the developing populations migrate to developed nations**
- **Brain-drain issues are tackled by ‘western’ universities and multinationals who open up research branches in developing countries**

In terms of **information**, the world in 2025 is

- **Strong and open flow of information especially with regard to new SD oriented solutions that spread very quickly. New approaches in patent law has also boosted this development**
- **Better off; access to info is omnipresent, specifically on multivariate scenarios on (global) sustainability**

E) Economic governance - international financial system - access to resources

In terms of **governance**, the world in 2025 is

- **The consensus drives are also visible in this domain and new vigorous global institutions are now in place**
- **More or less the same as no new bodies have been installed, only fruitlessly discussed**

In terms of **international financial system**, the world in 2025 is

- **In shape again after the problematic years a few years from 2007**
- **More globalised and better prepared to counterbalance financial crisis**

In terms of **access to resources**, the world in 2025 is

- **The competition around resources is continued a fierce one. But the global agreement about the forms in which this should be conducted (the frames of the market) has been established and is strongly implemented as the general consensus is strong not only to let this stay on paper.**
- **Much controversy still exist on how to exploit the newly found (ant)arctic natural resources**

F) Defence-security-safety

In terms of **defence**, the world in 2025 is

- **Due to the consensus world a shift of investments has been able to achieve to more common SD investments**
- **Characterised by a decrease in the number of conflicts**
- **Existing conflicts are small scale and very local but may easily get out of hand**

In terms of **security**, the world in 2025 is

- **General world security has gone up and the meaning of it in many dimensions has widened**
- **Better prepared to guarantee security, to offer a safe heaven to citizens, to always have special feeler antennas for danger**
- **Some vicious groups still try to bring the world out of balance**

In terms of **safety**, the world in 2025 is

- **Safety is stronger both at world, national and individual levels**

KEY MESSAGES FROM THE EXPERT GROUP
"THE WORLD IN 2025"

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The key messages that came out from the contributions and the discussions are presented here under the following 4 headings: **main challenges to be faced in the next 20 years, main drivers that could impact the future, main strengths and weaknesses of Europe for the next 20 years, wildcards that may change radically the situations.**

1. Main challenges towards 2025

1.1. Demography, migration, urbanisation

- **World population** size currently stands at 6.5 billion, will continue to grow but is expected to stabilise at about 10 billion in the next century (UN 2006 Medium variant²¹²).
- **Fertility is the main driver of population sizes.** No change in both the fertility and mortality levels from 1950 onwards would lead to 10 billion inhabitants by 2025 and 15 billion by 2050 (with also a continuing exponential growth rate afterwards).
- Europe's²¹³ share will diminish from currently 12% to around 9% by 2025. In 1950 Europe had 22%. Europe is the 'big loser', Africa the 'big winner'.
- If EU-27 is seen as one country then it currently has, with 496 million inhabitants, the third position in the row of most populated countries, after China (1331 million in 2007), India (1136) and before the USA (304).
- Maybe more important than the sheer numbers of population will be their **behaviour**. If from tomorrow onwards all world citizens would behave like the American population with by far the largest per capita energy and food/water consumption patterns in the world these commodities would become scarce immediately and most likely create a severe world crisis with exploding costs of living. The poorest nations would be the main victims. **Extending cheap energy, food and clean water supply therefore is a number one priority.**
- The '**low fertility** virus' is spreading quickly to increasingly more countries, also outside Europe. It is associated with societal developments that stress the importance of ideational changes in bringing about certain (macro) demographic behaviours such as single living, pre- and post-marital cohabitation, and delayed fertility, high prevalence of non-marital fertility and high rates of union disruption.
- The future of **life expectancy** is under debate. Some scientists believe that the rise in life expectancy will continue as it did over the past decades, others believe that it is much more difficult to keep up that pace since improvements now have to be made mainly at higher ages while at the same time people at lower ages increasingly show unhealthy life styles. Moreover scarcity in food and drinking water may form a threat as well as climate change if that would lead to disasters including mass migration.

²¹² See: <http://esa.un.org/unpp/index.asp?panel=1>

²¹³ Europe according to the UN definitions, i.e. including the complete Russian Federation.

