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Gordian Knots of the 21st Century

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Abstract

In this paper we identify four Gordian knots of the global economy in the 21st century, that is 1) limits to growth: scarce energy and natural disasters, 2) aging of the developed world and the 21st century as the age of migration, 3) the rise of China and the failure of democracy, and 4) rising significance of global financial markets and emergence of new global players.

We describe what policies are adopted at international and European level to deal with these Gordian knots and assess, when it can be done, what are the strengths and flaws of these policies. Finally we suggest “outside-the-box” Alexandrian solutions to some of these problems.

We argue that while the natural resources constitute limits to growth in the medium run, the humanity’s ability to develop disruptive innovations will challenge those limits in the long run. We therefore call on the Club of Rome to broaden its discussion as what appeared as the main Gordian knot of the 21st century some 30 years ago should now be seen in a broader context. Europe has immense challenges and opportunities lying ahead. It is high time that the Club of Rome warns politicians which so diligently take Europe towards the dead end called global marginalization. Lack of strategic vision, national patriotism, protectionism, inability to see developing countries as legitimate global players. All these strategic weaknesses will strike back and will lead to weak Europe, unable to play an important global role in the 21st century. It is not too late to avoid this gloomy scenario.

1. What we mean by Gordian knots?

A Gordian knot is a metaphor for an intractable problem, that can be solved by a bold stroke. It is associated with the following legend:

“According to a Phrygian tradition, an oracle at Telmissus, the ancient capital of Phrygia, decreed to the Phrygians, who found themselves temporarily without a legitimate king, that the next man to enter the city driving an ox-cart should become their king. Midas, a poor peasant, happened

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to drive into town with his father Gordias and his mother, riding on his father's ox-cart. Before Midas' birth, an eagle had once landed on that ox-cart, and this was explained as a sign from the gods. Midas was declared a king by the priests. In gratitude, he dedicated his father's ox-cart to the Phrygian god Sabazios, whom the Greeks identified with Zeus, and either tied it to a post or tied its shaft with an intricate knot of cornel (*Cornus mas*) bark. It was further prophesied by an oracle that the one to untie the knot would become the king of Asia (today's Asia Minor).

The ox-cart, often depicted as a chariot, was an emblem of power and constant military readiness. It still stood in the palace of the former kings of Phrygia at Gordium in the fourth century BC when Alexander arrived, at which point Phrygia had been reduced to a satrapy, or province, of the Persian Empire.

In 333 BC, wintering at Gordium, Alexander attempted to untie the knot. When he could find no end to the knot, to unbind it, he sliced it in half with a stroke of his sword, producing the required ends (the so-called "Alexandrian solution", taken by the Hellenic Army IV Army Corps as their motto). Plutarch disputes this, relating that according to Aristobulus, Alexander pulled the knot out of its pole pin rather than cutting it. Either way, Alexander did go on to conquer Asia, fulfilling the prophecy".

(Source: Wikipedia http://en.wikipedia.org/wiki/Gordian_Knot).

The goal of this paper is closely associated with the legend. We will make an attempt to identify Gordian knots of the global economy in the 21st century, wearing economist glasses. Then we will describe what policies are adopted at international and European level to deal with these Gordian knots and we will assess, when it can be done, what are the strengths and flaws of these policies. Finally we will suggest "outside-the-box" Alexandrian solutions to some of these problems.

For the purpose of this paper we adopt the following definitions:

A Gordian knot is a sequence of events that will likely take place in the future. The outcome of these events is very important for the future state of the global economy, but this outcome cannot be predicted with certainty basing on today's knowledge. Multiple outcomes are possible that might lead to very different distributions of global wealth, power and influence.

An Alexandrian solution to a Gordian knot problem is a set of actions, which may seem strange, or politically incorrect, but which significantly increase the odds of positive outcomes, i.e. future states of the global economy where Europe is a powerful global player and global innovation leader¹.

An Alexandrian solution is an outside-the-box strategic choice, which has three features as described in Kukliński (2007):

- *primo*—it is a crucial choice opening a new path of development or at least a significant correction of the existing path of development,
- *secundo*—it is a long lasting choice establishing a new element in the process of long duration,
- *tertio*—it is a irreversible choice—or a choice which can be reversed only at very great material and sometimes also spiritual costs.

Before we proceed with Gordian knots identification problem, we note that a series of recent conferences, books and papers identified enormous challenges that Europe faces in the 21st century global knowledge economy: Kukliński (2007), Kukliński, Skuza (2003), Kukliński, Pawłowski (2005a), Kukliński, Pawłowski (2005b), Kukliński, Skuza (2006), Kukliński, Lusiński, Pawłowski (2006), Radzikowski, Rybiński (2007), Rybiński (2007b), Rybiński (2007c), Tausch (2007).

Today Europe is unable to deal with these challenges. Politicians are strategically-blind and instead of creating a strategic long-term vision for Europe they engage in myopic actions aimed at increasing

¹ See Radzikowski, Rybiński (2007) for explanation why ability to generate, transform and diffuse innovation is crucial for the future prosperity of Europe.

popularity ahead of next elections. Tausch (2007) refers to these short-term action plans as “destructive creation”.

It is high time to replace “destructive creation” with a strategic vision for Europe. Ability of Europe to rise to this challenge will be tested by its reaction to most important global issues identified in this papers as Gordian knots.

2. Identifying Gordian knots

As presented in Kukliński (2007), predicting far-away future requires a certain set of skills. For example, when identifying various future scenarios one needs to take into account the following dilemmas:

- 1) long duration versus turning points
- 2) path dependency versus path creation
- 3) virtuous versus vicious circles
- 4) catching up versus lagging behind

For example the first dilemma calls for outside-the-box thinking. Most researches rely on trend extrapolation or mean-reversion techniques, while in many cases long-term trends have been abruptly changed by disruptive innovations (steam, steel, light-bulb, internal combustion engine, Wal-Mart business model, cell phone, the Internet, China WTO membership). This obviously indicates that the Gordian knots identification is researcher-specific, different researchers, coming from different backgrounds, would find different Gordian knots. However in what follows we define the big ticket items, that would show up on radar screens of most people pondering what might shape the future.

Basing on the knowledge pool available to us in the Fall of 2007 we postulate that the following sequences of events should be labeled Gordian knots. Below we justify our choice:

1. Limits to growth: scarce energy and natural disasters

Will scarce energy resources halt global growth? Will rising human ecological footprint associated with emerging markets industrialization and lack of improvement in developed world lead to accelerated global warming, and to even larger number of disasters? Will new disruptive innovations be born (19th century of steam and coal, 20th century of oil, and 21st century of what)?

2. Aging of the developed world and the 21st century as the age of migration

Huge threat to public finances, what policies are needed? Can European social model be kept, are we ready for massive immigration from Asia and Africa in Europe in the coming decades?

3. The rise of China, the failure of democracy

Will Chinafrica become the new axis of world power in the 21st century? Why non-democratic countries such as Singapore, Hong Kong, Korea or Taiwan managed to achieve great economic prosperity while maintaining environmental and social integrity? Will the same success path (but on a much larger scale) be repeated by China, or will China follow the Japanese footsteps and fail?

4. Rising significance of global financial markets and emergence of new global players

The new global financial architecture will be developed in the 21st century. The end of New York and London dominance in world financial markets, the rise of Shanghai/Shenzhen/Hong Kong as the world financial centre. Return of protectionism, triggered by rising assets of Sovereign Wealth Funds in non-democratic societies (China, Russia, Gulf oil exporters). Two scenarios seem likely: “national patriotism and Europe financial marginalization” and “balanced East-West distribution of power”. The

coming years will determine which scenario will materialize. The Alexandrian solution is called for to increase the likelihood of the good outcome.

In what follows we describe the four Gordian Knots and their implications for the future. We also make an attempt to identify the possible Alexandrian solutions to deal with the four Gordian Knots.

2.1. Limits to growth: scarce energy and natural disasters

Since the groundbreaking book published by the Club of Rome in 1972 (Meadows et al., 1972) the perspective of a coming collapse of the global economy caused by excessive development has been at the heart of public debate. Many of the gloomy forecasts have not materialized so far, but they have rather moved away than disappeared. Two issues will be discussed in this chapter. First, what is the risk of energy resources depletion—is it really plausible taking into account estimates of available resources, but also alternative energy sources? What could be the economic consequences of shrinking common-used energy resources? And what should be done to take advantage of incoming changes? Second, what would be the environmental consequences of unsustainable growth—where are the limits to growth according to environmental measures and what should be done to lower human ecological footprint?

Depletion of common-used energy resources

What is the probability that common-used energy resources will be depleted during the 21st century? According to the World Energy Council, at the end of 2005 recoverable resources of coal reached 847.4 billion tonnes, of crude oil 159.6 billion tonnes and of natural gas 176.5 trillion cubic meters. In the same year, the world's consumption of coal amounted to 5.8 billion tonnes, 3.7 billion tonnes of crude oil and 2.8 trillion cubic meters of natural gas (World Energy Council, 2007). According to EIA estimates, world market energy consumption will increase by 57 percent from 2004 to 2030 (Energy Information Administration, 2007). With the simplifying assumption that this increase will be equally distributed into greater use of all kinds of resources it means that by 2030 we will have used up 23 percent of coal, 77 percent of oil and 52 percent of natural gas of recoverable resources known-today. Of course, those assessments should be adjusted if predictions about available amounts of recoverable resources are revised.

Table 1.

Amount of common energy resources and their consumption

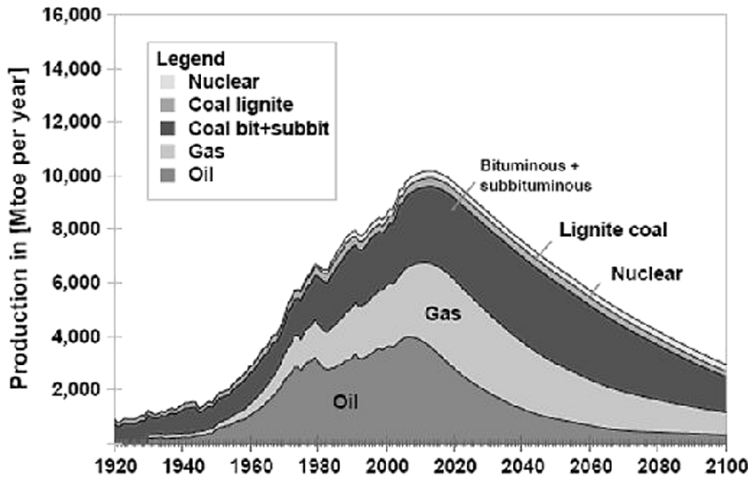
	Recoverable Resources in 2005	World's Consumption in 2005	World's Consumption in 2005–2030*	Percent of recoverable resources use in 2005–2030**
Coal (billion tonnes)	847,4	5,8	193,6	23%
Crude oil (billion tonnes)	159,6	3,7	123,3	77%
Natural gas (trillion cubic meters)	176,5	2,8	92,2	52%

* with the assumption of equal distribution of rise in the usage of resources by the year 2030.

** recoverable resources as known in the 2005.

Source: World Energy Council, 2007, own calculations.

Zerta, Schmidt, Stiller and Landinger (2007) claim that the production of energy from oil will peak before 2010, nuclear energy before 2020, gas energy before 2025 and coal energy in the years 2030–2040. In cumulative terms, the peak of energy production from fossil fuels and nuclear power plants is forecasted for the years 2015–2020.



Source: Zerta, Schmidt, Stiller, Landinger (2007).

Fig. 1. Forecasts of fossil fuels production

A comparison of the foregoing estimations with those presented by the Club of Rome in 1972 reveals many differences. In fact, according to the 1972 estimations, all resources of coal and natural gas will already have been exhausted by 2030 (Meadows et al, 1972). In the report there are many other examples of forecasts that today seem to be incorrect. For example, in one of the scenarios it was claimed that until the year 2000 the world's society would have to deal with huge shortages of arable land. The revised version of the book published twenty years later postponed this moment by about 50 years (Meadows et al, 1992). According to the 1972 estimations, resources of gold should already be depleted at the moment of writing this article (which obviously is not the case), and resources of mercury and silver will be exhausted within the next seven years (which is unlikely) (Meadows et al, 1972).

The foregoing shows that the precision of available predictions is rather low. All forecasts' methodologies have some drawbacks. For instance, assumptions about exponential growth of variables may equally well lead to exponential overshoots. Nevertheless, the Club of Rome's report contains many important messages and implications which cannot be denied or ignored. Drawing conclusions from the report and own assessments allows to state that:

1. the quantities of common used fossil fuels are limited and sooner or later will be exhausted;
2. shrinking quantities of traditional energy resources will be reflected in their pricing;
3. rising price of energy will lead to growth of incentives to move to alternative energy sources;
4. new energy resources equilibrium will lead to a change in the distribution of global political power.

One can be sure that sooner or later stocks of energy resources used today will be depleted. And as the reserves shrink, the price of the unit of energy will rise. Higher prices of energy will have at least two consequences. First, after a certain level is reached, it will be profitable to exploit these resources which are today considered as not recoverable. Second, the expected profitability of research

and development in the field of alternative energy sources will rise, maybe even resulting in a huge technological leap (as it was in the case of coal-steam and oil eras in the 19th and 20th century).

