

# SCOR Papers

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## Aging: a Global Phenomenon

### Abstract

*Aging is a simple concept which nonetheless encompasses a multiplicity of more or less implicit meanings, the misuse of which can lead to serious misconceptions that need to be cleared up. The first one concerns the nature of the phenomenon, which is thought to be typical of wealthy nations. The first part of this paper attempts to show how misguided this view is. The second misconception has to do with the scope of the phenomenon, which some limit to the question of how to finance the growing number of retirees who are no longer in the workforce. The second part of this paper will seek to show how this view has been overly influenced by the specific situation of Europe and Japan, whose representative power is at best very limited.*

### 1 A global phenomenon

After having set aside the misconceptions that are too often drawn from the Preston curve, we will examine the multiple meanings of the concept of demographic aging before attempting to assess the global dimension of the phenomenon, which is in fact increasingly dominated by the situation found in the emerging and developing countries..

#### 1.1 The misleading findings of the Preston curve

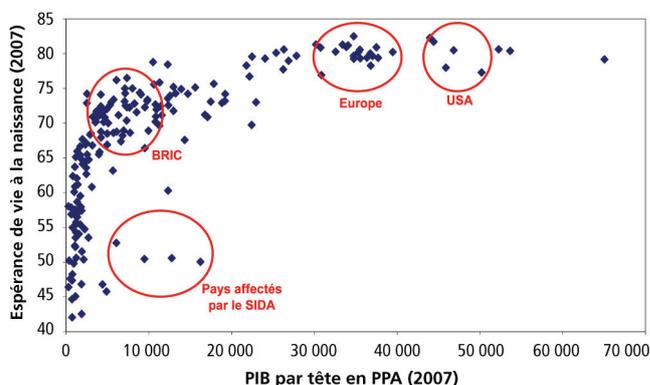
It is fairly widely accepted that the phenomenon of demographic aging is linked to development. In fact, when we correlate the level of development (as measured by per capita GDP) to life expectancy, we typically find the curve above, which was highlighted for the first time by Preston<sup>1</sup>: initially, life expectancy increases very rapidly as the level of development rises, then tapers off with higher levels of development, becoming practically flat for the highest levels of development.

It is often concluded that countries must move along this curve, and that development is accompanied by higher rates of life expectancy<sup>2</sup>. The phenomenon of demographic aging is thus thought to be one of the happy consequences of economic development. Barring unusual circumstances (such as a war or a revolution that has disproportionately impacted the youngest or the oldest segments of the population), demographic aging is considered to be a specific feature of advanced countries. As we will see, this conclusion is in fact the result of an error of perspective, since the Preston curve is not stable and presents its own translation movement, which is substantially more significant than the movement resulting from the movement across the curve towards higher levels of development.

In fact, income is not a significant determinant of health or life expectancy. For example, there is no relation between the shift in life expectancy and economic growth per capita between 1960 and 2000. As the examples of China and India illustrate perfectly, phases of positive relations alternate with phases of negative relations. There is a purely mechanical reason for this, to the extent that the reduction in infant mortality, which remains one of the main factors driving longer life expectancy, is initially reflected by a decline in per capita GDP. This statistical artifact masks the positive linkage that may exist between economic growth and life expectancy<sup>3</sup>.

But, more fundamentally, there are good reasons to think that economic growth might have negative consequences on health and on longevity, at least initially. For one thing, economic growth is generally associated with a process of rapid and uncontrolled urbanization, whose health repercussions for the affected population have a good chance of being negative, as we saw in 19th century Europe and in many emerging nations after the Second World War. For another, we observe the phenomenon of substitutability between investment expenditure in support of growth and healthcare expenditure per capita. Finally, the relationship between wealth and life expectancy is reversible and, in fact, the existence of a positive impact of health on level of income is better established than the inverse<sup>4</sup>.

### The Preston Curve



Source of data: United Nations and the World Bank

## 1.2 The multiple meanings of demographic aging

In its most common meaning, demographic aging refers to the phenomenon of the increase in the percentage of the oldest segment of the population and, more generally, in society. The graph below clearly shows that the phenomenon is not limited to industrialized countries, and that it affects every category of economy in the world, independently of the level of development. Since the early 1980s, for example, the percentage of the oldest segment in the least developed economies, as defined by the United Nations, is also trending upward, even though the phenomenon remains rather modest at this stage. Naturally, the phenomenon is much more perceptible in the daily lives of individuals living in industrialized economies. UN experts expect that the phenomenon of demographic aging will continue and will increase in pace over the next forty years. In the least developed countries, however, the acceleration is not expected to be significant until the end of the period, whereas for the industrialized countries the trend is expected to taper off at this same time.