And we should be on the alert, every day and every place, for a possible start of a pandemic, which may spread quickly (via air traffic contacts) and kill millions if we are too inattentive.

- The models for Europe show that **population ageing** will reach a top around mid century (with in EU-27 a share of the 65+ population at around 30%) and that some rejuvenation will occur. However the 65+-share will only drop a few percentage points and most likely become more or less stable then. Anyhow it will be much higher than the current level.
- Ageing will challenge **intergenerational solidarity** due to changes in family patterns (more unmarried cohabitation, later marriage, more divorce, more re-partnering, smaller family sizes, later childbearing). This will trigger social protection systems in finding social cohesion to support people to interact as much as possible within and between generations, both in countries with cultural traditions of stronger or weaker family ties. Measures in support of child and elderly care as well as measures that make work-family balances more compatible can strengthen intergenerational solidarity.
- **The first and massive migration in 21st century is the one to cities.** Urban population passed 50% in 2008: 3.3 billion. Urban population grows twice faster than total population growth (1.78% vs. 0.95% annual rate for 2005-2030): projected resulting 4.9 Billion (about 60% of total population) by 2030 (out of 8.2 billion) 1.8 Billion urban population will be added in 2005-2030 out of which 1.1 Billion will be added in Asia.
- The key question is raised by the **cultural difference** of the migrants and the tensions it may generate with the existing population.
- Regarding **climate refugees**²¹⁴, the estimation by Norman Myers, published also by IPCC is 150 million in 2050. It shows an order of magnitude of the climate impact on migration comparable to the one of international migrations for economic and social motivations at the end of 20th century. It should be added to these figures that the estimation of climate effects in terms of hurricanes (like New Orleans Katrina), floods and drought are rough ones. And if, as explained previously, the rise of the ocean level would reach 3 meters, most mega cities being built on the seashore, another 135 million displaced people should be added (OECD).

1.2. Economy, employment, trade

- Too many governments are only **weakly focused on future readiness** rather than past commitments
- The novelty comes from the **emergence a new immaterial, information-intensive order**, in the realm of the material paradigm of progress and socio-economic development.
- Information and knowledge are not regulated by the regimes of cumulative possession or ownership developed for tangible transactions. **Communicative “sharing” is a concept that must be introduced to allow for aspects such as assimilation and audience.** What this means is that knowledge can no longer be thought of as a fluid, as in a mechanical framework, but has to understood by enhancing its communicative, language-based features.

²¹⁴ Estimated 25 Million at the beginning of 2008, by European deputy Hélène Flautre.

- **No classification of knowledge can be envisaged without a reference to the societal context in which it is generated.** The present notion of “explosion” of information and of “fragmentation” of knowledge is probably the result of the powerful weakening and fragmenting effects that the forces of economic globalisation provoke in the social order of our nations.
- If current problems turn into a more sustained slow down, with very uneven impacts, there is likely to be **a need for more conscious innovation in fields such as job creation, parallel currencies, creative ways of using underused assets** (people, land, buildings &c)
- The **volume of trade should double over the period 2008-2025**, despite a temporary brake during the 2009 recession. This growth will be partially driven by the rapid development of Asia opening wide markets for statutory to-range products.
- Physical limits such as **scarcity of hinterlands behind ports** in Europe, or the saturation of (road, air, rail) transport infrastructures will put a limit to the rapid progression of flows. The increasing **cost of energy**, with a 3-digit price of the barrel, will inevitably play a role for certain heavy products
- **EU will be even more specialised in the top range varieties of the (currently unknown) products.** Such outcome has to be prepared, by providing the European economy with the right framework for the qualification, innovation, creativity and flexibility that will be needed.
- Future **population growth** appears today a more relevant measure of future market opportunities, **indicative of unfulfilled consumption aspirations**, than current GDP which appears in many ways more an economic measure of industrial strength of the past.