Today we already know many possibilities of replacing traditional technologies of energy production. The most advanced works are done in the fields of:

- **Nuclear power** and development of fast breeder reactors, powered by the uranium-238, resources of which are estimated to be available for at least thousands of years;
- **Hydroelectricity** as an important local source of energy;
- **Solar power**—as MacDonald (2007) states, “*if outfitted with solar collectors, one percent of the land currently used for crops and pasture could supply the world’s total energy consumption*”;
- **Wind power** which is already being developed in many places of the world due to the relatively low cost of wind powerplant construction and low cost of its maintainance;
- **Bioenergy** recieved from waste, at the same time reducing the problem of garbage storage;
- **Other**, less developed energy sources like fusion, geothermal, tidal or wave power, ocean thermal energy conversion, etc. (MacDonald, 2007).

There are many more technologies beside those mentioned above waiting to be discovered. And one should not exclude the possibility that it will happen within next 50 years. Just a quick reminder (following Wikipedia)—during the last fifty years we put a satellite (1957) and a man (1961) into space, landed on the moon (1969), constructed a laser (1960), invented a video tape recorder (1965), carried out the first heart transplantation operation (1967), introduced portable mobile phones (1983), personal computers (1980s), the Internet (1990s) and many more.

The last issue to be considered in the field of transition of energy sources is the problem of the best choice of new energy technologies from the social point of view. For example, all alternative energy sources presented above differ in terms of their influence on the environment. Nuclear power plants produce waste which must be stored, dams used in hydroelectricity have negative influence on water species and wind turbines produce noise and are dangerous to birds. So maybe an international agreement is needed to promote these ideas, which are the most sustainable rather than the most profitable. The world’s leaders will have to create a vision of future energy supply guaranteeing sustainable development, that is development which balance the fulfillment of human needs all over the globe with the protection of natural environment so that these needs could be met not only in the present, but also in the indefinite future (Radzikowski, Rybiński, 2007, p. 3). Today’s Europe does not have such a vision. As an example: on the one side, it tries to fulfill the Millennium Development Goals, one of which is to halve the world’s poverty in 2015 as compared to the 1990 level (United Nations, 2006a p. 5). On the other hand, it promotes biofuels as an alternative source of energy. This has, however, added to the already high demand-supply imbalance for foodstuffs which can be used to produce biofuels and make at the same time an important part of the Third World’s food supply. Consequently, we may end up in a scenario in which people in rich countries will pay less to drive, at the price of millions of lives lost amid rapidly rising food prices, as many families in the third world will not have enough resources to feed their members, children in particular. But this is not the end of the story. Spiegel online describes latest research led by the Nobel-price winning chemist Paul Crutzen which finds that biofuels emit even 70 percent more greenhouse gases than fossil fuels (Spiegel online, 2007). These examples are a very clear cases of “destructive creation”². This term describes intense activity in formulating partial goals and policies, while at the same time there is no clear long-term vision, which would allow to formulate coherent goals and policies.

To conclude, changes are coming. And one of the most important issues is whether Europe will be able to take advantage of them. As the importance of fossil fuels falls, the distribution of political power

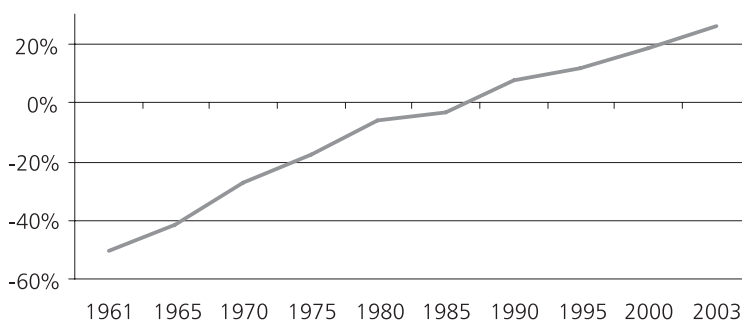
² The term destructive creation was borrowed from Tausch (2007) who used this term with respect to the Lisbon agenda.

in the world will change. The transition to the new sources of energy will benefit those prepared. Europe cannot afford to be unprepared.

Environmental effects of growth

As it was stated earlier, sustainable development may be defined as balancing the fulfillment of human needs with the protection of natural environment so that these needs can be met not only in the present, but also in the indefinite future. Most researchers agree that today the conditions of global sustainable development are not fulfilled. In this section environmental aspects of development will be discussed.

Human development affects the natural environment to such a great extent that it may prove unsustainable in the long-term. As research on the scale of human ecological footprint shows, we are already exceeding the Earth's biocapacity by about 26 percent, see figure 2 (Hails et al, 2006). And this excess is constantly increasing. Human ecological footprint measures how many hectares of a land and sea are required to satisfy needs and to absorb the waste produced by one person in a given country or region in a given year. It is expressed in units of "global hectares" per person, where global hectare "is a hectare that is normalized to have the world average productivity of all biologically productive land and water in a given year" (Kitzes et al. (2007)). It varies between countries and regions as the needs of people and the waste they produce differentiate. For example in 2003, 1.1 global hectares per person were required to satisfy needs of people living in Africa, 2.0 ha per person in Latin America, 4.8 ha per person in EU25 and 9.4 ha per person in the United States, see figure 3. Foregoing demand on land and water of every country or region can be set together with the area that is actually available for use and for waste absorption. This second measure is called biocapacity and is defined as a "capacity of ecosystems to produce useful biological materials and to absorb waste materials generated by humans using current management schemes and extraction technologies" (Kitzes et al. (2007)). It is expressed in units of "global hectares" too and varies between countries and regions as different quantities of land and water per person are available (areas which are considered as non-productive or productive but not used by humans are excluded from the biocapacity measure).

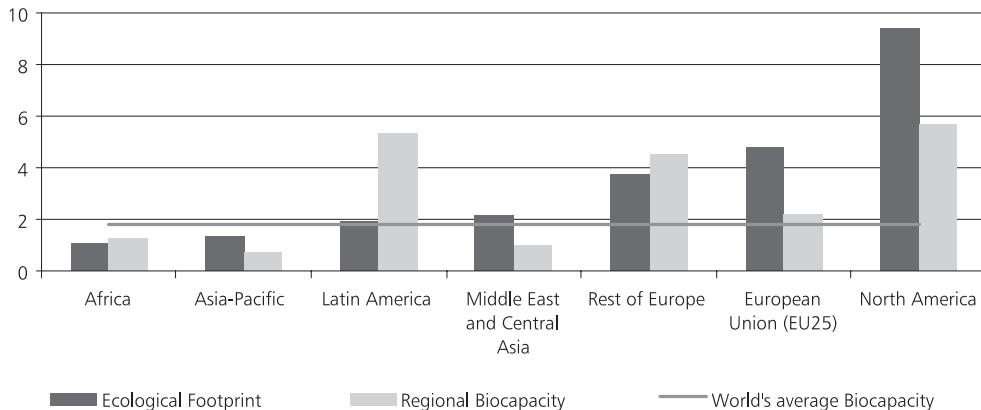


* Ecological Footprint Deficit is the difference between Human Ecological Footprint and Earth's biocapacity.
Source: 2006 National Footprint Accounts dataset.

Fig. 2. World's Ecological footprint deficit* in the years 1961–2003 (in %)

As it was explained, human ecological footprint is distributed differently between countries—while Africa and Asia-Pacific regions are today below the world's average biocapacity, the rest of the world exceeds it, North America being the leader. But because the Earth's biocapacity differentiate between regions too, in fact different levels of ecological footprint can be sustained in different regions. For example, although Asian footprint (1.3 ha per person) does not exceed the world's average biocapacity (1.8 ha per person), Asia still runs an ecological footprint deficit, as the biocapacity in Asia (0.7 ha

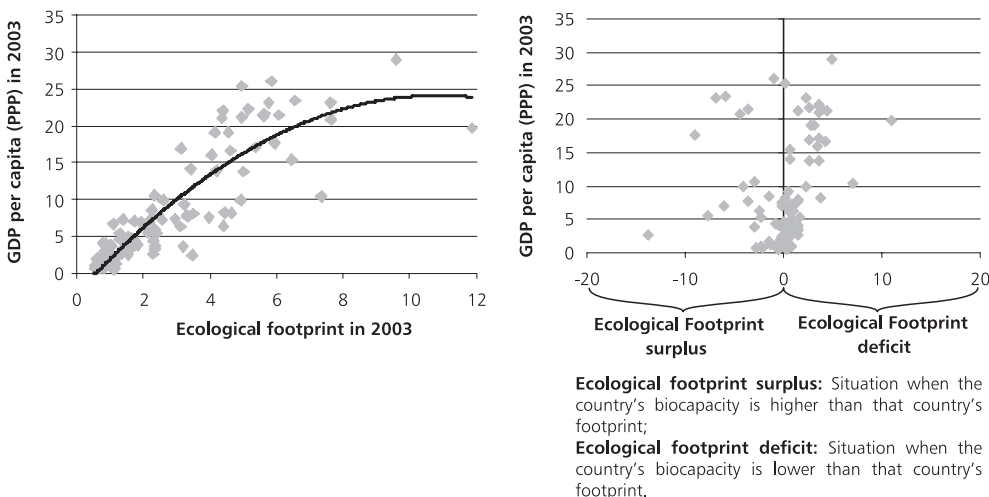
per person) is lower than its footprint. The opposite situation can be observed in non-EU25 European countries, where relatively high level of ecological footprint (3.8 ha per person) is sustainable as regional biocapacity in this region is even larger (4.6 ha per person).



Source: 2006 National Footprint Accounts dataset.

Fig. 3. Ecological footprint and biocapacity in 2003 (in ha per person)

There is a general observation that countries with higher GDP per capita contribute to the world's human ecological footprint on a larger scale. But with higher GDP per capita the diversity of ecological footprint rises (for example, ecological footprint of the United Arab Emirates is 11.9 ha per person, while that of Austria, a country with similar GDP per capita in PPP, it accounts for 4.9 ha per person) suggesting that there is potential for its reduction in many countries. Another interesting observation is that there is no strong relation between GDP per capita and the ecological footprint balance, that is the difference between the country's footprint and biocapacity. But it seems that the probability of running an ecological deficit rises with increasing GDP per capita.



Ecological footprint surplus: Situation when the country's biocapacity is higher than that country's footprint;
Ecological footprint deficit: Situation when the country's biocapacity is lower than that country's footprint.

Source: 2006 National Footprint Accounts dataset.

Fig. 4. Ecological footprint, ecological footprint balance (in ha per person) and GDP per capita (PPP) in 2003

In 2003 the United Arab Emirates was the country with the highest human ecological footprint deficit (measured as a nominal difference between the ecological footprint and biocapacity). Kuwait took the second place and the United States the third. It is interesting to notice that four among ten countries with the highest ecological footprint deficits are members of the European Union (see table 2).

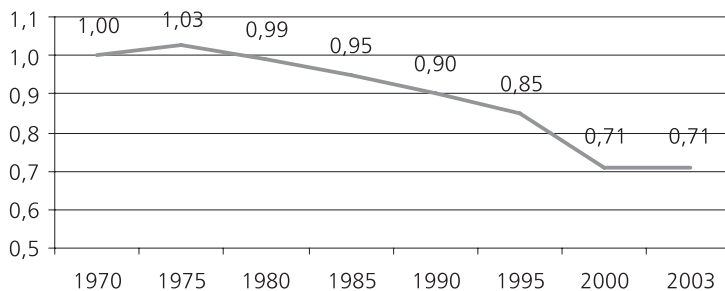
Table 2.

Top ten regional ecological footprint deficits in 2003 (in % and ha per person)

Rank	Country	Regional ecological footprint deficit	
		Percentage difference between footprint and biocapacity	Nominal difference between footprint and biocapacity
1.	United Arab Emirates	1 313%	11,0
2.	Kuwait	2 177%	7,0
3.	United States	102%	4,8
4.	Belgium	365%	4,4
5.	Israel	1 111%	4,2
6.	United Kingdom	245%	4,0
7.	Saudi Arabia	388%	3,7
8.	Spain	209%	3,6
9.	Japan	494%	3,6
10.	Netherlands	466%	3,6

Source: 2006 National Footprint Accounts dataset.

Another interesting measure of sustainable development is the Living Planet Index published by the WWF. It reflects trends in population of 695 terrestrial species, 274 marine species, and 344 freshwater species (Hails et al, 2006, p. 4). The index has fallen by about 30 percent since 1970, showing the scale of decreasing world biodiversity.



