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# THE OUTLOOK FOR WORLD DEMOGRAPHIC CHANGE AND GROWTH TO THE YEAR 2030

*The rise of working populations will slow down in all regions of the world over the next thirty years. Nevertheless, global economic growth (at 3%) is likely to be similar to that experienced during the last thirty years, thanks to a faster rise in productivity and the increasing importance of the more dynamic emerging countries. The shift of the world's economic centre of gravity to developing Asia will continue. On the other hand, there is likely to be little catch-up of the world's poorest regions, especially sub-Saharan Africa. A far greater investment effort will be required, if these regions are to benefit from the opportunities offered by the demographic situation over the next decades.*

Drawing up an economic outlook over a time horizon of thirty years is a difficult exercise which few economists undertake willingly, being convinced by past experience that it is a hazardous operation. But such long term forecasting is vital, both for company strategies as well as states, especially when it is necessary to estimate constraints linked to the environment and the availability of natural resources. Furthermore, models which are currently constructed to simulate medium term trends, such as computable general equilibrium models or macroeconomic models based on rational expectations, require a central, long-term scenario. The construction of such scenarios also makes it possible to underline the major trends that will structure the evolution of the global economy, over several decades.

## A Forecasting Model

The growth forecast conducted by the CEPII, through to 2030[1] is based on the neo-classical concept of conditional convergence of a closed economy: each country is assumed to converge on its own long term state of equilibrium, which is conditioned by its rates of investment in physical and human capital and by the demographic growth rate[2]. During the transition period, growth depends on the rate of investment and on demographic growth, as well as on technical progress. Technical progress then becomes the only engine of growth, once equilibrium has been achieved. This growth model is applied to all countries here, apart from the petroleum producers (whose growth is determined by the real price of oil and by growth in the rest of the world). Production functions are assumed to be identical for all countries. The pace of technical progress is the same as it has been over the last thirty years, except in the United States, Western Europe and developed Asia, where it will be a little more rapid. The demographic outlook is based on the central forecast by the UN[3]. The projections for investment rates in physical capital depend, in a non-linear way, on levels of productivity and, in certain cases, on hypotheses carried out "outside the model". Investment in human capital is linked to the level of development. The parameters for the growth model are those estimated by Mankiw, Romer and Weil (cf. footnote 2). They allow growth to be projected, on the basis of the assumptions made, for 138 countries and two regions[4]. The main results are given for 11 major regions.



1. This forecast is presented by Nina Kousnetzoff in, "Croissance économique mondiale: un scénario de référence à l'horizon 2030", ***Document de travail du CEPII***, 2001-21. It was carried out as part of the ARES project (***Analyse des stratégies de réduction des émissions de gaz à effet de serre***), which received support from the GICC research programme (Gestion et impact du changement climatique), conducted by the French Ministry of the Environment. A forecast to 2030 was already prepared by the CEPII in 1996, for a study of the world energy system ("Une image de l'économie mondiale à l'horizon 2030", ***La lettre du CEPII***, n° 148, juillet 1996).

2. This refers to a neo-classical model of exogenous growth with human capital, as described by N. G. Mankiw, D. Romer and D. N. Weil (1992), "A Contribution to the Empirics of Economic Growth", ***The Quarterly Journal of Economics***, May.

3. United Nations (2000), Department of Economic and Social Affairs, Population Division, ***World Population Prospects, the 1998 Revision***

4. For three regions, India, the former-USSR and Japan, the pace of convergence given by the model has been slowed down "outside the model". It is believed that the weakness of the economic, social or political institutions of these countries should lead to a downward shift in the growth path given by the model.

Table - Factors contributing to growth and per capita income - average annual growth rates, in %

