

## OUR FUTURE PENSIONS AND GLOBALISATION: AN EXPLORATION OF THE ISSUE USING THE INGENUE MODEL

***The demographic characteristics and disparities of pension schemes will lead to strongly contrasting trends in the supply and demand for capital across the various regions of the world, in this century. Capital transfers, which a priori are mutually beneficial, should be possible, thanks to financial globalisation. However, simulations carried out with the INGENUE model indicate that the scale of such transfers may put Europe in a delicate financial position, towards the middle of the century. The world outlook over the very long term therefore sheds new light on the debate surrounding European pension schemes. Two options are thus simulated: a postponement in the age of retirement or a partial substitution of redistribution schemes in favour of capitalisation. Both reforms, and especially the latter, would improve Europe's financial position. But capitalisation implies significant sacrifices in terms of living standards. Later retirement, along with the maintenance of full pension rights would seem to be preferable.***

The reform of pension schemes is much debated, often being backed up by detailed studies. But paradoxically, such work assumes a closed economy framework, thus ignoring a twofold aspect of the macroeconomic problems linked to demographic ageing. On the one hand, such ageing is a global process, though it occurs at different moments and speeds across the regions of the globe. Such disparities make it possible for inter-temporal trades to take place, which are advantageous to the world economy. On the other hand, financial globalisation is the vehicle of those trades. Taking these characteristics into account leads to results which are significantly different to those relating to a closed economy. INGENUE, a world model embodying overlapping generations, has been constructed especially to study such problems. The model makes it possible to explore the very long term economic consequences of the demographic transition.

### ■ The Demographic Transition and Financial Globalisation

The long term trend of demographic ageing across the world stems from the fall in fertility rates and the rise in life expectancy to an advanced age. Taken together, these two trends have a contradictory impact on the proportion of

dependent individuals relative to the working population (there are less children and more pensioners). Overall, if these fundamental trends persist, then this proportion - the dependency ratio - will rise throughout the century, at different speeds and at different moments, from one region across the world to another. This dependency ratio is one of the criteria which has been used to divide the world up into six regions, within the INGENUE model (see Box). Over the next decades, the ratio will rise strongly in the developed countries, under pressure from demographic ageing that will occur at the top of the age pyramid. This trend is at the heart of all discussions concerning the reform for Pay-As-You-Go (PAYG) pension schemes. However, the effect of demographic shifts on these economies is far from being limited to this perspective.

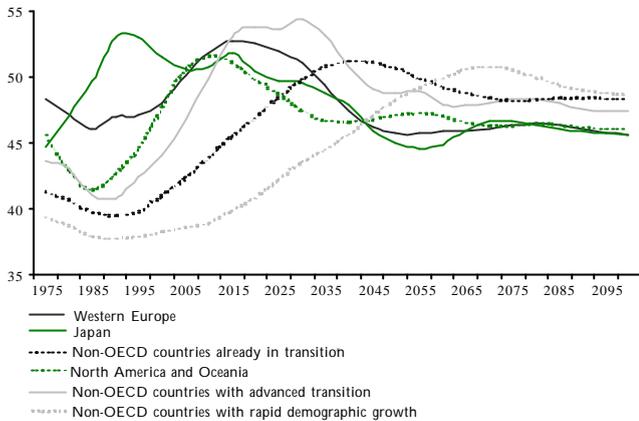
The life cycle hypothesis stresses the fact that cohorts aged from 40 to 65 are active and have the highest incomes. They also have progressively less responsibility for their children and so save more. Given such behaviour, demographic projections indicating these generations will become more numerous, at different points in time across the world, suggest that there will be important discrepancies in national savings rates. Thus, between 1995 and 2015, the share of the population with the highest savings will peak in the three developed regions of the world, before falling off (Graph 1). During the same period,

\* This issue of the *Lettre du CEPII* summarises the principle conclusions of a series of studies carried out using the INGENUE model. For more information, please refer to: "*INGENUE : Une modélisation intergénérationnelle et universelle*", Intermediate reports, for the CDC and the CNCT, December 1999 and December 2000, and "*Réformes des régimes de retraite de l'Europe dans un monde de marchés du capital intégrés*", a CEPII Working Paper, March 2001.

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the share of the three categories of developing countries will rise, with peaks then occurring between 2035 and 2070, depending on the region. An examination of these high savings “waves” helps understand the profile of savings in each of the regions over time.