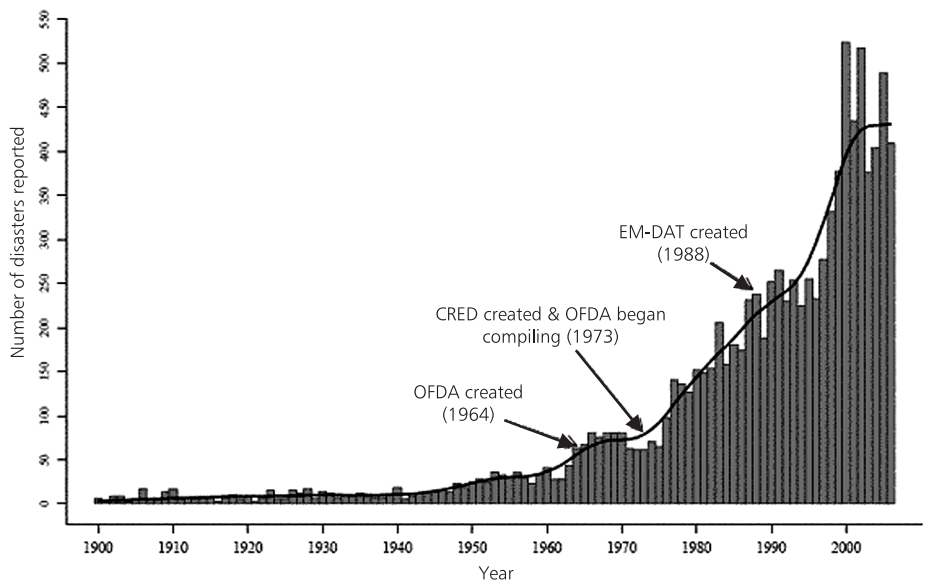
Source: Hails et al (2006).

Fig. 5. Living planet index in the years 1970–2003

The foregoing measures show that we are already exceeding the Earth's capacity and contribute to environment degradation. Ozone depletion, global warming, the greenhouse effect, melting of ice caps and rising sea levels can already be observed and are already affecting our lives. The number of natural disasters rises at an increasing pace. Although available disaster datasets are burdened by the

fact of rising quality and universality of measurement, at least part of the increase in the number of disasters reported can be assigned to the changes in natural environment. Table 3 presents “top ten” countries most severely affected by natural disasters such as extreme temperatures, floods and wind storms from the beginning of 20th century. What is striking, in the case of each kind of disaster half of disasters have been recorded within the last ten years. According to Emergency Disasters Database, in the last two years alone 0.8 million people were affected by extreme temperatures in Argentina (May 2007), 105 million people by the flood in China (June 2007) and almost 30 million people by the wind storm in China (July 2006) (EM-DAT, 2007).

Natural disasters reported 1900–2006



EM-DAT: The OFDA/CRED International Disaster Database—www.em-dat.net—Université Catholique de Louvain—Belgium

* due to changes in the methodology, numbers after 2003 are not comparable with those before.
Source: EM-DAT (2007).

Fig. 6. Number of natural disasters reported 1990–2006*

The consequences of further ecological unsustainability may be catastrophic, so corrective and preventive actions are needed. First, incoming changes in the field of energy production provide opportunity to significantly reduce pollution. It is necessary however to promote those technologies and ideas which guarantee achieving sustainable development, i.e. satisfy human needs under the condition of environmental protection. Second, more restrictive international agreements on pollution reduction must be adopted and implemented. One of “Alexandrian” ideas of achieving sustainability may be to trade human ecological footprint deficits and surpluses between countries, regions and enterprises. It could bring the market pricing mechanism to the environmental aspect of production and thus eliminate the problem of market failure in this area. In effect it would contribute to an increase in ecological efficiency of production.

Table 3.

Top 10 Countries affected by natural disasters*

Country	Date	Total Affected**
Extreme Temperatures		
Australia	Feb-1993	3,000,500
Peru	Jun-2004	2,137,467
Peru	7-Jul-2003	1,839,888
Australia	Dec-1994	1,000,034
Liberia	1990	1,000,000
Argentina	May-2007	884,572
Russia	Jan-1999	725,000
Kazakhstan	Nov-1997	600,000
Australia	Nov-1995	500,100
Australia	Jan-1994	100,150
Floods		
China	1-Jul-1998	238,973,000
China	1-Jun-1991	210,232,227
China	30-Jun-1996	154,634,000
China	23-Jun-2003	150,146,000
India	8-Jul-1993	128,000,000
China	15-May-1995	114,470,249
China	15-Jun-2007	105,000,000
China	23-Jun-1999	101,024,000
China	14-Jul-1989	100,010,000
China	8-Jun-2002	80,035,257
Wind Storms		
China	14-Mar-2002	100,000,000
China	20-Apr-1989	30,007,500
China	16-Jul-2006	29,622,000
China	1-Sep-2005	19,624,000
Bangladesh	11-May-1965	15,600,000
Bangladesh	29-Apr-1991	15,438,849
China	8-Sep-1996	15,005,000
China	1-Jul-2001	14,998,298
India	12-Nov-1977	14,469,800
India	28-Oct-1999	12,628,312

* Disasters which occurred within last 10 years are bolded.

** People requiring immediate assistance during a period of emergency.

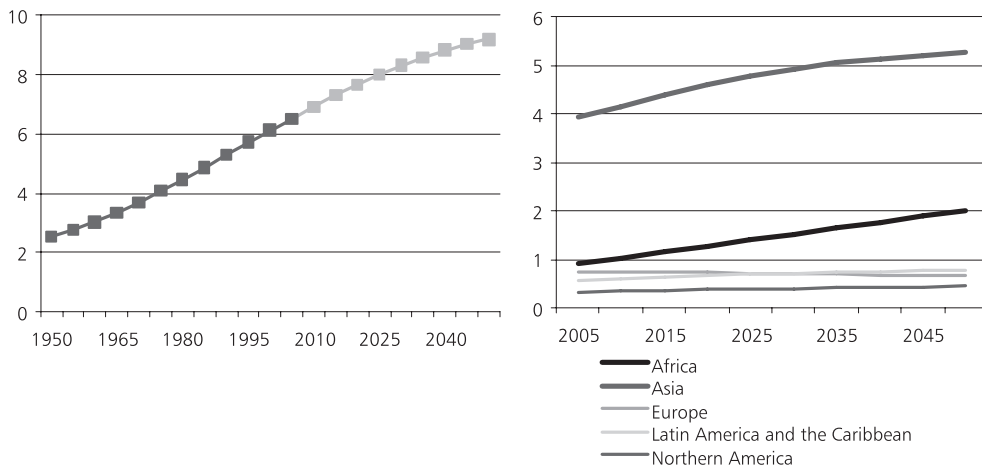
Source: EM-DAT (2007).

2.2. Ageing of the developed world and the 21st century as the age of migration

We are living in a world of demographic changes. The improvement in living conditions and the build-up of knowledge in developed world led to increased life expectancy and significant reduction of fertility rates. This kind of transition is these days observed in some catching-up countries such as

China and India while some other regions are still waiting for their turn. This chapter will consider how the world's demographic structure will be shaped in the 21st century, what the economic consequences of ageing will be, and what kind of policy can contribute to long term sustainability.

Today the world's population accounts for 6.5 billion people. According to United Nations (2006b) forecasts, it will reach 9.2 billion in 2050. Population in Europe will fall from 731 million in 2005 to 664 million in 2050. Population in Africa will increase from 922 million to about 2 billion, and in Asia from 3.9 to 5.3 billion in the same period.



Source: United Nations (2006b).

Fig. 7. UN world population forecasts (in billions)

Analyzing population datasets for the years 1950–2050 (see figure 8), one can observe:

- a trend of rising population in Africa and India during the whole period;
- the number of persons in Central and Eastern Europe (CEE) peaking in 1992, and forecasts of such peaks in Japan in 2008 and in China and EU-15 in the 2030s;
- a growth of population by 790 percent in Africa, by 350 percent in India and by 150 percent in China in the years 1950–2050;
- a moderate growth of population in EU-15 and Japan (by about 35 percent) in the years 1950–2050 and almost the same population in 2050 as it was in 1950 in case of the CEE region (but only as an effect of increases noted before the 1990s—in the years 2005–2050, population in CEE is forecasted to fall by 20 percent).

The decrease in Europe's population in forthcoming decades is not as great a concern as the one lying behind it—that is low fertility rates in European countries. Low fertility rates together with increasing life expectancy contribute to gradual ageing of society. In 1950 the number of people in the age of 0–14 years in Europe was three times higher than of those in the age of 65 years and more. In 2005 population in those groups was almost equal and it is forecasted that in 2050 the number of people in the age of 65 years and more will be 80 percent higher than of the people in the age 0–14 years. The share of people of the working-age (15–64 years) in the population will fall, which will lead to a dramatic rise of the dependency ratio in Europe. In 2005 there were 47 persons of non-working-age per 100 persons of working-age and it is forecasted that this number will increase to 73 persons in 2050. The potential support ratio, that is the ratio of the size of population in working-age to the size of population above working-age, or in other words the number of people in working-age per one person above working age will fall in Europe from 4.3 in 2005 to 2.1 in 2050.

supported only with a higher labour productivity and/or a higher employment rate. This implies that policies focused on raising productivity and the employment rate can limit direct effects of ageing on economic growth. An increase in the productivity of labour means that more output is produced by the same number of workers. It can be done by an increase in production inputs or by technological progress, that is innovations, ideas and knowledge. Increase in production inputs can be achieved by greater capital intensity of production or by increasing labour supply which in the case of a constant number of workers implies the need for working time adjustments. Technological progress is mainly a function of the country's intellectual capital, which consists of knowledge, structural and relationship capital³ and of institutional and infrastructural conditions in which companies operate. An increase in the employment rate can be achieved by activation of the non-working part of population, for example through programs and policies focused on unemployment limiting, such as trainings, removing labour regulations, limiting social benefits for the unemployed etc.

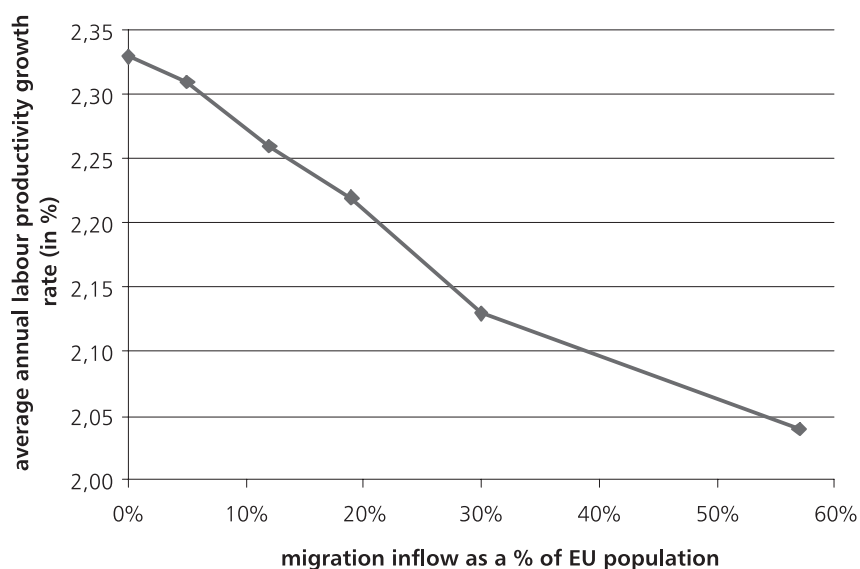
Second, labour productivity will be affected by ageing because of its impact on GDP through various channels such as investment, level and structure of consumption, pensions, health care services, taxation etc.

Third, the level of GDP per capita can be maintained if the ageing of society does not affect the working-age population to total population ratio, which is theoretically possible when the combination of changes in retirement-age regulations and allowing for huge migration of working-age persons from third countries is applied. Unfortunately both solutions have some limitations. In the case of retirement age, there is the issue of elderly persons' limited work ability for natural or biological reasons. It is hard to assess the upper level of retirement age that is socially and physically plausible. The United Nations (2001) calculated that the retirement age in the European Union needed to maintain potential support ratio on the level noted in 1995 exceeds 71 years. Without prejudging about the reality of such outcome, it is worth to notice that in many European countries improvements in the field of retirement policy (for example men and women's retirement age equalization, early retirement policy) are still possible in spite of all. In the case of migration, the research by the United Nations (2001) suggests that it also cannot be treated as a remedy for ageing but rather as a method of weakening its effects. The maintenance of potential support ratio in the European Union on the level not lower than 3.0 (in fact still much lower than it was in 2005) would require such an inflow of migrants that in 2050 they and their descendants would account for 40 percent of total EU population. But even then the problem of ageing would not have been entirely solved—to maintain the 1995 level of potential support ratio in the European Union, the share of migrants and their descendants in population would have to rise to about 75 percent in 2050 (United Nations, 2001, p.28). Although such a flow of migrants to Europe is rather impossible we should be prepared for significant changes in this field.

To sum up, we can draw two main scenarios for the European Union. As figure 11 shows, the maintenance of annual GDP-per-capita growth rate at 2.0 percent in the years 1995–2050 would require an annual growth rate of labour productivity of 2.33 percent with zero migration inflow, or alternatively 2.04 percent with the inflow of migrants reaching such levels, that the cumulative stock of migrants will reach almost 60 percent of EU population⁴.

³ Following Radzikowski and Rybiński (2007), "Knowledge capital refers to formal knowledge acquired at school or university, to experience gained at work and to tacit knowledge. Structural capital encompasses capital of processes in organization, innovation capital (such as patents), and organizational culture, for example flat corporate structure, knowledge-sharing attitude, sharing common vision and goals. Relationship capital refers to relations with clients, suppliers, it describes both the client base but also the clients potential."