| | Working population[1] | | Productivity[2] | | $GDP_{PPP}$ | | Population | | $GDP_{PPP}$ per capita | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1970-2000 | 2000-2030 | 1970-2000 | 2000-2030 | 1970-2000 | 2000-2030 | 1970-2000 | 2000-2030 | 1970-2000 | 2000-2030 |
| North America[3] | 1,2 | 0,4 | 1,8 | 1,6 | 3,0 | 1,9 | 1,0 | 0,6 | 2,0 | 1,3 |
| Western Europe | 0,8 | -0,2 | 1,8 | 2,1 | 2,6 | 1,9 | 0,5 | 0,1 | 2,0 | 1,8 |
| Japan, Pacific region | 0,8 | -0,3 | 2,4 | 2,0 | 3,2 | 1,6 | 0,8 | 0,0 | 2,4 | 1,6 |
| Eastern Europe | 0,5 | -0,4 | 1,9 | 3,2 | 2,5 | 2,8 | 0,4 | -0,2 | 2,1 | 3,0 |
| Former-USSR | 0,8 | 0,0 | -0,7 | 3,5 | 0,1 | 3,5 | 0,6 | 0,0 | -0,5 | 3,4 |
| Latin America | 2,6 | 1,3 | 0,9 | 1,9 | 3,5 | 3,3 | 2,1 | 1,1 | 1,4 | 2,1 |
| South-East Asia[4] | 2,7 | 1,0 | 3,5 | 2,9 | 6,3 | 3,9 | 1,9 | 0,9 | 4,3 | 3,0 |
| China | 2,1 | 0,5 | 4,2 | 4,5 | 6,4 | 5,0 | 1,4 | 0,5 | 4,9 | 4,5 |
| India sub-continent | 2,5 | 1,6 | 2,2 | 2,9 | 4,7 | 4,6 | 2,1 | 1,2 | 2,6 | 3,3 |
| North Africa and Middle East[4] | 3,3 | 2,1 | 0,6 | 0,9 | 3,9 | 3,0 | 2,8 | 1,6 | 1,0 | 1,4 |
| Sub-Saharan Africa | 2,8 | 2,7 | -0,4 | 1,1 | 2,4 | 3,8 | 2,7 | 2,1 | -0,3 | 1,7 |
| **World** | **2,0** | **1,1** | **1,2** | **1,9** | **3,3** | **3,0** | **1,7** | **1,0** | **1,6** | **2,0** |

[1] Population of working age (15-64 years old).

[2] $GDP_{PPP}$ per capita of the working population.

[3] Excluding Mexico, which is included in Latin America.

[4] Excluding some countries, which have not been included in the model, for lack of data.

*Sources*: UN, CHELEM and projections by the CEPII.

## Asia Remains Ahead

The characteristics of the demographic trends over the next thirty years play a key role in the forecasting results.

The growth of working populations[5] will slow down in all regions of the world. At the global level, the slowdown will be equal to nearly one percentage point in the rate of growth over the next three decades compared to the last three decades (i.e. 2% annual growth followed by 1.1%). However, economic growth will be more or less the same as it has been during the last thirty years: 3% on average for the period running from 2000 to 2030, compared to 3.3% for 1970 to 2000. Such global growth will be sustained by stronger productivity growth in many countries, due to higher investment. It also stems from the increasing weight in the world economy of fast-growing emerging economies.

The slowdown in working population growth rates is general, but it varies considerably depending on how far a country has evolved in the process of demographic transition. Apart from North America, all the industrialised regions of the world have experienced population growth that has been noticeably under 1%, over the last thirty years. On average over the next thirty years, this will lead to falls in the working populations. In contrast, working populations will continue to grow in less developed regions, at annual rates that are greater than 2% per annum in some cases. For these economies, the rising working population will remain an important factor for growth. This is especially so for those that have little progressed over the last thirty years and will experience productivity growth rates that will remain low in the future[6] (Table).

In the most developed countries - the ***United States,*** the ***European Union*** and ***Japan*** - economic maturity and demographic maturity go hand-in-hand. These countries are close to their equilibrium state: the main engine of productivity growth is technological progress. At less than 2%, GDP growth is lower than it has been over the past thirty years.

Demographic growth has been particularly weak for a long time in the ***former-USSR***, and even more so in ***Eastern Europe***, so that working populations are likely to experience a clear fall over the next decades. The break with the past which occurred in the 1990s has led to a massive elimination of obsolete plant and equipment and future investment may progress rapidly. But productivity growth will remain moderate, at the start of the period, due to persisting difficulties with the transition in several countries. Over the next thirty years, productivity growth should nevertheless average more than 3%, and GDP growth should be relatively high despite the demographic slowdown (2.8% in Eastern Europe, 3.5% in the countries of the former-USSR).