Graph 1 - The high-saving population (40-65 years old) as a percentage of the total population



Source: Authors' calculations, INGENUE database.

Demographic trends will also influence the shifts in the demand for capital. A region experiencing a rise in its labour force will seek to “equip” its workers with capital equipment. As it happens, the regions in the world which are the most dynamic from this point of view are also those which currently have the lowest levels of capital per worker. In the developed regions, on the other hand, capital intensity is already high and the capital equipment needs of new workers are getting scarcer. It is this “de-synchronisation” of the demand and supply of capital across regions that will explain why capital transfers, facilitated by financial globalisation, will occur.

Populations with high savings rates in the developed, ageing countries will experience falls in the profitability of their financial wealth if they are only able to invest in property rights related to domestic capital. However, the global integration of capital markets makes it possible for them to invest in property rights in productive capital within those regions that have strongly growing labour forces. Everybody benefits from this transfer of savings. Financial integration equalises rates of return on capital throughout the world (due to transfers), bringing them to intermediate levels between the high rates prevailing in developing but financially autarkic countries and the low rates in developed countries facing a similar context. Savers in rich countries will thus receive a greater remuneration than they would in a state of autarky. As for the developing countries, they will be able to satisfy their greater capital needs, at a lower cost. Above all, real wages will rise more quickly thanks to the accumulation of capital financed by capital imports. In time, when these countries too achieve high savings rates, they will be able to pay off their foreign debts and finance those countries that will run down massively their savings as the numerous “baby boomer” generations go into retirement. While such capital transfers

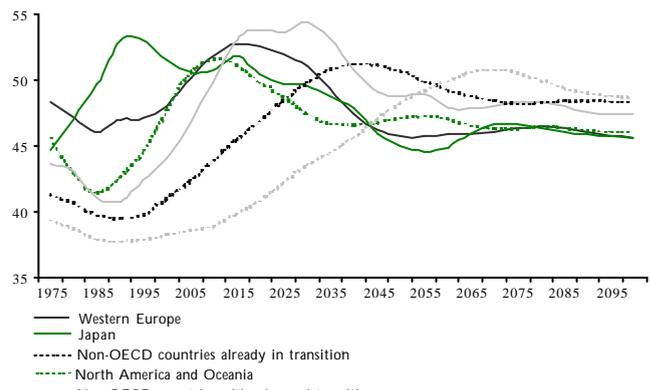
may *a priori* be mutually advantageous, they could also lead to unsustainable financial situations. This is what simulations by the INGENUE model suggest, based on an examination of Europe.

## Europe's Critical Financial Situation

According to this scheme, the intergenerational trade in capital at the global level follows from the demand and supply of capital in each region. These market forces depend on demographic movements and are conditioned by the institutional nature of retirement regimes, which fix both the age of retirement and the level of pensions. The scenarios for the “course of time” put forward here are based on average demographic projections made by the United Nations, and assume that retirement regimes remain the same as they currently exist in the different regions. However, the demand for capital also depends on the rate with which technological progress is spread. A rapid catch-up scenario assumes that the level of productivity in the least-developed regions of the world rises from 20% of the US level, in 2000, to 85% of America's level by 2100. In a slow catch-up scenario, these regions only attain 40% of the US level.

The interest rate and world growth profiles are significantly different in the two simulations (Graph 2). When catch-up is slow, the demand for capital in developing regions is essentially determined by the growth of the labour force, during the first two thirds of the century. Concomitantly, this demand for capital parallels an abundant supply of capital in the developed regions. As this latter trend is stronger, the interest rate falls during the first decades. Subsequently, it picks up somewhat, stabilising at about 3.5%, when the capital equipment needs of the developing countries are pulled by stronger productivity, and as the fall of savings in the developed countries is offset by a rise in the developing countries. The evolution is different when catch-up is rapid. The investment needs of the developing countries are then clearly greater during the first quarter of the century and will lead to a rise in the world interest rate. Ultimately, the rapid progress of incomes in these regions stimulates their savings too, so that the interest rate falls continuously until the end of the century.

Graph 1 - The high-saving population (40-65 years old) as a percentage of the total population



### BOX: THE INGENUE MODEL\*

INGENUE is a computable general equilibrium model which describes a world divided into six regions, on the basis of demographic and socio-economic criteria. There are three "developed" regions, whose demographic transition has already occurred (Western Europe, Japan, and North America-Oceania); three developing regions, whose demographic transition is either well underway (Eastern Europe and Asia, including China), or only partial (Latin America, Indonesia and Turkey), or still to come (the Middle East, Africa, Central America and Central Asia).