⁴ Assuming constant employment rate at 65% of population in the age 15–64 years. Labour productivity growth calculations are based on projections of total population, population in the working-age and migration flows from six scenarios presented in UN(2001). One must be aware, that some of scenarios in the UN(2001) are considered to be unrealistic. Moreover, measures of labour productivity presented here are calculated as GDP per person employed, so possible effects of changes in the working time etc. are not included. Changes of the retirement age are also not included, as the working-age population is assumed to be in the age 15–65 years.



* assuming constant employment rate amounted to 65% of work-force population (15–64) and population developments as presented in UN(2001).

Source: own calculations based on UN(2001).

Fig. 11. Labour productivity growth and migration inflow needed to maintain annual GDP per capita growth in the EU at 2% level in the years 1995–2050*

Table 4.

Historical growth rates of labour productivity per person employed in the EU-15 countries

Period	Average annual labour productivity growth rate	Average annual GDP per capita growth rate
1960s	4.6	4.2
1970s	3.0	2.9
1980s	1.8	1.8
1990s	1.6	1.7
2000–2006	0.9	1.8

Source: Groningen Growth and Development Centre and the Conference Board, Total Economy Database, January 2007, <http://www.ggdc.net>.

Although the exercise above consists of many simplifying assumptions and ignores indirect negative effects of ageing on growth (which may require even higher productivity growth rates), it clearly shows the choice which Europe will have to face. First, Europe should make an effort to improve the productivity of its economy and to raise its employment rate to new heights. It will however require adopting a long-term and comprehensive vision, with an indispensable political will and agreement on reforming of the European social model known today. Second, if the first path were not chosen, Europe would be condemned to a huge inflow of migrants from regions with younger society, mainly Africa and Asia. But is Europe mentally and politically prepared to new demographic structure where migrants and their descendants account for a half or more of the population? If not, action needed to translate first scenario into reality must be taken as soon as possible.

And what can be the Alexandrian solution to the problem of ageing? Maybe, instead of silent accepting of fertility rate decline in the developed world, we should think of ideas how to slow this process down or maybe even reverse it. These ideas could for example consist of various methods of parenthood promotion, such as tax allowances, more effective day nursery and kindergarten policies but also of supporting technological advances that allow to do more work at home, for example easily accessible videoconference techniques or development of virtual offices. As regards the latter, development of online spaces such as Second Life seems an interesting and promising example. Second Life is a virtual world where, at the time of writing this article, almost 10 million people around the world were registered and where they met, sought information, and did businesses. Some companies run training courses and workshops in Second Life. In September 2007 alone more than 7 million USD were exchanged for the currency used in the game. The number of enterprises opening their offices in the virtual world is growing on exponential rate, private firms are created to offer services for avatars⁵. And this is just the beginning. It is difficult to predict what the limits to online spaces' development are and more generally what the impact of social networking on human productivity could be (me, my avatar and my blog can create more value added than the "physical me" alone). So who knows, maybe the web 2.0 revolution will be a great support to the classic methods of dealing with the problem of ageing by contributing to faster productivity growth.

2.3. The rise of China, the failure of democracy

China is big. A very large literature has documented the rise of China and its growing role in many markets, especially in commodities. Equally interesting is the frantic pace of these developments. As shown in table 5 below, China's share in many markets has grown significantly just over the last few years (for example in exports of telecommunications equipment). Between 2000 and 2006 China accounted for 40% of the world incremental demand for oil.

Table 5.

China's share in world GDP, exports, and commodities use

	2000	2005/2006
World GDP, PPP based	11	15
World exports	3.9	8.1
Export of machinery	3.1	9.1
Export of office and telecom equipment	4.5	17.7
Export of electronic data processing and office equipment	4.5	17.7
Exports of telecommunications equipment	6.8	20.4
Exports of integrated circuits and electronics components	1.7	5.9
Steel use	16.4	32
Cement use	35	45
Coal use	28.3	38.8
Oil use	6.3	8.9

Source: IMF WEO database, WTO, various professional associations internet resources.

China is also moving up the production value added ladder, for example biotechnology clusters operate in Beijing, Shanghai and Shenzhen. Li&Fung Research Center (2006) identified 20 locations

⁵ Graphical representation of Internet users

of clusters in China, specializing in various products, ranging from wearing apparel, household electronic appliances to biomedicine and aeronautic engineering in Nanjing, spacecraft, biomedicine and micro-electronics in Shanghai, opto-mechatronics in Dalian and biotechnology, pharmacy and medical apparatus in Zhuhai. As documented by Radzikowski, Rybinski (2007) China is accelerating efforts to build world class research and development, although a lot remains to be done according to recent OECD report⁶. It states that the share of high technology goods in Chinese exports rose from 14% in 2000 to 30% in 2005, but it is concentrated in two sectors that remain in large part under foreign control (especially in the ICT sector) and involve large high-tech import component. Having said that we point out that the learning curve of Chinese companies and authorities is very steep. Moreover the number of higher education students⁷ reached 30 million in China, which is equal to the number of such students in the U.S. and EU taken together. Fifteen years ago China had only four million students in this category. We can safely predict that with recent war for talent in Asia raising economic return to education, the number of students will increase further and China will have increased number of people in tertiary education tenfold in just 20 years.

China has also joined the club of world “enlightened nations”. As shown on the picture world at night, large part of coastal China regions were well illuminated at night already in 2000. Since then further progress has been made.



Source: C. Mayhew, R. Simmon, NASA archive, November 2000.

Fig. 12. Earth at night

We are aware of all the problems and challenges that China is facing. Heavy pollution, infant employment, sharply rising manufacturing wages, income disparities (strongly correlated with light and dark spots on the NASA picture), necessity to create some 20 million jobs per year for people leaving rural areas and moving to cities, overheating residential estate markets, bad loans in the banking sector and possible equity bubble. It is still possible that at some stage China will make a major economic mistake and its rapid expansion path will be interrupted. Japan has made such a mistake, albeit at

⁶ See OECD (2007).

⁷ Higher education: Post-secondary education at colleges, universities, junior or community colleges, professional schools, technical institutes, and teacher-training schools. University: An educational institution that usually maintains one or more four-year undergraduate colleges (or schools) with programs leading to a bachelor's degree, a graduate school of arts and sciences awarding master's degrees and doctorates (Ph.D.s), and graduate professional schools.

a much later stage of economic development as measured by GDP per capita. However a number of indicators (some of them shown in table 6 below) show that it is rather unlikely. China is a much more open economy than Japan, and international openness exposes domestic companies to international competition, and forces them to innovate and raise productivity. China is already filing similar number of patents that was recorded in Japan in 1980, and publishes more papers in scientific journals than Japan in 1980s. While R&D expenditure in China lags behind other indicators, and has just recently reached the level recorded by Japan in 1970s, at the same time the share of high-technology goods in manufacturing exports in China has already exceeded the present Japanese level. We should therefore assume that in the coming decades China will become the global leader in innovation, challenging high value added industries and services in the European Union and the United States. It is therefore a valid question to ask, what would be the global implications of the rise of China.

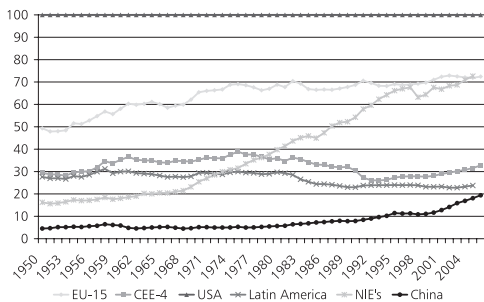
Table 6.

Some measures of future economic potential

	1970		1980		1990		2003/2005	
	China	Japan	China	Japan	China	Japan	China	Japan
(EX + IM) / GDP %	5.3	20	21.8	28.2	34.8	19.9	69.3	28.4
Number of patents, 000	NA	130	NA	191	11	361	173	427
Scientific journal articles	NA	NA	1.1	25	6.3	38.6	29.2	60.1
R&D expenditures, %GDP	NA	1.5	NA	1.9	NA	2.7	1.5	3.5
High-tech exports, % of manufactured exports	NA	NA	NA	NA	6	23.9	29.8	23.7

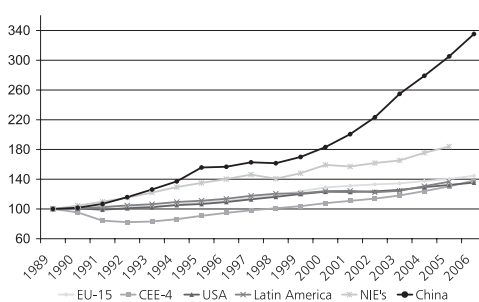
Source: WDI, WIPO, Japanese Statistical Office.

In order to answer this question it is worthwhile to look back into history of growth track record of non-democratic states. The most successful growth pattern among all world economies in the last few decades was recorded in the non-democratic Newly Industrialized Economies⁸ (NIEs) in Asia: Singapore, Taiwan, South Korea and Hong Kong. This undoubtedly serves as a very good example for China, which appears to pursue the same growth path on a much larger scale some twenty years later.



Source: Groningen Growth and Development Centre and the Conference Board, Total Economy Database, January 2007, <http://www.ggdce.net>.

Fig. 13. GDP per capita in 1990 US\$ (converted at Geary Khamis PPPs, US=100)



Source: Radzikowski, Rybinski (2007)

Fig. 14. GDP per capita in 1990 US\$ (converted at Geary Khamis PPPs, 1989=100)

⁸ More precisely, South Korea democratized in the end of the 80's, Taiwan—in the middle of the 90's. Hong Kong and Singapore are still considered autocracies. The same can be said about China and India. See for instance Freedom House at: <http://www.freedomhouse.org>.

According to the European Commission (2005) pursuing a democratic system is one of the key elements of social development. It is of prime importance for sustainable development to make the state work for its society as a whole and not for the interest groups. This is however very difficult to do under democracy as many studies show.⁹ The most evident example of this tendency is CAP under the auspices of the EU, consuming 44% of the EU's budget,¹⁰ which shows that even pan-European bodies are prone to the pressure from the interest groups. Western multinational agreements tying these issues may be even more difficult to challenge. Another example may be a mass exodus of young Polish people (usually under 35) to the West, which may be a form of protest against the lost balance in the society¹¹. Therefore in the face of rising China, European Union democracies have to look into their weaknesses anew and have to come up with Alexandrian solutions.

Of course China can meet many obstacles on its way to reach EU GDP per capita level. While NIEs were too small to have an impact on global markets China already consumes almost half of the world cement output. This has been understood very well by Chinese authorities and China has embarked on the global quest to secure raw material supplies for its soaring economy. This has been so evident in China involvement in Africa. As argued in chapter 2.1 in this paper, we may expect that rapidly growing pool of researchers will contribute to a birth of disruptive innovations that will eventually remove many of speed limits faces by large Chinese economy. But this race between growing demand for raw materials and growing demand for disruptive innovations may be uneven and we should expect bouts of volatility in global growth in the coming years. It is not unconceivable for the oil price to rise to 200 dollars per barrel, for example, before collapsing to nil after humanity finds new source of energy.

Another implication of China's rise would be in geo-strategic dimension. Professor Zbigniew Brzezinski, former advisor to president Carter presented his "World forecast" in a recent lecture at Gdansk Aeropag¹². He documented that in the last 200 years the same group of countries had a dominant impact on the world: the Great Britain, the United States, Germany, Russia (Soviet Union) and to a lesser extent France. Other countries had very little or no impact on the key global decisions. In the 21st century only the United States retained its global power status, others can no longer play a global role, and those who try are boxing well above their weight.

According to professor Brzezinski the next axis of power is developing. This new set of global powers should include: the United States, China, India, Japan, Russia (assuming it becomes a responsible global stakeholder) and Indonesia (as the largest Muslim country). There is also an important role to play for the European Union if it manages to speak in more unified voice and builds its global position along ambitions voiced by the United Kingdom, Germany and France. It is worth noticing that prof. Brzezinski composition of new global powers differs from the group of countries invited to multilateral consultations by the IMF¹³: the United States, the European Union,

⁹ For example Barro (1996) finds that the overall effect of democracy on growth is weakly negative and hypothesizes about a nonlinear relationship in which democracy enhances growth at low levels of political freedom but depresses growth when a moderate level of freedom has already been attained. A Polish philosopher and advisor to the Solidarity movement, Mirosław Dzielski, claimed that democracy can limit freedom and it is economic freedom that should be pursued first and then, slowly, democracy.

¹⁰ One of the very few examples of democracies that do not subsidize agriculture is New Zealand.

¹¹ According to Community Statistics on Income and Living Conditions Poland is the only one country in Europe, in which the average income of people aged 65 and more is higher than the average income of people aged 0-64 (it is 113% in Poland and 55%-94% in other European countries).

¹² See Brzezinski (2007).

¹³ See IMF (2007b).

China, Japan and Saudi Arabia, although the latter choice was influenced by the prominent role these countries play in the global imbalances¹⁴ story.