1.3. Environment (and health), climate change, energy

- The rising centrality of **chronic diseases** to health systems, requiring radically **different models of care**, with a much greater role for **self-care**, informal as well as formal support structures, and **ubiquitous access** to information and advice
- **Death rate of suicides** including those caused by nerve breaks and psychological problems would rise.
- “**Slow infections**” would remain important problem.
- **Climate change** – even before the current crisis there were grounds for expanding a possible marked slowing of trends towards **hyper mobility**, promoting a **new localism** and showing up very uneven abilities to adapt to higher carbon costs. This suggests the need for some areas to be supported as pioneers.
- With regards to energy crisis, Russia would certainly develop all major sources of **alternative energy**, including nuclear stations, but wouldn’t make considerable investments in renewable sources. Hydrogen energy would also play a modest role during the next 15 years.
- **Oil and gas prices will grow**, together with volumes of their extraction. Development of oil sands is very likely, and development of shelf is almost unavoidable.
- **Nuclear energy renaissance** is scenario-dependent. It is unavoidable in case of creation of closed nuclear fuel cycle that includes combination of «fast» and «slow» neutron reactors. Russia would conduct considerable R&D in fast neutron reactors and closed-cycle reactor system, however, quick large-scale introduction of such systems is rather unlikely.

- Russia envisages a systemic fail of energy saving policy: specific consumption of energy would decrease, while total consumption would grow. In Russia **energy crisis will have regional nature**, closely linked to structural problems of this industry and in fact can be partially overcome by government regulatory policy.
- **Regional innovational policy** will be accompanied by **intensive restructuring of transportation system** within the discussed period.
- Tomorrow cities will be at the core of security, economic attractiveness, energy and climate change matters.
- **Convergences between the energy question and that of the climate will not be given a priori, and will have therefore politically to be built.** The irreversible consequences of massive recourse to coal will have in particular to be avoided, particularly in INDIA, in CHINA and in the United States; but also try *to articulate oil prices and carbon tax in order to* – stabilise on the long term intelligently the costs of access to fossil energy... and the profitability of innovations in alternative energy;
- **The impact of the cities on the greenhouse effect and final energy consumption goes far beyond what one can usually include** through the public transport, lighting or the heating of the houses and the workplaces. Mobility also must be incorporated the construction materials, the development of the infrastructures, the related to trade or leisure, the logistical activities or of supplies, and a part of the consumption related to the specific character of the urban ways of life.

1.4. Technology, innovation, research, education, information, entrepreneurship

- **Europe needs to become much more energetic in promoting innovation in all fields**, and specifically that investment in technology R&D needs to be complemented by much more vigorous investment in **social innovation** in order to discover the future through action rather than believing that it can be discovered solely through analysis. This will require a **much more prominent role for civil society, social entrepreneurs and citizens themselves.**
- The **continuing growth in the density of connections** which one may call ‘connexity’ and which is measurable in the form of flows of money, products, information and also of people. Europe made the world global through empire, trade and communications, but no longer controls globalisation and connexity. Instead it is itself being profoundly shaped by new networks and flows:
- The **continued interaction of civic cultural integration** (an emerging world public opinion, and an increasingly confident global civil society) alongside hardening of national identities in particular nations
- **Declining political party affiliation** as the mirror of rising civic activism in the old democracies, and continuing innovation to find new ways to connect politics to the public (from e-petitions and deliberative processes to transparent budgeting)
- There is a growing need to **explore systematically the opportunities for a full integration of what could be called Southern “research for development”** aspects in the curricula and the research activities of university departments and research institutes in the North

1.5. Economic governance, international financial systems, access to the resources

- Europe as a whole resilience will depend on **pluralism** – with different places and institutions optimised for different possible futures.
- **The current crisis requires an acceleration of actions to improve resilience** – including mobilising civil society to reduce the damaging impacts of recession, and adapting any fiscal stimulus to reinforce future-readiness rather than simply propping up existing economic models and practices.
- **The continued imbalance of weak multilateral institutions and strong economic and ecological integration** is a very preoccupying issue.
- Without a **radical change in the world governance organisation modalities**, the current negotiation on climate (KYOTO II) will probably lead to inefficient solutions in relation to the objective of decreasing heating of 2 degrees.