Each region is made up of three agents: households, companies and the public sector. There is only one good and one asset, both of which are traded at a single, real world price, with the corresponding markets assumed to be perfectly competitive and integrated at the world level.

The labour market is in equilibrium in each region, thanks to perfectly flexible real wages which enable the exogenous labour supply (determined by demographics and the legal retirement age) to match the demand for labour (which is endogenous) emanating from companies and dependent on the productivity of local, immobile labour.

The single good (which may be used indifferently for final consumption or for productive investment) is produced by companies employing local labour, in combination with productive capital. Technical progress is exogenous and raises total factor productivity in the United States: its rate of growth in other countries depends on the assumptions made about their progressive catch-up with the US.

Adult households have perfect expectations. However, while each individual cannot know his/her date of death, heterogeneity among households in terms of life expectancy allows the model to reproduce, at an aggregate level, a life expectancy which is in line with demographic projections. Households begin to choose to consume or to spend for a 5-year period, at the start of adult life, with the objective of maximising their inter-temporal utility function.

Lastly, the behaviour of the public sector in each region is focused on guaranteeing balanced accounts in the redistribution pension fund, for each period. Each regional system is characterised by two institutional parameters: the legal retirement age and the replacement ratio. Contribution rates vary in each period so as to balance the fund. The solution to the model determines, among other things, the net financing need of each region, and the configuration of global, current balances.

\* For a more detailed presentation see: "Vieillesse démographique et transferts internationaux d'épargne : premiers enseignements du modèle INGENUE", special issue of the *Revue d'Economie Politique*, pp 195 - 214, February 2001.

The contrast in demographic trends and the institutional disparities in retirement regimes work together to bring about marked differences in accumulated wealth, which in turn show up in the financial equilibria of the different regions with respect to the rest of the world. These financial situations are summarised by the net foreign asset positions of each region with respect to the world economy, as expressed by rates of ownership (the relationship between wealth accumulated by residents in a region and the productive capital available in that region): a region is a net creditor when its rate is above 100%, and a net debtor below 100%.

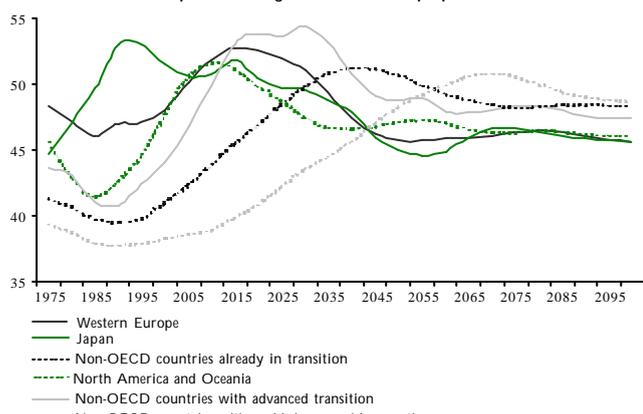
Whatever assumptions are made about world growth, a very spectacular fall is to be observed in Europe's ownership rate, as of 2030 (Graph 3). This is despite the fact that at the turn of the century Europe is in a strong creditor position: the population which saves markedly is still numerous, and finds profitable investment opportunities in the developing countries, especially when world growth is strong. But, the demographic shock wave of the "baby boom" generation

progressively leads to a very large number of retirees, while the labour force contracts relatively. Henceforth, and for several decades to come, the strong diminution of European households' savings rates will entail cumulative deficits and push the continent from being in credit to being strongly in debt. In the slow catch-up scenario, the ownership rate is set to run at 120% during the first quarter of the century, but will then fall to 60% as of 2060. In the fast catch-up scenario, the rate will fall from 240% in 2025 to less than 50% during the last quarter of the century. In the second scenario, savings will be greater in the catch-up regions, so that these regions will export more capital to the high income countries, including Europe. Such financial dependence by Europe on the rest of the world may be politically uncomfortable. Under these circumstances, the issue of pension scheme reform becomes unavoidable.