Of course one can argue fiercely why this or that country will have a better chance to join the group of new global leaders in the 21st century. But irrespectively of the actual outcome it is worth performing the forward-looking exercise of assuming certain productivity trends and taking today's demographic forecasts. In the table 7 below we present results of such exercise performed in PWC (2006) study and show current and future weights of certain countries relative to the GDP of the United States. We compare these results with the present share of these countries in the IMF and World Bank quota.

Table 7.

Selected countries' GDP in PPP terms in 2005 and forecast in 2050. Present share of these countries in IMF and World Bank votes. All figures relative to the United States = 100

Country	GDP in PPP terms		Share in IMF/WB quota	Vote disparity (above 100 overrepresented below 100 underrepresented)	
	A	B		C	C/A (%)
US=100	2005	2050F	2007		
US	100	100	100.0	100	100
Japan	32	23	35.8	112	156
Germany	20	15	35.0	175	233
China	76	143	21.8	29	15
UK	16	15	28.9	181	193
France	15	13	28.9	193	222
Italy	14	10	19.0	136	190
Spain	9	8	8.2	91	103
Canada	9	9	17.1	191	191
India	30	100	11.2	37	11
Korea	9	8	7.9	88	99
Mexico	9	17	8.5	94	50
Australia	5	6	8.7	174	145
Brazil	13	25	8.2	63	33
Russia	12	14	16.0	133	114
Turkey	5	10	3.2	64	32
Indonesia	7	19	5.6	80	29

Source: PricewaterhouseCoopers, Hawksworth (2006), own calculations.

Of course the share in the IMF voice and quota is determined by a very complicated formula (see IMF (2007a)) and European countries strongly oppose using PPP based GDP figures to compute new quota.

¹⁴ See Rybiński (2006 and 2007) for an in depth discussion of global imbalances.

Having said that, we do think that a very simple table 7 yields very powerful conclusions. A number of European countries are overrepresented at Bretton Woods institutions relative to their size in comparison with the United States, this applies in particular to Germany, the United Kingdom and France, which are countries that enjoyed global importance in the 19th and early 20th century, and lost this role in the 21st century. This overweight will intensify in the coming decades unless a proper mechanism is found to scale down European share in the IMF and World Bank quota and voice, or, most preferably, to replace many national seats with one European Union seat. These forecasts imply that France and Germany will be overrepresented more than two times relative to their size. Conversely, emerging market countries are heavily underrepresented relative to their present size, and even more relative to their future size, China will have been underrepresented six times, and India nine times, Brazil, Indonesia and Turkey more than three times, Mexico two times.

Above exercise shows that two scenarios are possible. Either developed nations allow China and other developing countries to have a bigger say in international institutions, or the Bretton Woods institutions will gradually lose their global mandate. Regional development and investment banks have already been created, just to mention African and Asian Development Banks and the recent decision to create Banco del Sur in Latin America. China lending practices make it very difficult for the World Bank to run its lending operations based on heavy conditionality. Number of initiatives in Asia make it likely that any future financial turbulence in that region will be resolved with the help of regional institutions rather than with the IMF involvement.

Finally, with the rise of China we are probably witnessing the end of Washington consensus¹⁵ era. As argued in Gowan (1999), Hudson (2003), Ngai-Ling Sum (2005) and many other books and papers Washington consensus setup allowed biggest financial institutions, especially those based on Wall Street, to gain enormous “scale privilege” amid free entry into less financially developed economies. In particular:

- The United States was able to run huge current account deficits with the rest of the world by issuing US treasury securities that were bought by central banks of surplus nations
- The United States was able to focus its policy actions basing on domestic market without much concern for global implications. Hence higher stability of the US economy was achieved at the expense of higher volatility in other economies, and the most recent decision by FOMC might serve as the best example, when securing soft landing in the US will likely contribute to asset bubbles in many emerging market economies
- The United States as a country was able to enjoy “exorbitant privilege”¹⁶, i.e. in the post-Bretton Woods period earn some 7% on its foreign assets while paying only 3.5% for its foreign liabilities.

It is unquestionable that Bretton Woods and Washington consensus financial order helped the United States to achieve global financial hegemony, while other factors have contributed as well.

Several contributions¹⁷ discuss the emergence of the new transnational capitalist hegemony by building consensus across global corporate elites and influencing national authorities. Some authors argue that there was informal Wall Street—Treasury coalition that made joint efforts to ensure that Washington Consensus was the mantra of economic policies around the world, and that this “coalition” secured backing in domestic financial sectors around the globe. Indeed, for example in Mexico and Poland it was the financial sector that gave strong backing and endorsement for Washington consensus policy, which in the Mexico case was called “bankers’ alliance”¹⁸.

Grote, Marauhn (2006) describe this situation as follows:

¹⁵ See Rodrik (2006) for an in-depth discussion of Washington consensus

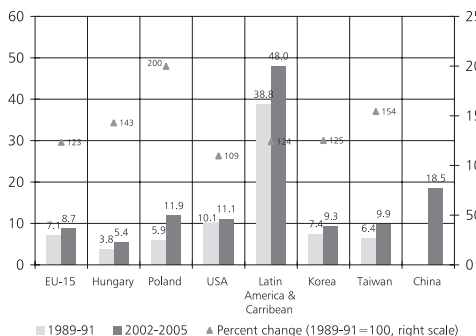
¹⁶ See Gourinchas, Rey (2005) for estimation of this effect. See Rybinski, Sowa (2007) for explanation why changing global financial landscape will lead to elimination of this privilege.

¹⁷ See for example Carroll, Carson (2003), Agnew (2006)

¹⁸ See Maxfield (1991)

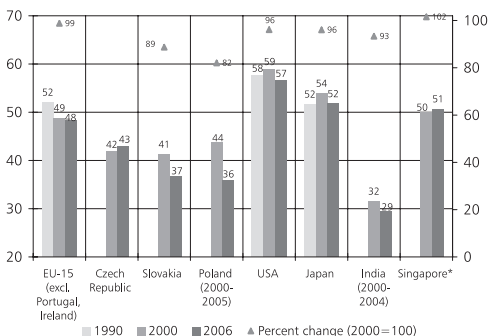
“Governments were under pressure not from one but two directions. Opposition to controls comes not just from the United States and IMF on the outside; but also from key elements of the private sector at home determined to preserve benefits and privileges derived from liberalized financial markets. Interacting with the “Wall-Street-Treasury” complex, in other words, is a comparably influential bank-industrial-wealth holder complex—combining in effect into a powerful transnational coalition that works in a mutually reinforcing fashion to bar any retreat from Washington consensus”.

While we do not fully subscribe to this “conspiracy theory”, we indeed acknowledge that massive deepening of financial markets in the last 20 years was accompanied by falling share of wage bill in nominal GDP in many countries and by rising income inequality within countries, see Radzikowski, Rybiński (2007). It is important to stress, however, that globalization reduces inequality, as documented in Sala-i-Martin (2006), where eight indices of world income inequality declined in the period 1970–2000.



Source: WIDER World Income Inequality Database; World Development Indicators 2007. U.S. Census Bureau; Korean Statistical Information Service: <http://www.kosis.kr/eng/main.htm>; Report on The Survey of Family Income and Expenditure in Taiwan Area, National Statistics Republic of China (Taiwan): <http://eng.stat.gov.tw/ct.asp?xItem=3458&CtNode=1597>. Source: Radzikowski, Rybinski (2007)

Fig. 15. Decile dispersion ratio (10th income decile/1st income decile)



* Refers to earnings and excludes employer social contributions. Source: Ecowin Databases: Ecowin Economic and OECD QNA.

Fig. 16. Compensation of employees (in % of GDP)

In other words globalization and the Washington consensus financial order allowed poor countries to catch up, but at the same time the owners of financial capital in developed countries benefited much more than owners of human capital. Maybe the most striking example of this widening of the income inequality is shown by the level of income of hedge fund managers in the United States. Under the 2-20 arrangement (fee amounts to 2% of managed assets and 20% of generated profits) in 2006 26 fund managers earned more than 130 mln dollars, while the founder of Renaissance Technologies, James Simons, made 1.5 billion dollars in 2006 alone.

The rise of China is unlikely to change this picture, income inequalities in China are even bigger than those in the United States. What will change however, is the Wall Street global influence. It has been said that the United States is run by Goldman Sachs, to reflect numerous senior positions held by former Goldman Sachs bankers in the United States administration. A careful reader of the recent book by Alan Greenspan will also find out how important was the Wall Street in the American, and hence global, politics. This is about to change, with Asian financial and political class replacing American “bankers alliance” global influence. Say good bye to Washington consensus, say hello to Beijing challenge.

2.4. Rising significance of global financial markets and new global players

Financial markets have grown very fast in the last three decades and their role in the global economy have increased immensely. Tables 8 and 9 below documents this development.

Table 8.

Financial markets development (in \$ trillion)

\$ trillion	1980	1993	2000	2005
Global GDP (nominal)	10.1	24.4	31.7	44.5
Global bond market capitalization	4.0	22.3	36.0	58.0
—government debt securities	2.0	10.6	14.0	23.0
—private debt securities	2.0	11.7	22.0	35.0
Global equity market capitalization	3.0	14.3	32.0	44.0
Global bank deposits	5.0	16.4	25.0	38.0
Hedge funds assets	n.a.	0.1	0.5	1.5
Pension funds assets	n.a.	5.3	10.3	17.9
Global derivative markets (notional outstanding)	n.a.	94.2	109.5	355.5
Central bank foreign exchange reserves	0.4	0.9	1.9	4.2
Sovereign wealth funds assets	N/A	N/A	N/A	2.1–2.5

Hedge funds assets—the last presented data set for hedge funds corresponds to the year 2006. Pension funds assets—data only for OECD countries. Global derivative markets—first data publicized by BIS corresponds to the year 1998. Data for 2000 and 2005 without commodity contracts. SWFs assets estimates for 2006.

Source: BIS, OECD, McKinsey Global Institute, IMF, Morgan Stanley, own calculations.

In the last quarter of the century global bond market capitalization rose from nearly 40% of the global GDP to over 130%, with private debt securities market developing much faster than government debt securities. Global equity market cap to GDP ratio quadrupled. There was no growth in the last five years amid bursting of the internet bubble in 2000–2001. Both markets are now bigger than global bank deposits, which reflects global shift of the savings structure. There was an explosion of derivative markets, notional outstanding contracts stood at eight times global GDP in 2005, and years 2006–2007 saw further rapid growth in these markets, rapidly interrupted in August this year amid crisis in the US subprime housing loan market and subsequent collapse of asset backed commercial paper market and collateralized debt obligations market¹⁹. Pension funds assets to GDP ratio doubled and new types of large investors emerged: hedge funds, central banks and sovereign wealth funds.

This rapid growth of financial markets is accompanied by significant growth of cross-border financial claims, which tripled in the last quarter of a century as a ratio of global GDP, see table 10. This trend was briefly interrupted by bursting of the internet bubble in 2001–2002.

As argued in the previous chapter the existing Washington consensus required countries to adopt stabilize-liberalize-privatize policy, which implied removing barriers to entry for foreign, capital-rich investors, which were based in developed countries. This led to situations when for example in some Central and Eastern European countries the share of the banking sector owned by foreign investors amounts to 70–90 percent. Interestingly, many Asian countries resisted this Washington consensus dogma, and allowed for only moderate penetration of their financial sectors by foreign capital.

However the early 21st century saw a rapid accumulation of financial wealth in emerging market countries which began to use Washington consensus rules in a reciprocal fashion. However they were

¹⁹ See Mead (2007) for a comprehensive description of credit derivatives.

Table 9.

Financial markets development (in % of global GDP)

% of nominal global GDP	1980	1993	2000	2005
Global bond market capitalization	39.6	91.4	113.6	130.3
—government debt securities	19.8	43.4	44.2	51.7
—private debt securities	19.8	48.0	69.4	78.7
Global equity market capitalization	29.7	58.6	100.9	98.9
Global bank deposits	49.5	67.2	78.9	85.4
Global derivative markets (notional outstanding)	n.a.	386.1	345.4	798.9

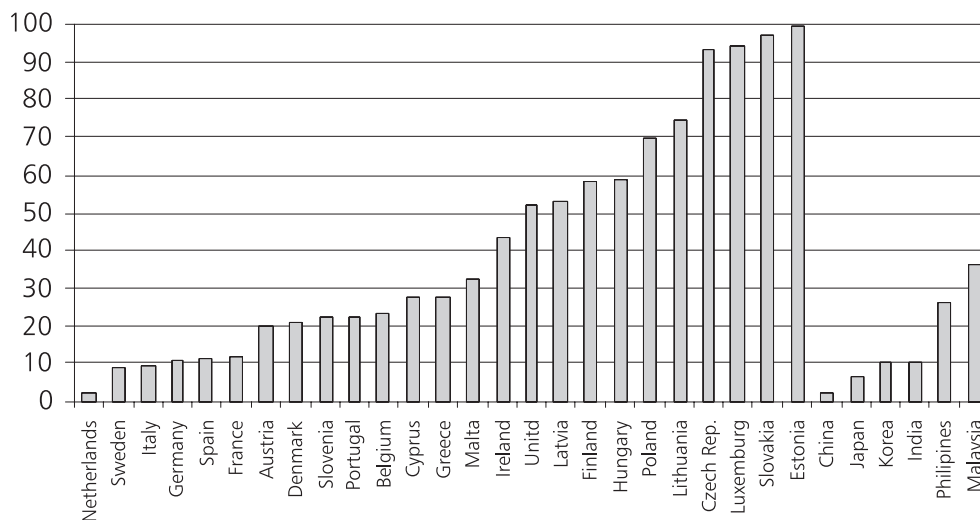
Global derivative markets—first data publicized by BIS corresponds to the year 1998. Data for 2000 and 2005 without commodity contracts. Source: BIS, OECD, McKinsey Global Institute, IMF, Morgan Stanley, own calculations

Table 10.