***Developing Asia*** is the region that will experience the fastest growth rates between 2000 and 2030, with GDP rising at an annual average of between 4 and 5%. However, in several countries fertility rates already fell some time ago, which leads to a fall in the growth rate of working populations. This shock is especially marked in China, where the number of persons of working age is set to fall from 2020 onwards. But the rate of productivity growth will continue to rise given the accumulation of capital, which will partly compensate for the slowing of demographic growth. In contrast, in South-East Asia, which has been industrialised for longer, accumulation will decelerate and will contribute to the slowdown of growth. The slowdown in the growth of the working population will be less pronounced for the Indian sub-continent, than in the other two regions, as the working population will continue to expand at an average rate of 1.6% per year.

5. The demographic forecasts by the UN provide trends by age groups. It is considered here that the working population is the same as the age group of 15 to 64 year-olds.

6. Using an exogenous growth model, the author has adopted the assumption that labour productivity growth rates will converge on a common value, equal to the rate of technological progress. But this convergence is slow, and the spread between countries will continue to be significant even in 2030.

Accumulation will rise too, leading to somewhat faster productivity growth only, as the economic take-off of the region remains recent and fragile. Overall, economic growth in the region is forecast to run at 4.6% per year from 2000 to 2030, which is comparable to the rate of the last thirty years.

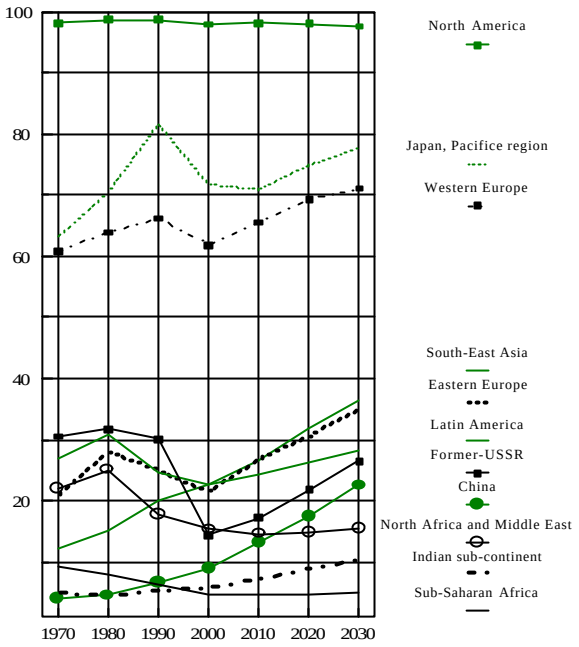
***Latin America*** is expected to experience a demographic evolution similar to that of the Indian sub-continent. Over the next thirty years, the working population will grow at a rate that is faster than the world average, though it will fall noticeably compared to rates over the last thirty years. But during the period stretching from 1970 to 2000, successive economic crises meant that growth was essentially based on the expansion of the working population, while productivity growth remained very low. The latter should rise to 2%, but will continue to be significantly lower that in the emerging Asian zones, due to insufficient investment and levels of education which remain low in several countries, including Brazil. Under these circumstances, growth is expected to remain at 3.3%, comparable to what it has been over the last thirty years.

***Sub-Saharan Africa*** is the only region in the world where the working population is set to rise at a high rate (2.7% per year), similar to the rate over the last decades. It is assumed that external conditions as well as internal reforms will allow investment to progress in a certain number of countries, which should lead to an average productivity growth rate for the region of 1% per year. Under these conditions, expansion of the working population will not be any more the only factor contributing to growth, and the annual increase of GDP could reach 4%.

Lastly, growth in ***North Africa and the Middle East*** will largely depend on changes in the price of oil. It is assumed that the real price of oil will remain more or less stable, through to the middle of the present decade, but will rise thereafter at an annual rate of 2% per year. Under these circumstances, growth in the region will not be greater than 3% per year.

These projections confirm that the world's economic centre of gravity is shifting rapidly. The older industrialised regions of the world, which are also ageing demographically, will see their share of the world's GDP fall rapidly over the following decades. As over the last thirty years, it will be developing Asia that will make up the ground lost by the industrialised countries: between 2000 and 2030, the share of world GDP produced by North America, Western Europe, Japan and the developed zones in the Pacific will fall by 15 percentage points (from 55% to 40%), whereas developing Asia will see its share of global GDP rise by 14 percentage points (up from 24% to 38%). Per capita GDP in this latter region will rise rapidly, with South-East Asia's GDP per capita attaining 36% of the US level in 2030 (Graph 1). In contrast, the catch up of the poorest regions of the world will be limited, though they will benefit from especially favourable demographic development.