## Reforming European Pension Regimes

Retired households derive their income from pension rights which are financed by employees in work at any one time (redistribution) and from savings they have accumulated during their working lives (capitalisation). Compared to other regions in the world, Europe has the most generous public pension system: the retirement age is lower than elsewhere and the income replacement rate (the ratio of the average pension to the average gross wage) guarantees benefits which are higher than in any other part of the world relative to the salaries of active employees. The financial handicap Europe will face, as illustrated by the above scenarios, also follows on from the superposition of the massive, transitory shift into retirement and the maintenance of the present regime, which is especially favourable. This implies notably, according to the model, that

Graph 1 - The high-saving population (40-65 years old) as a percentage of the total population



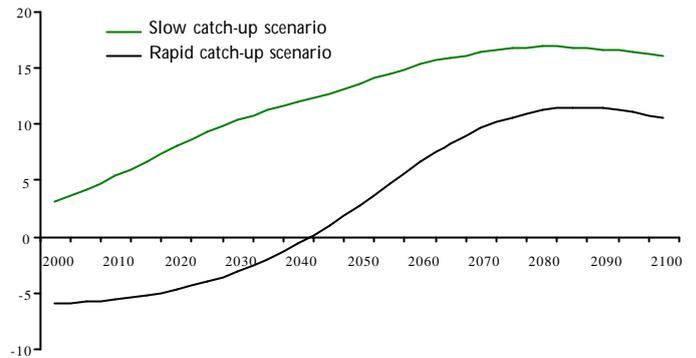
persons of working age will see their contribution rate rise from 24% to 46% of the wage bill, between 2000 and 2050.

Two alternative types of adjustment have been studied<sup>1</sup>. The first type consists of holding contribution rates at their level of 1999; which means programming the progressive and massive fall in the purchasing power of pensions. To meet this, working households are encouraged to save more. This scenario is thus based on the partial substitution of redistribution by capitalisation. The second type of reform consists of maintaining benefits, but raising the age of retirement progressively from 60 to 65 years, between 2000 and 2020. To be sure, these two types may be mixed. But, given the present state of the debate, it is more interesting to contrast the options, which are not based on the same philosophy: on the one hand, encouraging individuals to insure themselves against the loss of working wages, on the other hand, maintaining inter-generational solidarity and enlarging the size of the working population.

The macroeconomic consequences of the two scenarios are different. The capitalisation scenario strongly raises savings in Europe, and lowers the world rate of interest. **De facto**, Europeans will export a major share of their additional savings, by buying property rights on accumulating capital in regions that are demographically dynamic. Under these circumstances, Europe will remain a net creditor throughout the century, despite the counter-shock of the rapid increase in the number of pensioners, as of 2030. In contrast, the scenario based on expanding the working population will raise Europe's productive capacity. In this case, savings will increase with the rapid rise in the wage bill, but will be partly invested in Europe, in order to equip the additional working population. In this case, the other regions of the world will be encouraged to invest their savings in Europe. The result of this set of forces will be to raise the interest rate above the rate associated with the maintenance of contributions. The ownership rate will take on the same profile as the "no reform" scenario: Europe will remain a net debtor during the second half of the century. However, this debit situation will be less perilous and hence more sustainable as it will unfold in a more dynamic region (the ownership rate at the end of the century will stand at around 80%, rather than the 60% in the case of no reform, and 130% with partial capitalisation).

However, the soundness of such reforms cannot be gauged only with respect to global financial equilibria. More important to the population will be the impact of reform on consumption. Using this criteria, the contrast between the two scenarios is staggering (Graph 4). Average per capita consumption for the whole population is always weaker in the capitalisation case than if the retirement age is raised with **benefits remaining unchanged**. Capitalisation is even costly,

Graph 4 - Average consumption with the two reform scenarios (the % spread with respect to the "no reform" scenario)



Source: Authors' calculations.

compared to the "no reform" scenario, as it leads to a relative fall in consumption throughout the first half of the century! On the contrary, the progressive raising of the retirement age, combined with the preservation of the current generosity of pension schemes financed by redistribution, will always lead to higher consumption than in the "no reform" scenario. This result is sufficiently clear-cut and robust with respect to uncertainties concerning world growth to allow this option to be judged as preferable, if Europeans do indeed want a higher standard of living rather than a shorter working life.

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1. In this exploratory study, the date announced for reform is fixed at 2000, by convention. Reform only takes place in Europe, whereas the other regions of the world are assumed to remain unchanged.

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