Cross-border financial claims

	1980	1992	2000	2005
Total cross-border capital flows, \$ trillion	0.46	0.90	4.50	6.19
% of global GDP	5	4	14	14

Source: McKinsey Global Institute.



Source: ECB, BIS.

Fig. 17. Foreign share in banking sector assets, 2005

about to find out that the traffic regulated by Washington consensus is one way only. When it comes to buying developed world companies by emerging markets investors, it is not called openness to direct foreign investment, it is obstructed by “economic patriotism”. There all sorts of arguments raised. For example it is said that Asian central banks and sovereign wealth funds may introduce political

consideration in their investments. This could lower the economic value added in host countries and distort market signals that allow markets function efficiently. Many politicians are voicing concerns that these government owned investors in current account surplus countries may move from passive investor style into active owner after acquiring large stakes in publicly trade companies in developed world.

In what follows we take a closer look at new types of investors that emerged in 21st century and paint two scenarios that seem probable, depending on actions taken by developed nations and response by new types of investors based in emerging markets.

But first we must acknowledge that the fact that capital flows from poor to rich countries—contrary to what economic theory would predict—is not new, it has been well documented and has been labeled as “Lucas Paradox”²⁰. So the new phenomenon in the 21st century is not the direction of flows, but the fact that these flows became larger and take a different form.

In the 20th century emerging markets “invested” in developed countries by placing funds in safest instruments: bank deposits, government bonds, or asset backed securities of highest quality. This allowed the United States, which had the most developed and most liquid markets²¹ to enjoy the “exorbitant privilege”. We are witnessing a rapid change in early 21st century with sharp increases of market capitalization in Asia as shown in table 11 below.

Table 11.

Selected World Stock Exchanges, market capitalization, USD billion

Stock exchange	1990 December	2000 December	2006 December	2007 June	2007 August	Growth 2007/1990 August, %	NYSE=100 August 2007	NYSE=100 1990
<i>Asia total (ex. Japan)</i>	<i>369</i>	<i>1189</i>	<i>4804</i>	<i>6569</i>	<i>7768</i>	<i>2 003</i>	<i>49.8</i>	<i>13.7</i>
Bursa Malaysia	48	113	236	307	274	472	1.8	1.8
Hong Kong Exchanges	83	623	1715	2028	2276	2 629	14.6	3.1
Jakarta SE	8	27	139	167	165	1 935	1.1	0.3
Korea Exchange*	110	148	834	1042	1102	899	7.1	4.1
Shanghai SE	NA	NA	918	1693	2382	NA	15.3	NA
Shenzhen SE	NA	NA	228	491	707	NA	4.5	NA
Taiwan SE Corp.	99	248	595	669	678	586	4.3	3.7
Thailand SE	21	29	140	173	183	780	1.2	0.8
<i>Japan</i>								
Tokyo SE	2929	3157	4614	4681	4518	54	29.0	108.8
<i>United States</i>								
NYSE	2692	11535	15421	16604	15590	479	100.0	100.0
<i>United Kingdom</i>								
London SE	850	2612	3794	4037	3854	353	24.7	31.6
<i>Europe</i>	<i>616</i>	<i>4815</i>	<i>7695</i>	<i>8816</i>	<i>8461</i>	<i>1 275</i>	<i>54.3</i>	<i>22.9</i>
BME Spanish Exchanges	111	504	1323	1520	1497	1 244	9.6	4.1
Borsa Italiana	149	768	1027	1100	1060	613	6.8	5.5
Deutsche B	355	1270	1638	1956	1894	433	12.1	13.2
Euronext	NA	2272	3708	4240	4010	NA	25.7	NA

Source: World Federation of Exchanges, www.world-exchanges.org.

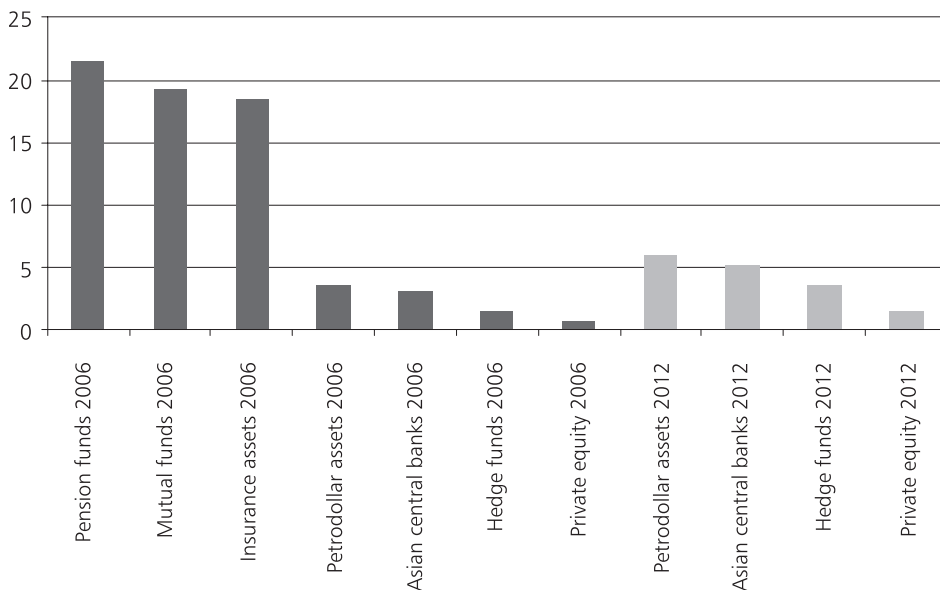
While markets in the United States remain the world’s largest and most liquid, Asian exchanges are catching up fast in terms of market capitalization and liquidity and they improve transparency and regulations at the same time. For example in 1990 stock exchanges in Asia had market capitalization equal to 14% of NYSE capitalization, and stock exchanges in Shanghai and Shenzhen did not exist at

²⁰ See Lucas (1990).

²¹ As argued by Caballero (2006) there were asset shortages in emerging markets, so asset-rich financial institutions in emerging markets (Asia and oil exporters) were forced to invest in financial-asset-rich countries. This asset shortages hypothesis was one of important factor explaining the emergence of global imbalances, i.e. huge US current account deficit financed by large capital inflows from Asian and oil exporters’ central banks and sovereign wealth funds.

all. In August 2007 Asia stock exchanges market cap stood at 50% of NYSE market cap, and exchange in Shanghai and Hong Kong were bigger than those in Western Europe. Chinese exchanges became the world's leaders in the cumulative size of IPOs.

Fast growth of Asian capital markets coincided with an emergence of the new types of global investors: Asian central banks and sovereign wealth funds located in Asia and in oil exporting countries²². McKinsey consultancy estimates that in 2012 Asian central banks and sovereign wealth funds based in Asia and in oil exporting countries will have amassed some 12 trillion dollars of assets.



Source: MGI (2007).

Fig. 18. Assets under management (in \$ trillion)

But the size of these new global investors is not the only factor that has been changing in the last few years amid rapidly rising oil prices and interventionist exchange rate policy. World has also witnessed the change of style of investing. Capital has flown for decades from poor to rich countries, but it was in much smaller volumes and was placed in low yielding deposits collected by large western banks and into western governments' bills and bonds. This is no longer the case and we witness a gradual shift towards investments carrying credit risk (equities, corporate bonds, asset backed securities). As presented in appendix 1 these new investors are activist, taking large stakes in western world companies, with a number of large transactions completed in 2007. There is much more in the pipeline, publicly announced deals are reported in appendix 2.

As long as capital inflows to the western world were rising but were placed in government securities it was accepted and welcomed by western world governments. It allowed the United States to enjoy "exorbitant privilege" and allowed US consumers to expand consumption and personal investment (in housing) beyond what was justified by their intertemporal budget constraint. The United States has been able to find easy financing for its booming current account deficit, which approached 7% of GDP

But in early 21st century Asian central banks and oil based SWFs became world biggest investors and started to move into territory reserved so far for the private funds, managed by individuals based

²² See MGI (2007) and Kern (2007) among others for a throughout analysis of sovereign wealth funds and Rybiński, Sowa (2007) for a discussion on central banks as investors.

in the developed world. The threat that the West might loose control over assets that are considered of strategic importance²³ triggered a hostile response, and economic patriotism flourished in many countries. Appendix 3 presents the list of blocked transactions and the action taken by authorities in developed countries to prevent Asian and oil based investors to buy assets in the West.

This problem is magnified further by the fact that while in the years to come cumulative assets managed by developed countries' managers will still be larger than those in the developing countries, in the former case it is scattered among thousands of investment, pension funds and insurance companies. In the latter case it is controlled by an handful of investors as described in the table 12 below.

Table 12.

Assets under management, Asian central bank, SWFs and biggest “western world” asset managers

		Assets (USD bn)
Petrodollars	Kuwait Investment Authority	200
	Abu Dhabi Investment Authority	500–875
	Qatar Investment Authority	40
	Saudi Arabian Pension Fund	130–150
	Dubai International Capital	5
	Saudi Arabian Monetary Agency	250
Asian central banks	China	1066
	Japan	875
	Taiwan	265
	South Korea	238
	Russia	295
	India	167
	Singapore	136
	Hong Kong	133
	Malaysia	82
Hedge funds (without leverage)	JP Morgan/Highbridge (US)	33.1
	Goldman Sachs AM (US)	32.5
	Bridgewater (US)	30.2
	DE Shaw (US)	27.3
	Farallon (US)	26.2
	Renaissance Technologies (US)	26
	Och-Ziff Capital (US)	21
	Barclays Global Advisors (Europe)	19
	Man Group/AHL (Europe)	18.8
GLG Partners (Europe)	15.8	
Largest traditional funds operating in the West	PIMCO (investment fund)	693
	CalPERS (pension fund)	247

So it is difficult to take control over a multinational corporation by a single fund managing private assets in the West, and it is possible to engineer such takeover by large investor based in Asia or in oil

²³ Typically energy is rightly defined as strategic industry, but in some cases such “classification” is hard to understand, with France Danone as best example. Loosing control over yoghurt production may hurt national pride, but has nothing to do with national security.

exporting country. And then the next question immediately pops up, what would be intensions of such investor, who is often state-owned, and the state is a non-democratic nation. Moreover these investors lack transparency and in general do not report their holdings, unless required by stock exchanges, which also has not been observed in some cases.

Evidence collected in this chapter allows to paint the following high likelihood scenario. The western world will put up barriers to capital flows, “economic patriotism” in Europe and in the United States will flourish, as it is easy to sell to the electorate and can contribute to politicians popularity. Politicians will become “guardians” of national strategic treasures to be protected from “eastern barbarians standing at the gate”. In response, gradually, capital flows will be redirected to fund developing countries corporations, and the relative value of “guarded treasures” will gradually fall over time. This is likely to happen anyway in the coming decades, but the protectionism scenario will act as a catalyst accelerating this process. Instead of bringing in new investors as important stakeholders of the new global order, it might lead to development of new “axis of power”, with acceleration of Asian and oil exporters investments in Asia and Africa. This strengthening of capital ties will be reinforced by African demographic dividend, and “Chinafrica” will emerge and the center of world power in the coming decades. It will naturally lead to marginalization of Europe and to a fall of United States role in shaping the global landscape.

This scenario can be avoided but it calls for the Alexandrian solution. We see a pressing need for a global conference that will result in an agreement that could be summarized as “transparency-openness-minority-passivity” or TOMP agreement. This international agreement, based on full reciprocity, will keep capital account in developed countries open to developing countries investors, in exchange for investors’ commitment to full transparency of investments, for their commitment to be passive investors and to hold only minority stakes. Such an agreement will likely help the developing countries to adopt western values, that served the global economy well in the past centuries, to become responsible global investors and responsible global stakeholders. The West will be able to benefit from a steady flow of capital and balanced East-West distribution of power will be achieved. The scenario choice between “national patriotism and Europe financial marginalization” and “balanced East-West distribution of power” will be made in the coming years. The Alexandrian solution is called for to increase the likelihood of the good outcome.

Conclusions

We defined four Gordian knots in this paper:

1. Limits to growth: scarce energy and natural disasters
2. Aging of the developed world and the 21st century as the age of migration
3. The rise of China, the failure of democracy
4. Rising significance of global financial markets and emergence of new global players

Evidence amassed in this paper allows to draw the following conclusions:

First, while the natural resources constitute limits to growth in the medium run, the humanity ability to develop disruptive innovations will challenge those limits in the long run, while higher output volatility and possibly abrupt changes in relative prices do lie ahead. We are much more concerned about the problem of environmental effects of human’s development. Although Club of Rome’s report underlined possible consequences of further ecological imbalance, too little efforts have been made so far despite the fact that the first effects of irresponsible behaviour are already materializing.