1.6. Defence, security, cohesion, intercultural dialogue

- **A less Western world**, at the demographic level. At the economic level, monumental redistribution of the power is under way, to the profit of the others. Regarding the political leadership which was the one of Occident, and in particular of United States from the end of the second world war, nothing allows to bet on its maintenance. And the Occident is disputed. The image and the legitimacy of the United States as a dominant world power have known spectacular deterioration since the launching of the war in Iraq in March 2003.
- **An increasingly multipolar, but less and less controlled world**
- **Major tension** between the logic of the globalisation and the logic of the geopolitical strength reports. Globalisation is "geopolitising", just as traditional geopolitics globalises. This ambivalence of the globalisation becomes apparent in a series of dynamic contradictions: if poverty regresses considerably on an overall scale, the differential wealth between rich and poor progresses, within the nations as between the nations.

The transversal threats and challenges

- Increase of **non military overall threats**: natural disasters related to climate change, faster dissemination of pandemics, overall repercussions of a financial or stock exchange crisis.
- **Vulnerability of the computer systems**. The need for a "cyberdefense" becomes an emergency in globalisation.
- **The energy challenge**. The question is not about reserves but of access to the resources and modernisation of infrastructures. All the areas producing energy goods vital for defence and security (including uranium) are becoming major crisis areas: Russia, Middle East, Africa. The challenge for Europe is rather clear: except a genuine energy or technological revolution, Europe will be indeed increasingly dependent on more and more unstable areas (Africa, Middle East, Russia)
- **Irreducibility of terrorism and proliferation**. International Terrorism, type Al Qaida, moves on without weakening. The probability of major attacks in

Europe remains high, including by unconventional weapons. The proliferation of ABM is doubled by a considerable ballistic proliferation, in particular in the Middle East and in Asia. The risks of proliferation by diversion of civil nuclear power are fed with the lack of an effective control system.

- **Relativity of military power.** The major lesson of last decade external crises (Iraq, Iran, Lebanon, and same Kosovo) is that complex political crises are not regulated only by military tools. The strategic dilemma is likely therefore to set up between increasingly sophisticated armies less and less relevant on the operation grounds, unevenness always increasing between sophistication of military technologies and barbarisation of planetary violence.
- **A complete range of armed conflicts.** A major conflict between states remains possible, in particular in the Middle-East area. The decomposition of states, based on under development, ethnic conflicts, sharing of natural resources, continues. The destructurement of the societies and states may have of regional impacts.
- **Privatisation of violence.** The non-state actors involved in armed conflicts or in traffic of all kinds diversify (mafias, organised crime, terrorist networks). This jamming between the official and private actors, for the management security, is a major trend.
- The strength of passions. ***The emotional collective becomes an important variable in relations.***
- **The question of legitimacy.** The major consequence of this geopolitics of passions concerns obviously the legitimacy of the international action: legal legitimacy probably remains a necessary condition of any external intervention. But it is no longer inevitably a sufficient condition.
- **The interconnection of threats and risks.** One of the effects of the globalisation (due to permeability of the borders, immediacy of the information, multiplicity of the flows allowed both legally and illegally) is to scramble the traditional categories of safety. Security and defence think themselves in a continuum, both in the causes of the crises and in the means necessary for their solution, or even their prevention. This strategic jamming also affects the traditional distinction between internal and external safety, via terrorism, energy ruptures, computer vulnerability, but also pandemic risks or natural disasters, or even migration flows.

2. Main drivers that could impact the future

- Two main factors are driving human evolution: (i) people; and (ii) their talents, or cognitive abilities, taken in the French sense of “savoirs”.
- Communicative “**sharing**” is a concept that must be introduced to allow for aspects such as assimilation and audience. What this means is that knowledge can no longer be thought of as a fluid, as in a mechanical framework, but has to be understood by enhancing its communicative, language-based features.
- We now have to understand **knowledge** from three different aspects: (i) the production of theories; (ii) the creation of communities, and (iii) the development

of specialized languages; in other words, we see knowledge as a cognitive, communal and rhetorical device.