Graph 1 - Comparisons of GDP PPP per capita, 1970-2030
(United States = 100)




*Sources*: CHELEM, UN and projections by the CEPII.

## A Demographic Opportunity

All regions of the world will experience demographic ageing as birth and adult death rates slow simultaneously. In the rich countries, which are well advanced in their demographic transition, such ageing will lead to a fall in the working population and a rise in the number of older people. Dependencies ratios (the ratio of inactive to active persons) will therefore rise, and income per capita will expand more slowly than productivity. In the poorest countries, which have entered their demographic transition much later, demographic ageing will lead to an increase in the size of the working population, to the detriment of the population of the under-15s. This is an especially favourable phase in the demographic transition, during which per capita income rises faster than productivity. Levels of GDP per capita should therefore converge, given that these countries are experiencing trends opposite to those occurring in the rich countries.

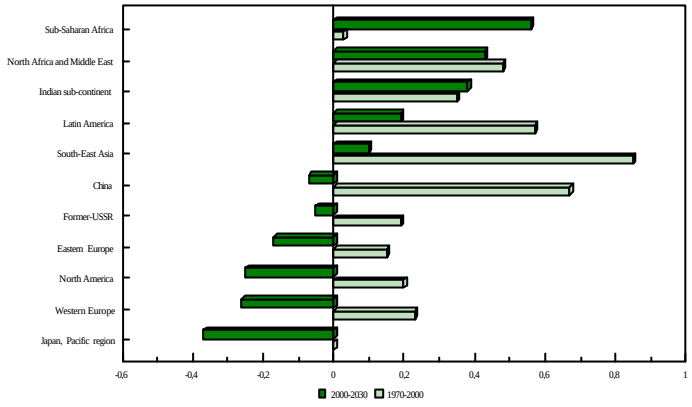
South-East Asia and China have especially benefited from this demographic opportunity, over the last thirty years[7]. But for China, the lag between the change in the working population and that of the total population will switch round in the period 2000-2030, as it will for the former-USSR and Eastern Europe (Graph 2). The significant rise in per capita GDP levels in these three regions, relative to the



7. See D. E. Bloom & J. G. Williamson (1998), "Demographic Transitions and Economic Miracles in Emerging Asia", ***The World Bank Economic Review***, vol. 12, n°3, September.

American level, will stem overwhelmingly from the productivity gains mentioned above[8].

Graph 2 - Gaps between the growth of working populations and overall populations (in % points)




*Sources*: CHELEM, UN and projections by the CEPII.

In the Indian sub-continent, North Africa and the Middle East, the lag will remain positive and important, before disappearing towards 2030. Sub-Saharan Africa is the region which is expected to benefit the most from this phase of the demographic transition.

Nevertheless, for the poorest regions, the gap in GDP per capita with the rich countries will remain considerable in 2030 (Graph 1). Africa's decline will not be reversed before 2010 and GDP per capita in sub-Saharan Africa is set to remain extremely low, according to the assumption used here (at only 5% of the American level in 2030). The GDP per capita level of the Indian sub-continent is expected to rise to only 10% of the American level, despite its acceleration. Still in relative terms, North Africa and the Middle East are expected to stagnate further.

The experience of several regions over the last decades indicates that the demographic factors, which have helped South-East Asia and China, may remain insufficient to boost growth, if investment levels are too low and do not substantially improve the productivity of the working population. In this area, the assumptions retained here are relatively optimistic as they assume an improvement for several regions of the world. But it is equally clear that they are not sufficient to guarantee catch-up, for Africa in particular. For the world's poorest regions to benefit from the one-time opportunities offered by demographic change and for there to be a significant reduction in global inequalities, domestic and international development conditions have to improve far more significantly.

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8. Demographics will continue to favour the catch-up of these regions, in a minor way, between 2000 and 2030, in as far as it is the relative situation (compared to the United States) which matters.

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