Second, Europe is getting old. This undeniable fact will become a serious challenge for economic development in the 21st century as ageing means less people able to work and more people to take

care of. While there were 4.3 persons in the working-age per older person in 2005 it would be a half of that in 2050. We drew two possible scenarios for Europe. First, Europe would make an effort to improve productivity of its economy and to rise employment rate to the new heights. This would however require adopting of a long term and comprehensive vision, with an indispensable political will and agreement on reforming of today's form of European social model. Second, if the first path was not chosen, Europe would be condemned to huge inflow of migrants from regions with much younger society, mainly Africa and Asia.

Third, in the last decades of the 20th century the most successful growth pattern among all world economies was recorded in the non-democratic Newly Industrialized Economies in Asia. At the beginning of the 21st century incredible civilization jump in the largest country of non-democratic group, that is China, can be observed. China will probably become the strongest and the most competitive economy in the world within next few decades. It is already setting up strong alliance with Africa and thus crowds out Europe and the United States from African economic landscape. The share of China in global resources usage is growing, as same as the share and strength of Chinese enterprises on global markets. China is the world's largest exporter of computer equipment, its intellectual capital is on the rise and the number of higher education students is larger than in the United States and the European Union. China is the world's leader in capital exports and thus is becoming a "global store" as well as "global bank". Next centuries will bring rises and falls of countries and regions. It seems that, as Great Britain lost its power to the United States in the 20th century, in the 21st century China will be the most powerful player on the economic, political and cultural scene with Europe and perhaps the United States becoming "the Great Britain of the 21st century". The strategy of the European Union have not taken this likely scenario into account so far. It can be seen for example in the Europe's resistance for greater representation of China and other developing countries at Bretton Woods institutions, which consequently may lead to development of strong alternative regional financial institutions and thus to weakening World Bank's and IMF's global mandates. If Europe wants to keep its position as an important global player, radical change of strategy is needed with the comprehensive vision of strong and competitive Europe in 2050. But the question is whether small European democracies living in the 4-years election cycle can abandon destructive national protectionism and short-term political goals to create such a vision.

Fourth, the role and importance of financial markets soared in the last three decades. Global bond and equity market capitalization rose from nearly 70% of the global GDP in 1980 to over 230% in 2005. At the same time cross-border financial claims rose from 5% to 14% of global GDP. There was an explosion of derivative markets. Rise of China and oil exporting countries where huge amounts of assets are managed led to emergence of new types of global investors. It is estimated that in 2012 Asian central banks and sovereign wealth funds based in Asia and in oil exporting countries will have amassed some 12 trillion dollars of assets. Large part of those assets will be invested on the global financial markets with rising significance of investments carrying credit risk (equities, corporate bonds). Those developments bring much concern in Europe and in the United States. There are voices that the protectionism policy must be introduced to avoid the possibility of taking charge of multinational corporations by the capital flowing from non-democratic countries. It seems that the era of Washington consensus which assumed removing barriers to entry for foreign goods and capital is ending and the world is moving towards protectionism, especially in the field of capital transactions. In response, gradually, capital flows will be redirected to fund developing countries corporations and the relative value of "guarded treasures" in the West will gradually fall over time. It might in turn lead to development of the new "axis of power", with acceleration of Asian and oil exporters investments in Asia and Africa. This scenario of European financial markets marginalization can be avoided if global agreement on "transparency-openness-minority-passivity" (TOMP) is concluded where the capital account in developed countries remains open to developing countries investors in exchange

for investors' commitment to full transparency of investments, for their commitment to be passive investors and to hold only minority stakes. TOMP should also assume full reciprocity.

To sum up, we call on the Club of Rome to broaden its discussion. What appeared as the main Gordian knot of the 21st century—limits to growth—some 30 years ago should now be seen in a broader context. Europe has immense challenges and opportunities lying ahead: aging and migration versus productivity dilemma, the rise of China, the growing global role of financial markets and the emergence of new investor class. It is high time that the Club of Rome warns politicians which so diligently take Europe towards the dead end called global marginalization. Lack of strategic vision, national patriotism, protectionism, inability to see developing countries as legitimate global players. All these strategic weaknesses will strike back and will lead to weak Europe, unable to play an important global role in the 21st century. It is not too late to avoid this gloomy scenario.

We postulate that the best way to launch a wide debate on Europe's future is to continue a series of conferences launched and organized by professor Kukliński. The next international conference should be titled "Gordian knots of the 21st century". The conference should address all four Gordian knots and work out policy recommendations. It should also identify the key assets Europe needs to become the leading world region in the 21st century. The conference should be followed by a multidisciplinary research project, which will among other issues will also address the weaknesses of economics, sociology and political science in dealing with 21st century global economy.

We are convinced that organizing a large international conference under the auspices of the Club of Rome could create a proper discussion platform. In-depth analysis, dialogue, honesty, mutual understanding combined with outside-the-box thinking could lead to a formulation of new vision for Europe. Without new vision and new strategic plans Europe's future looks bleak. While US can lose global dominance and become the Great Britain of the 21st century, Europe may risk becoming Argentina of the 21st century²⁴. Let us repeat, it is not too late to avoid this gloomy scenario.

References

- Agnew J. (2005) "Hegemony. The New Shape of Global Power", Temple University Press.
- Barro R. (1996) "Democracy and Growth", *Journal of Economic Growth* 1(1), 1996.
- Brzezinski Z. (2007) "World forecast", lecture in the Gdansk Aeropag, 1st October 2007 (in Polish)
- Carroll W., Carson C. (2003) "Forging a New Hegemony? The Role of Transnational Policy Groups in the Network and Discourses of Global Corporate Governance", *Journal of World-Systems Research*, Winter 2003
- Caballero R. (2006) "On the Macroeconomics of Asset Shortages", paper presented at the 4th ECB Central Banking Conference on "The Role of Money: Money and Monetary Policy in the Twenty-first Century," Frankfurt, November 2006.
- EM-DAT (2007), The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium.
- Energy Information Administration (2007), "International Energy Outlook 2007", Office of Integrated Analysis and Forecasting, U.S. Department of Energy, Washington, DC, www.eia.doe.gov/oiaf/ieo/index.html
- European Commission (2005) "Communication from the Commission to the Council and the European Parliament. Draft Declaration on Guiding Principles for Sustainable Development", Brussels 2005.
- Gourinchas P-O., Rey H. (2005) "From World Banker to World Venture Capitalist: US External Adjustment and The Exorbitant Privilege", working paper UC Berkeley, August 2005.
- Gowan, P. (1999) "The Global Gamble: Washington's Faustian Bid for World Dominance", London, New York, Verso.

²⁴ Argentina had GDP per capita close to US level in late 19th century. After a series of strategic mistakes it fell to less than a third.

- Greenspan A. (2007) "The Age of Turbulence. Adventures in a New World", The Penguin Press, New York, 2007
- Grote R. Marauhn T. (2006) "The Regulation of International Financial Markets: Perspectives for Reform", Cambridge University Press
- Hails C. (ed.) (2006), "Living Planet Report 2006", WWF International, Institute of Zoology, Global Footprint Network.
- Hawthornth J. (2006) "The Word In 2050. How big will the major emerging market economies get and how can the OECD compete?", PricewaterhouseCoopers, March 2006.
- IMF (2007a) "Reform of IMF Quotas and Voice: Responding to Changes in the Global Economy", International Monetary Fund Issues Brief, April/May 2007.
- IMF (2007b) "The Multilateral Consultation on Global Imbalances", International Monetary Funds Issues Brief, April 2007
- Kern S. (2007) "Sovereign Investment Funds—State Investments on the Rise", Deutsche Bank Research, September 2007.
- Kitzes J., Peller A., Goldfinger S., Wackernagel M. (2007), "Current Methods for Calculating National Ecological Footprint Accounts", Science for Environment & Sustainable Society, Vol. 4, No. 1, Research Center for Sustainability and Environment Shiga University.
- Kukliński A. (2007) "The Regio Futures Programme—The Feasibility Study", research memorandum, August 2007
- Kukliński A. (2007) "The Regio Futures Programme—The Feasibility Study", research memorandum, August 2007
- Kukliński A., Pawłowski K. eds. (2005b) "EUROPE—The Global Challenges", Wyższa Szkoła Biznesu—National Louis University, Nowy Sącz 2005.
- Kukliński A., Lisiński C., Pawłowski K. eds. (2006) "Creative Europe. Warsaw Conference Towards a New Creative and Innovative Europe. Pre-conference volume", Wyższa Szkoła Biznesu—National Louis University, Nowy Sącz 2006.
- Kukliński A., Pawłowski K. eds. (2005a) "EUROPE—The Strategic Choices", Wyższa Szkoła Biznesu—National Louis University, Nowy Sącz 2005.
- Kukliński A., Skuza B. eds. (2006) "Turning Points in the Transformation of the Global Scene", The Polish Association of the Club of Rome, Oficyna Wydawnicza Rewasz, Warsaw 2006
- Kukliński A., Skuza B. eds. (2003) "Europe in the Perspective of Global Scene", The Polish Association of the Club of Rome, Oficyna Wydawnicza Rewasz, Warsaw 2003
- Li&Fung (2006) "Overview of the Industrial Clusters in China", Li&Fung Research Centre, May 2006.
- Lucas R (1990) "Why Doesn't Capital Flow from Rich to Poor Countries?", American Economic Review, May 1990.
- MacDonald J. A. (2007), "Alternative energy technologies promise pollution reduction, accessible power development", Energy Tech Magazine, <http://energy-tech.com/index.cfm?PageID=108&c2e=236&e2e=0&rs=0&artid=1162>
- Maxfield S. (1991) "Bankers' Alliances and Economic Policy Patterns Evidence from Mexico and Brazil", Comparative Political Studies, 1991
- Mead R. (2007) "Demystifying the Structured Credit Jargon and Identifying Opportunities", PIMCO European Credit Perspectives, May 2007.
- Meadows D. H., Meadows D. L., Randers J., Behrens III W. W. (1972), "The Limits to Growth", New York: Universe Books.
- Meadows D. H., Meadows D. L., Randers J. (1992), "Beyond the Limits", Post Mills, VT: Chelsea Green Publishing Company.
- MGI (2007) "The New Power Brokers: How Oil, Asia, Hedge Funds and Private Equity Are Shaping Global Capital Markets", McKinsey Global Institute, October 2007.

- OECD (2007) "OECD Reviews of Innovation Policy. CHINA. Synthesis Report", August 2007
- Radzikowski M., Rybiński K. (2007) "Achieving Sustainable Growth: Will New Europe Fly or Crawl in the 21st Century Global Knowledge Economy", in Nadolny A., Schauer T (eds). "The Future of Europe", Sustainable Development and Economic Growth?", Vienna 2007.
- Rodrik D. (2006) "Goodbye Washington Consensus, Hello Washington Confusion", *Journal of Economic Literature*, December 2006.
- Rybiński K. (2006) "Globalne nierównowagi", *Ekonomista* nr 4/2006 (in Polish)
- Rybiński K. (2007a) "Global imbalances: Hard or Soft Landing?. Implications for Monetary Policy", in Czyżewski A., Eijffinger S., Koedijk K. (ed) "Globalisation and Monetary Policy", ESI and CEPR, May 207.
- Rybiński K (2007b) "Meaningless Europe?", in Jakubowska P, Kuklinski A., Zuber P. (eds) "The Future of European Regions", Ministry of Regional Development, Warsaw 2007.
- Rybiński K. (2007e) "Three aspects of globalization. Offshoring, global imbalances, monetary policy.", Difin, Warsaw, May 2007 (in Polish). Several topics covered in the book are available in English at www.rybinski.eu.
- Rybiński K., Sowa U. (2007) "Global Reserves Management", *Ekonomista* nr 4/2007.
- Sala-i-Martin X. (2006) "The World Distribution of Income: Falling Poverty and ... Convergence Period", *Quarterly Journal of Economics*, May 2006.
- Spiegel online (2007), "Rethinking Renewables: Biofuels 'Emit More Greenhouse Gases than Fossil Fuels", <http://www.spiegel.de/international/europe/0,1518,508089,00.html>
- Tausch A. (2007) "'Destructive Creation"? Some long-term Schumpeterian reflections on the Lisbon process". Paper presented at the XVII Economic Forum, Krynica-Zdroj, Poland, September 5–8, 2007
- United Nations (2001), "Replacement Migration: Is It a Solution to Declining and Ageing Populations?", Population Division, Department of Economic and Social Affairs, United Nations, New York.
- United Nations (2006a), "The Millennium Development Goals Report 2006", New York.
- United Nations (2006b), "World Population Prospects 2006", New York.
- United Nations (2007), "World Population Ageing 2007", UN Economic and Social Affairs, New York.
- World Energy Council (2007), "2007 Survey of Energy Resources".
- Zerta M., Schmidt P, Stiller C., Landinger H. (2007), "Alternative World Energy Outlook (AWE0) and the Role of Hydrogen in a Changing Energy Landscape", Ludwig-Bölkow-Systemtechnik GmbH, Munich.