- It's expected that in the next 20 years **main drivers of economic growth are not oil and gas prices**, but contradiction between industrial and postindustrial economies and rapid development of previously underdeveloped sectors of the economy. It will be resolved through a **new regional policy** towards the simultaneously ultra developed and underdeveloped country.
- the need to reprioritize agricultural research as an area, not of “*grand*” but of “*glocal challenge*”: global in nature but local in implementation with particular attention being paid to world regions’ environmental, including fresh water availability, comparative advantage. Such reprioritization will also need to pay particular attention to the growing convergence between food and nutrition research and what it implies in terms of the trade-off between increased intellectual property protection and the resulting international trading of licenses and global access to such knowledge.
- **In terms of life long aspirations, the world has truly become global.**
- Autonomy from high quality energy, water, broadband network availability is undoubtedly one of the most pervasive drivers for BoP innovation. It is in this sense that one might talk about “*appropriate innovation*” and that there seems to be some analytical similarity with the old notion of “appropriate technology”
- To achieve the targets of future issues on cities, only **voluntarist control policies** of urban and massive investment development in the infrastructures, the energy modernisation of the houses, protection on floods... will be effective. **That supposes to agree to devote in the few coming decades to this object almost 15-20% from the investments to be made in the infrastructures (included housing) – i.e. on a worldwide scale between 20 and 30 Trillions of dollars between now and 2030.** It is obviously a considerable figure, especially in a context which is announced difficult for the financing of public or private investments. But, in addition to the direct profits in energy or climatic term, one can expect a whole indirect impact in terms of reduction of the precarious habitat (one billion people live in slums), of urban quality of life and finally of economic development... This justifies, at European and world levels, to set up a priority issue for the years to come.

3. Main strengths and weaknesses of Europe for the next 20 years

- The own Asian dynamics could be an opportunity rather than a threat for the rest of the world, and in particular for Europe.
- EU will be specialised in the top range varieties of the currently unknown products that it will export in 2025. The opportunity for Europe is that the rapid growth in Asia combined with income inequalities (which are of course not desirable per se) will be opening wide markets for statutory to-range products.
- European agriculture thus has to be considered for the time frame of 2025 in a very broad set of dimensions, as well as being considered from both the angle of e.g. a new global food security perspective, in parallel with sub-regional considerations within Europe about ways to live and at the same time promoting the functions of bio-space at local and sub-regional levels in all its diversity e.g. in terms of the emerging interest in “rural development”.
- The European outlook for 2025 has to be global. It has to put at its core both a development of values in congruence with the challenges as well as the investment in capacities developed to match the new situation. This should pave the way for the

needed transformation of how we may become “gardeners” of this planet. There are worthy images for European future leadership at world level in these explorations, but they have to be developed and pursued as a common enterprise by all people, especially in the European part of the world, but also jointly with people in the other parts of the world. We are historically well equipped for these coming efforts, but they have to materialise. Only in so doing and with a vision at the grand scale will we serve our important missions at the local level “back home” as well. The aim must be a decent livelihood also for our coming generations.

4. Wildcards that may change radically the situation

- A major war (in the turbulent years 2010-2020)
- The first collapse of a third-world big city (be it a capital or a major urban centre)
- The collapse of the EU architecture (in view of continuing difficulties in the search for a new political arrangement of the European nations)
- The fading-out of the university system in Europe (bringing forth the issue of the education of the elites)
- The new techno-economic paradigm being first implemented in any of the big countries of Asia.
- In a pessimistic conjecture, a major *systemic crisis* is no longer to be been discarded, or a strong economic recession due to insurmountable physical constraints on the resources ("*Malthusien scenario*")
- In optimistic hypotheses one can also imagine as various experts do, first a **widened and better controlled globalisation**; a **new technological wave** ("*a fourth industrial revolution*") related to alternative energy and "sustainable development"; or finally a "*supercycle of growth*" drawn by the massive weight of the Asian economies (CHINA, INDIA...) and emergent (BRESIL...) – supercycle who would have effects similar to those which had resulted, XX^{ème} century from the integration of the United States in the world economy. In the latter case, the second phase of the transition started in the 1980s would lead to an even more accentuated swing of the world economy towards the Asian countries, as the IIASA had anticipated as from the middle of the 1980s through its scenario of "*Big Shift*".

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