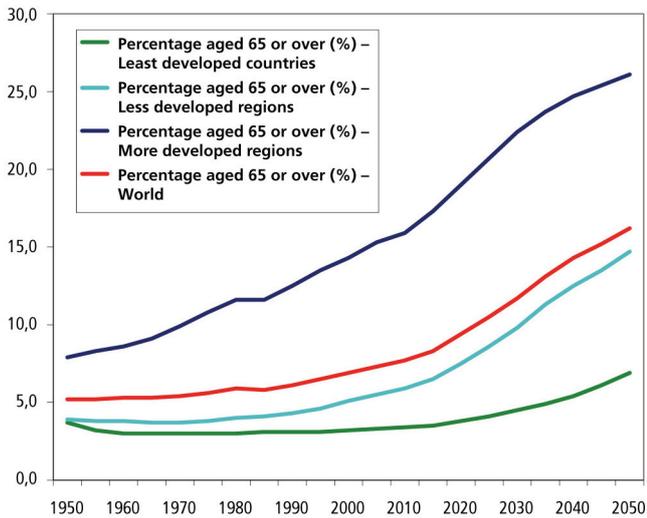
(1) See S.H. Preston (1975): « The Changing Relation between Mortality and Level of Economic Development », *Population Studies*, July

(2) See L. Pritchett et L.H. Summers (1996): « Wealthier is Healthier », *Journal of Human Resources*, 31/4

(3) Cf. D. Acemoglu et S. Johnson (2005): « Disease and Development: the effect of Life Expectancy on Economic Development », document de travail, MIT

(4) Cf. D. Cutler, A. Deaton et A. Ileras-Muney (2006): « The determinants of Mortality », *Journal of Economic perspectives*, Été

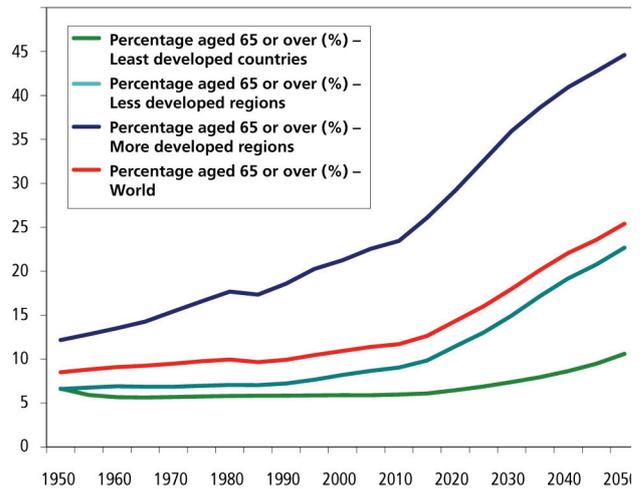
### People aged 65 and more as percentage of the population (%)



Source of data: United Nations and the World Bank

The term demographic aging is often used secondarily, in a less social and more strictly economic sense, to denote the rate of dependency, i.e., the ratio of people aged 65 or over to the working-age population, which is traditionally used in international comparisons to describe the 15 to 64 segment of the population. This concept of demographic aging refers to the relative capacity of an economy to bear the financial weight of non-working age or significantly less productive elderly persons. As we can see in the graph below, the rate of dependency that is attributable to the aged is trending upward around the world, including the least developed countries, where a trend reversal occurred in the 1960s. Naturally, the rate of dependency is growing faster in the industrialized countries. Echoing what they predict for most aged members of the global population, the UN's experts expect demographic aging to continue and accelerate over the course of the next forty years. In the least developed countries, this acceleration is not expected to become significant until the end of the period, whereas for the industrialized countries it will taper off at this same time.