Appendix 1: Large investment projects of SWF and of other state units

	Fund / unit	Investment	Source of information
1	Lenovo Group, China 2004	USD 1.75 bn takeover of IBM's personal computer business by Lenovo Group	Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07
2	Qatar Investment Authority 2006	Qatar Investment Authority bought a \$205 million stake in Industrial & Commercial Bank of China Ltd. before the Beijing-based lender's \$22 billion public share sale	BN, Qatar State Fund Buys 20% of London Stock Exchange, Sep 20 2007
3	Kuwait 2006	Kuwait bought \$720 million worth of shares in Industrial & Commercial Bank of China Ltd. before the Beijing-based lender's \$22 billion public share sale	BN, Mideast to invest \$300 billion in China, Merrill Says, Sep 4 2007
4	China National Offshore Corporation (CNOOC) 2006	USD 2.3 bn investment in Nigerian oil and gas exploration. (Rising engagement of China in Africa and Latin America: More than 650 Chinese state companies invested in Africa, especially in sectors such as oil, other commodities and telecommunications. USD 1.6 bn assets were held by China in 2005).	Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07
5	China Investment Corporation (officially operating since September 2007) May 2007	Acquisition of a 9.9% stake in The Blackstone Group L.P. The USD 3 bn investment was made in the form of non-voting common units. Taking earlier experiences into account (vide Unocal) it is probable that China had had informal agreement of the Treasury Department.	1/ Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07 2/www.globalpolitician.com —Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
6	Delta Two (investment vehicle owned by the Royal Family of the Kingdom of Qatar) Qatar June 2007	Increase in the existing 7.6% stake in J Sainsbury plc (the oldest chain of supermarkets in Britain) to a total of 25% by acquiring an additional USD 1.5 bn stake, making Delta Two the largest single shareholder. Delta Two considers buying rest of the stakes.	1/ Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07 2/ www.globalpolitician.com —Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare, 10-08-07
7	China Development Bank and Temasek Holding Ltd June 2007	Investment in Barclays PLC for a respectively: — 3.1% stake, USD 3 bn — 2.1% stake, USD 2 bn (with a conditional offer to increase their investment to a combined total of USD 19 bn in case the planned merger with ABN Amro succeeds).	Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07
8	Saudi Basic Industries Corp. August 2007	Saudi Basic Industries Corp. completed the \$11.6 billion purchase of General Electric Co.'s plastic division on Aug. 31.	Abu Dhabi National to buy PrimeWest for C\$4 billion (Update5), Sep 24 2007
9	Mubadala United Arab Emirates September 2007	Mubadala, the arm of Abu Dhabi is paying \$1.35bn for 7.5 per cent Carlyle stake. The deal was struck at a 10 per cent discount to a valuation of \$20bn for all of Carlyle.	Bloomberg (BRF), Carlyle sells stake to Abu Dhabi—Financial Times, Sep 21 2007

	Fund / unit	Investment	Source of information
10	Qatar Investment Authority September 2007	QIA bought 20 percent of London Stock Exchange Group Plc in a deal worth about \$1.2 billion. QIA states that it bought the LSE stake as part of a plan to "build long-term investments in high quality businesses" and doesn't plan to make a takeover bid. Still, the fund "reserves its position in the event that a third party announces a firm intention to make an offer". Run for the LSE's 31% stake was submitted by Temasek as well. It is understood that Temasek put in a bid significantly lower than Nasdaq was looking for and has acknowledged it has little chance of winning the auction.	BN, Qatar State Fund Buys 20% of London Stock Exchange, Sep 20 2007 Bloomberg (IND) Independent: Temasek "Off the radar" in Nasdaq LSE stake deal, Sep 13 2007
11	Borse Dubai, September 2007	Borse Dubai agreed to a deal with Nasdaq in which the emirate will get 19.99 percent of the exchange and a 28 percent LSE holding in return for allowing Nasdaq to take control of Nordic exchange operator OMX AB.	BN, Qatar State Fund Buys 20% of London Stock Exchange, Sep 20 2007
12	Temasek Singapur	Temasek is a big investor in Standard Chartered and Barclays	Bloomberg (IND) Independent: Concern Grows Over Sovereign Wealth Funds, Sep 11 2007
13	DIC, Dubai International Capital (private—equity arm of Dubai Holding)	Purchase of HSBC stock (1 bn USD)	www.globalpolitician.com—Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
14	Istithmar and Dubai Group	2.7 per cent of Standard Chartered's shares. It have also stakes in Greece's Marfin Financial and Bank Islam Malaysia.	www.globalpolitician.com—Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
15	Dubai's ruling family August 2007	France and Germany allowed Dubai's ruling family to buy its stake in EADS maker of Airbuses and Eurofighters.	www.globalpolitician.com—Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
16	Temasek Holdings Singapur	Temasek Holdings, established in 1974, has an \$85bn portfolio that includes stakes in Singapore Airlines, India's ICICI Bank, China Construction Bank and Standard Chartered, the UK emerging markets bank.	www.globalpolitician.com—Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
17	Temasek Holdings Pte, September 2007	Singapore Airlines and parent Temasek Holdings Pte agreed to buy a 24 percent stake in China Eastern for \$918 million, ending talks that had lasted more than a year. The Singapore deal now needs support from two-thirds of China Eastern's minority shareholders at a meeting expected to be held in November. The government has already approved it. At the same time, Cathay Pacific Airways Ltd. and Air China Ltd. withdrew from the deal.	BN, Cathay Pacific falls after dropping China Eastern bid (Update 1), Sep 25 2007
18	Abu Dhabi National Energy Co. (Taqa), August 2007 Abu Dhabi National Energy Co. (Taqa), November 2007	In August Taqa completed a \$2 billion purchase of Pogo Producing Co.'s Canadian unit, Northrock Resources Ltd. Taqa is expected in November to close its acquisition of Pioneer Natural Resources Co.'s Canadian assets for \$540 million.	BN, PrimeWest rises as Canada reviews takeover rules (Update 1), Oct 4 2007 BN, PrimeWest rises as Canada reviews takeover rules (Update 1), Oct 4 2007

Appendix 2: Planned investments

	Fund / unit	Investment	Source of information
1	China Investment Corporation October 2007	The fund would be seeking 5 to 10 per cent stakes in BHP and Rio Tinto—Australian resources companies that are riding China's industrial boom.	Bloomberg (MAG), China may look to buy shares in BHP, Rio Tinto, Oct 3 2007
2	Qatar Investment Authority (50 bn USD) / Borse Dubai October 2007	Qatar last month said it owns 9.98 percent of OMX and asked Swedish regulators for permission to raise its stake without saying how much more it wants to buy. It is vying for control of OMX with Borse Dubai and Nasdaq Stock Market Inc.	BN, Qatar is mulling a bid for OMX, Prime Minister tells CNBC Oct 3 2007
3	China Investment Corporation October 2007	The market is speculating about possibilities to buy shares of China's enterprises listed in the Hong Kong stock-exchange. China Mobile Ltd. and China Life Insurance Co. were in the group of companies with the most significant growth.	BN, Hong Kong stocks advance to record on China Investment Fund, Oct 2 2007
4	Abu Dhabi National Energy Co. (Taqa), September 2007	Abu Dhabi National announced Canadian energy corporation—the PrimeWest acquisition for about CAD 5 billion (CAD 4 billion excluding debt). The offer was reviewed in routine procedure by Canadian Industry Minister. Transactions are checked under the Investment Canada Act whether it yield “net benefits” to the economy, such as more productivity or research and development. PrimeWest assets include properties in Montana, North Dakota and Wyoming. US reaction to the takeover by Taqa will be probably limited.	BN, PrimeWest rises as Canada reviews takeover rules (Update 1), Oct 4 2007 BN, Canada says PrimeWest bid will be reviewed ‘as others would’, Sep 25 2007 Abu Dhabi National to buy PrimeWest for C\$4 billion (Update5), Sep 24 2007
5	Abu Dhabi National Energy Co. (Taqa), November 2007	Taqa agreed to buy Pioneer Natural Resources Co.'s assets in Canada for \$540 million.	BN, PrimeWest rises as Canada reviews takeover rules (Update 1), Oct 4 2007

Appendix 3: Blocked transactions and actions of authorities

Controversial / incompleted investment projects of SWF and of other state units

	Fund	Investment	Source of information
1	CNOOC (China National Offshore Oil Corporation), 70% owned by the Chinese government July 2005	USD 18.5 bn bid to buy US oil major Unocal Oil Company Withdrawn due to Congressional opposition Finally, Chevron Corp., the second-largest U.S. oil company, bought Unocal with a bid \$700 million less than Cnooc's offer.	1/ Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07 2/www.globalpolitician.com —Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07) 3/ BN, PrimeWest rises as Canada reviews takeover rules (Update 1), Oct 4 2007
2	Dubai Ports Word (a company owned by the government of Dubai) 2006	Tthe attempt to acquire the Peninsular and Oriental Steam Navigation Company (P&O), domiciled in London, which was then the fourth largest ports operator in the world, running major US port facilities in New York, New Jersey, Philadelphia, Baltimore, New Orleans, and Miami. The eventually failed transaction was a catalyst for the debate on a reform of the existing CFIUS US (Committee of Foreign Investment in the United States) legislation in the US. Dubai Ports World was forced to sell five port terminals it acquired when it bought P&O in 2006.	Deutsche Bank Research: Sovereign Wealth Funds—State Investment on the Rise, 10-09-07 www.globalpolitician.com—Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
3	Temasek 2006	Controversial operation—Temasek Holdings purchased a stake in the company owned by the ousted prime minister of Thailand, Thaksin Shinawatra.	1/Bloomberg (IHT), IHT: US Fears overseas funds could 'buy up America' undue 2/ The Economist, The world's most expansive club—24-05-07
4	Gazprom 2006	A bid for Centrica, the UK utility—UK government was divided over this transaction.	www.globalpolitician.com —Sovereign Wealth Funds—a Potential Tool of Asymmetric Welfare (10-08-07)
5	Dubai Aerospace, September 2007 Canada Pension Plan, September 2007	Dubai Aerospace abandoned a NZ\$2.6 billion plan to buy 51 percent of Auckland International after two city councils with a combined 23 percent holding objected to the sale. Dubai's bid was endorsed by the airport company because it would help attract more airlines and passengers Offer to buy a significant minority stake of Auckland International Airport Ltd. The offer has not been officially made so far.	BN, Canada Pension Offers to buy Auckland Airport Stake (Update 4), Sep 19 2007 BN, Canada Pension Offers to buy Auckland Airport Stake (Update 4), Sep 19 2007
6	Norwegian Fund 'recently'	Norwegian fund pulled its investment out of Wal-Mart, citing accusations that it has violated child-labor laws and scuttled efforts by employees to unionize.	Bloomberg (IHT), IHT: US Fears overseas funds could 'buy up America' undue

Actions of authorities

	Who	Action	Source
1	G7, October 2007	Finance ministers from the G-7 countries and central bankers are to discuss during the meeting in Washington how to deal with the sovereign-wealth funds. Trichet said that the funds are becoming an issue which could hamper global prosperity if it is not solved.	BN, Trichet says state-run funds must act transparently, Sep 29 2007
2	EU	EU Monetary Affairs Commissioner Joaquin Almunia told the Financial Times that the funds could have their investments restricted in Europe unless they reveal more about their intentions and strategy.	BN, Trichet says state-run funds must act transparently, Sep 29 2007
3	US	The U.S. has urged the International Monetary Fund to help oversee governance and transparency issues with the funds.	BN, Trichet says state-run funds must act transparently, Sep 29 2007
4	OECD	Organization for Economic Cooperation and Development is working on ways governments can review the investments without hindering free trade and capital flows.	BN, Trichet says state-run funds must act transparently, Sep 29 2007
5	Great Britain	Public policy with regard to takeovers in Britain focuses almost exclusively on whether they are likely to damage competition. That's rarely the case with sovereign wealth fund investment.	Bloomberg (IND) Independent: Concern Grows Over Sovereign Wealth Funds, Sep 11 2007
6	Germany, August 2007	Angela Merker said that the legislation introducing restrictions on SWF takeover of German enterprises should be considered.	
7	European Commission	Actions directed toward the assessment whether SWFs do not endanger to the EU's free market.	
8	Canada	The takeover surge led the opposition Liberal Party to ask for a moratorium and a review of whether ownership rules are lax. Currently transactions are reviewed under the Investment Canada Act. Industry Minister can block a proposal if it wouldn't yield "net benefits" to the economy, such as more productivity or research and development. Former minister Maxime Bernier, appointed a panel to study the issue, including whether the law needs a new security clause for foreign takeover reviews.	BN, Canada says PrimeWest bid will be reviewed 'as others would', Sep 25 2007
9	EU, September 2007	The European Union executive adopted hard-fought proposals aimed at forcing big energy utilities to separate power generation from their transmission networks. The legislation will bar foreign firms from controlling European networks unless their companies play by the same rules as EU firms and if their home country has an agreement with Brussels. Russian officials said that such limits are against the free market spirit of the European Union and amount to state protectionism.	Reuters, 19-09-07—Update3—EU tackles Russia, utilities with energy shakeup