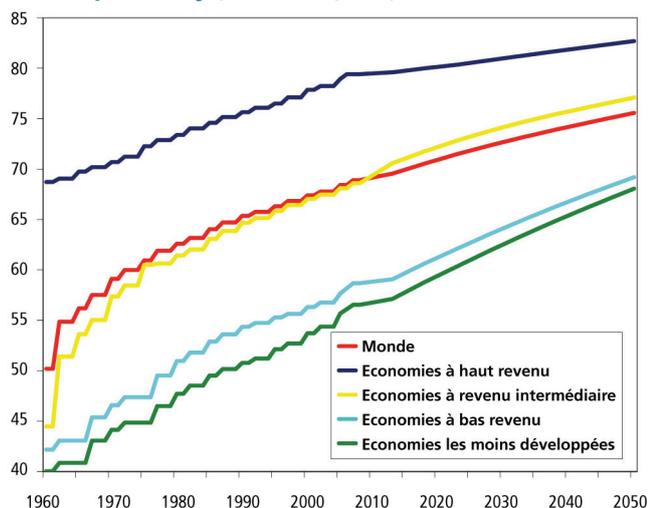
### Elderly Dependency Rate (%)



Source of data: United Nations and the World Bank

As we have observed in the past, the trends observed in the ratios presented above may be due to factors as different as longer life span, excessive infant mortality, lower fertility, wars or revolutions. The third meaning of the term demographic aging in fact seeks to narrow the phenomenon by relating it specifically to longer life span. Populations age because, on average, people are living longer and we have a longer life expectancy. In fact, our life expectancy has been increasing steadily over time since the early 18th century, when the phenomenon first appeared in Europe before spreading gradually to the rest of the world. This increase in life expectancy is itself linked to the prevention of infectious diseases, to the development of personal hygiene, to the improvement in eating habits and, more recently, to advances in the treatment of chronic and degenerative illnesses such as cardio-vascular disease and cancer. Because of its gradual propagation, periods of divergence in the situations between countries and social classes alternate with longer or shorter periods of convergence. The graph below shows that we are currently in a phase of convergence at the global level in terms of life expectancies, after many years of divergence that ended with the 1950s, and that this convergence is showing a tendency to accelerate.

### Life expectancy (number of years)



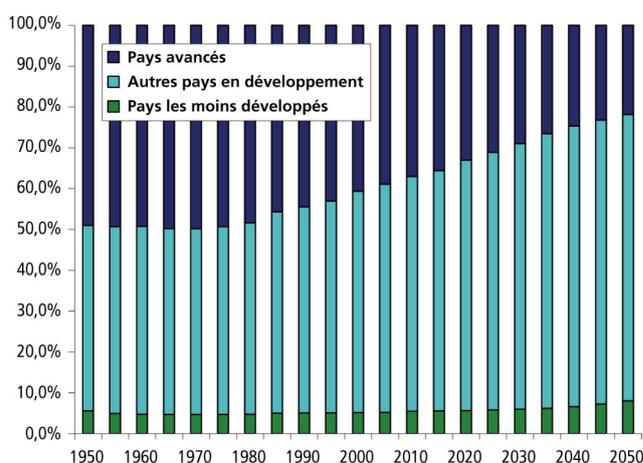
Source of data: United Nations and the World Bank

Naturally, this general movement toward convergence does not rule out one-off departures from the trend, in certain African countries, for example, adversely affected by AIDS, or in countries that were part of the former Soviet Union, where life expectancy has fallen significantly. UN experts think that the human life span will continue to increase in the decades to come, associated with greater convergence between countries due to a deceleration in the trend in advanced nations combined with an acceleration in the trend for the others. This forecast is, however, surrounded by many uncertainties linked to potential progress in the treatment of many diseases—AIDS, cardio-vascular ailments, neurodegenerative disorders—as well as those related to the consequences of obesity.

## 1.3 A global phenomenon dominated by developing countries

For some time now, the phenomenon of demographic aging has ceased to be specific to the advanced countries. It is true that until the beginning of the 1970s the percentage of individuals aged 65 and over worldwide increased modestly in the advanced nations. But since then, this percentage has been declining significantly and, based on the hypotheses presented above, this should continue to be the case in the years ahead. In fact, population aging is not just a global phenomenon; it is also and above all a phenomenon dominated by demographic changes within developing countries, which today represent nearly two-thirds of the world's population aged 65 and over and who are expected to account for about 80% by the year 2050. In other words, the issue of demographic aging in the advanced countries today is of limited interest for the treatment of the problem on a global scale. In addition, within the developing countries, the issue of demographic aging in the least developed countries is becoming increasingly important.

### Weight of those 65 Years and over in Population (%)



Source of data: United Nations and the World Bank

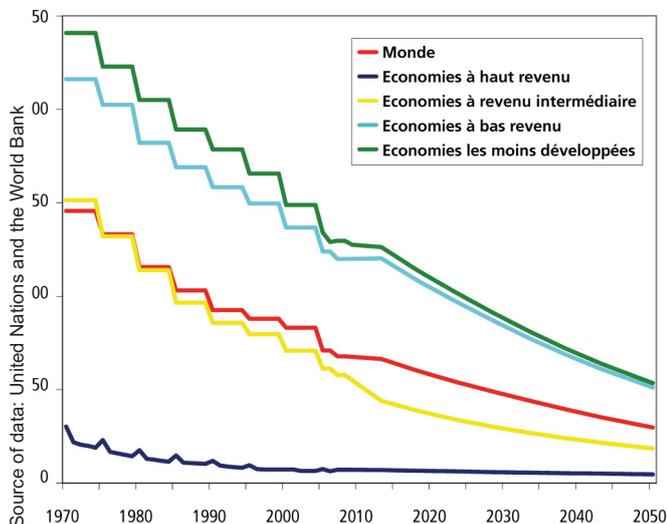
## 2 The economic and social consequences of global demographic aging

The multiplicity of meanings of the concept of demographic aging encompasses in reality three demographic dynamics that overlap and combine at the global level to model the trend in economic well-being, global inequalities, domestic financial challenges and global financial imbalances.

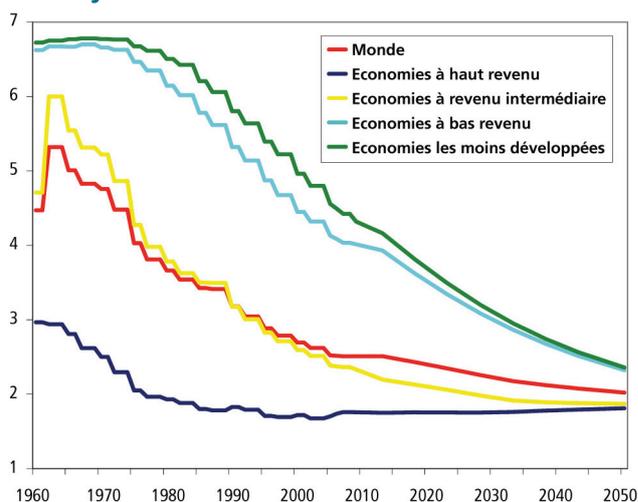
### 2.1 Global population aging dynamics

The phenomenon of demographic aging rests on a series of three demographic phases<sup>5</sup>. In the first phase, infant mortality declines. This trend began near the end of the 18th century in Western Europe and then spread gradually to the rest of the world. In some of the least developed countries, the decline in infant mortality began only in the course of the 20th century and even later, after the Second World War, for countries that include China. However, they are catching up and will continue to do so, at an extremely rapid pace, as the graph below indicates. In the course of this phase, which extends over approximately 70 years, the younger population grows more rapidly than the older population, with the educational and financial issues that this shift gives rise to. Most countries, including those that are the least developed, are well advanced along this phase, although they have not yet finished catching up with the advanced countries.

#### Child Mortality Rate (children less than 5 years old per 1000 live births)



#### Fertility Rate



In the second phase of the demographic transition, it is the fertility rate that begins to decline. This phase began between the end of the 19th century and the beginning of the last century in Western Europe, where it seems to have recently reached an end. Most countries, including the least developed ones, entered the second phase in the late 1970s or in the course of the 1980s, as the graph below indicates<sup>6</sup>, and the movement toward convergence is expected to continue in the years ahead. During this phase, the percentage of the youngest population segments decreases while that of the working-age population increases sharply, with the problems of unemployment and capital rationing that this shift in the age structure presupposes. As for the percentage of the population aged 65 and over, it continues to decline for a fairly long period, while fertility rates remain generally high, although they begin to come down before increasing in the final period of this phase, when working-age generations born during the decline in infant mortality begin to age.

(5) See R. Lee (2003): « The Demographic Transition: Three centuries of Fundamental Change », *Journal of Economic Perspectives*, Hiver

(6) It is interesting to note that the beginning of the series of UN data, which corresponds to the years 1960 to 1963, reveals a suspicious statistical leap for intermediary income economies and for the entire world.



In the third phase of the demographic transition, it is the life span or longevity of people aged 65 and over that is extended. Life expectancy does not extend at birth only; it also extends for the oldest members of the population. During this phase, the percentage of individuals aged 65 and over increases rapidly as four phenomena interact:

- The longer life span of individuals aged 65 and over, which increases the percentage of the total population aged 65 and over.
- The aging of numerous generations born in the period during which infant mortality was declining, which also accelerates the increase in the percentage of the population aged 65 and over.
- The passage to adult maturity of the generations born during the period when fertility was declining, which slows down the growth in the population segment aged 15 to 64.
- The pursuit of the decline in fertility among women, which slows down the rise in the population segment aged 15 and under.

The phenomenon of demographic aging corresponds in reality to this final phase of the demographic transition. As we can see from the general upward trend in the rate of dependency, this phenomenon is global. The vast majority of the world's population has entered this latter phase, albeit on "tiptoe" for the least developed nations (as defined by the United Nations). The countries of sub-Saharan Africa only entered this phase recently, as of 2005.

## 2.2 The social consequences of global population aging

Despite the multiple problems that it poses, the phenomenon of demographic aging is a positive social phenomenon, since it corresponds to an increase in life expectancy for all ages and in particular for the youngest members of the population. It appears that the overall rate of satisfaction with life, as measured by global Gallup surveys, is generally positively correlated with life expectancy or, to be more precise, with the improvement in life expectancy<sup>7</sup>. However, the rate of satisfaction declines sharply with age. This sharp decline is the highest for countries with intermediate income, attributable to behaviors observed in the Eastern European and ex-Soviet Union caused by the plunge in longevity observed in these countries. It is minimal in the advanced countries and modest in the low income countries.

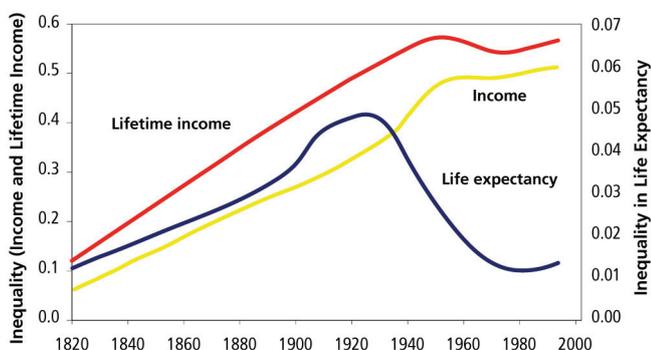
(7) See A. Deaton (2008): « Income, Health and Well-Being around the World: Evidence from the Gallup World Poll », *Journal of Economic Perspectives*, Printemps

But the rate of individual satisfaction is a complex indicator, which depends on a variety of factors, with life expectancy in fact playing just a modest role at the end of the day. This is why it is worth analyzing the trend in life expectancy in terms of economic well-being. The variations in well-being can be measured either by linking them to an average additional income for each year of life, or by identifying the additional income that would be needed to maintain the same level of economic well-being as today, but with a life expectancy that is lower than that reached today. The findings of this analysis in terms of economic well-being are extremely interesting. First, they reveal that the increase in life expectancy, which was the most rapid between 1965 and 1995 in the less developed countries, procured a per capita gain equal to three and a half times per capita GDP in the advanced countries, and five and a half times per capita GDP in the developing countries<sup>8</sup>. In countries such as Mexico, Egypt, Ecuador, Colombia and Chile, the gain is more than ten to fifteen times per capita GDP. And the gain attributable to increased life expectancy between 1965 and 1995 represents 5% of US GDP and 27% of Mexican GDP. Overall, the growth in human life's value was 37% higher in developing countries than in developed ones.

The consequences of this shift for global inequalities are extremely important, all the more so given that inequalities in life expectancy are probably more difficult to accept than income inequalities. While the global income gap continued to grow until well into the second half of the 20th century, longevity inequalities, which had been getting wider since the early 19th century, began to decline sharply in the 1930s. This decline accelerated after the Second World War. The combination of these two trends led to a substantial decline in inequalities in terms of the value of human life beginning in the 1950s<sup>9</sup>. In fact, the convergence of life expectancies has made a substantial contribution that is all too often overlooked, although it has a great deal of human significance, in reducing inequalities worldwide.

(8) See G. Becker, T.J. Philipson et R.R. Soares (2005): « The Quantity and Quality of Life and the Evolution of World Inequality », *American Economic Review*, mars

(9) See F. Bourguignon et C. Morrisson (2002): « Inequality among World Citizens: 1820-1992 », *American Economic Review*, septembre



Source : Bourguignon & alii (2002)

### 2.3 The economic consequences of global demographic aging

Demographic aging which, as we have seen, has historically made a fundamental contribution to the improvement in economic well-being worldwide, nonetheless poses a financial problem insofar as it is related to the decline and then to the disappearance of the capacity to generate the income needed for subsistence. Admittedly, longer life expectancy is generally associated with a longer period of time in the workforce. However, the phenomenon of rectangularization, i.e., the fact that people increasingly survive longer and die closer to longevity limits for human life and hence further from its lower limits, automatically leads to an increase in the number of aged individuals who are unable to meet their own subsistence needs and who therefore find themselves in one way or another—either through social taxes on payroll and wages or interest expense on the use of capital in economic activity—dependent on the working-age population. The rate of dependency, which is rising practically everywhere in the world, constitutes, as we have seen, an indicator of the potential financial pressure that could weigh on the working-age population due to the effects of demographic aging.

In most of the countries of the world, expenses related to an aging population are directly borne by those concerned, who must either save for old age or fall into poverty, or be cared for by their children. In practice, the three situations combine with one another.

It is rare that public or privately contracted systems of social security—such as the kinds seen in European social security frameworks or the pension fund approach favored by the Anglo-Saxon countries—exist in emerging or developing countries where, as we have seen, the vast majority of the over-65 population actually lives. When social security systems do exist, they tend to be partial and fragmented, as is the case in both India and China<sup>10</sup>. In China, the elderly often receive very small income transfers in the rural communities, while the more ambitious social security systems, which were initially set up by state-owned businesses and gradually pooled at the provincial level, cover just one-third of the urban population. Moreover, more than half of the urban population does not have any medical or healthcare insurance coverage at all. In India, the old age social security system covers just 10% of the working-age population and the system itself is running at a deficit, while the health insurance funds only cover civil servants and workers in the formal sector (10% of the population).

At the global level, the issue of demographic aging is closely tied to the life cycle saving<sup>11</sup>. In the first phase of demographic transition, centered on the decline in infant mortality, saving decreases because adults must devote a substantial portion of their income to a growing number of children. In the second phase of demographic transition, which combines lower fertility and adult maturity of the more numerous generations resulting from the decline in infant mortality, saving rises sharply even though the migratory balance of the working-age population becomes negative. It is during this phase that the problem of financing demographic aging appears, since the population aged 65 and over belongs to generations that did not save when they were adults because of the decline in infant mortality. In the third phase, which combines longer life expectancy and higher ages, the arrival of more and more generations of advanced aged individuals due to the decline in infant mortality and the adult maturity of fewer generations due to the decline in fertility, the rate of saving stagnates and then declines.

(10) See P.S. Heller (2006): « Is Asia Prepared for an Aging Population ? », FMI, working paper n°272

(11) See N. Batini, T. Callen et W. McKibbin (2006): « The global impact of Demographic Change », FMI, working paper n°9

In this phase, the problem of financing demographic aging remains because most households have not correctly anticipated the longer life expectancy and survival at higher ages and have therefore not set aside sufficient funds at a time when the rising rate of dependency limits the options for care by adults who are members of the working-age population. The problems of financing demographic aging relax when the generations born during the decline in fertility begin to age.

The combination of the various demographic transition phases in the world explains a good part of the global financial imbalances:

- In Europe, the problem of financing demographic aging is that of the increasing financial burden of covering old age for the working-age population, from income on which social security resources are based; the substantial transfers of income to older people are partially offset by saving, which remains surprisingly high because it is motivated by the desire to transfer estate to descendants; for this reason, this region of the world more or less balances its current payments.

- In the United States, the financing of demographic aging raises fewer problems to the extent that it is based on pay-as-you-go pension funds; due to the dynamic demography that results from immigration, the rate of saving is nonetheless very low and is feeding a current account payment deficit that has major repercussions on a planetary level.

(12) See R.N. Cooper (2008) : « Global Imbalances : Globalization, Demography and Sustainability », Eté

- In China, we see a problem in financing demographic aging that is fairly typical of the second phase of demographic transition; it is, however, aggravated by the plunge in fertility related to the single child policy, not to mention the under-development of the financial services sector (in particular the mortgage lending sector), lagging wage growth and deficient public health and education services. Accordingly, China has an exceptionally high volume of forced and precautionary saving which feeds a current account surplus that is itself exceptional.

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