

AUGUR PROJECT

Europe and the world in 2030

The effect of population ageing on the European economic evolution over the next decades

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1. Introduction

Population ageing represents a relevant issue in the analysis of the economic evolution of the economies in the future decades. The macroeconomic consequences of population ageing are several and very important.

First of all, population ageing has a direct and negative effect on labour supply. This negative effect may be partly offset by a rise in labour participation (in particular for females) and migration flows, even if they are uncertain due to the influence of several factors such as natural disasters, political instability, migration policies, etc. In addition, the change in the age structure of the population could produce mismatches in the labour market and then important reallocations of workers between sectors, requiring a rise in job mobility.

Population ageing may affect not only the quantity of labour supply but also the quality. The effect is positive if we consider the increase in educational attainment levels with respect to past generations, but negative if we consider that an individual's productivity declines with age.

One of the most serious effects of population ageing is on the evolution of the public expenditure and then on public savings. The strong increase in the old-age population will make, without any reform, the health care systems and the pension systems unsustainable in the future decades. Population ageing will also deeply affect private savings. Considering that savings depend on an individual's age according to the life-cycle theory, private savings will be deeply affected by the change in the age structure of the population. The evolution of private savings also depends on the individual behaviour in terms of precautionary savings and bequests. In addition, pension reforms that affect the generosity of the system may induce important changes on an individual's savings.

The strong reduction in labour supply will determine a substitution effect in favour of capital and a decrease in the marginal productivity of capital. The reduction in real interest rates will be greater in regions where the population ageing phenomenon is more important and this may induce significant international capital flows.

Thus, by affecting the size of the workforce, labour productivity, national savings, and international capital flows, it is clear that population ageing will produce important effects on the evolution of GDP.

In this work, we firstly analyse the characteristics of the demographic evolution of the most important world zones. Then, we describe the main characteristics of their pension schemes and we present the projections of the pension expenditures presented by international institutions such as the European Commission and the IMF. Then, using the CAM model, we evaluate the macroeconomic effects on the world zones for the period 2010-2030 by considering two scenarios. The first one is focused on the developed countries where pension reforms reducing the generosity of the system are implemented, while the second one considers the progressive launching of pension systems in emerging countries.

2. Demographic evolution

2.1 Demographic evolution in European countries

The demographic context in European countries is characterised by a decrease in fertility rates, an increase in life expectancy and net migration inflows that are expected to continue. In particular, fertility rates are strongly below the replacement levels (due to birth control, higher female educational attainment and participation in the labour force, changes in family formation patterns) and below the fertility rates of the previous decades. For example, in 2004, the fertility rate was 1.9 children per female in France and 1.3 in Germany and Italy. Life expectancy at birth increased by 8 years in EU25 countries between 1960 and 2000 and is expected to rise by 7 years in 2050. The annual net migration inflows to the EU25 currently amount to 1.3 million people and are expected to reduce to 800 000 by 2015. Of course, migration can be considered as an important tool to offset some of the economic effects of ageing. Tables 1 and 2 show the evolution of the fertility rates and the life expectancy at birth in Europe.

Table 1: Evolution of the Total Fertility rate (European zones)

	1955-1960	1975-1980	1995-2000	2005-2010
Eastern Europe	2.75	2.07	1.29	1.41
Northern Europe	2.52	1.80	1.70	1.83
Southern Europe	2.60	2.26	1.33	1.43
Western Europe	2.49	1.66	1.52	1.63
United Kingdom	2.49	1.73	1.74	1.83
Italy	2.29	1.94	1.22	1.38
Spain	2.70	2.55	1.19	1.41
France	2.70	1.86	1.76	1.97
Germany	2.30	1.52	1.34	1.36

Table 2: Evolution of the Life Expectancy at birth (European zones)

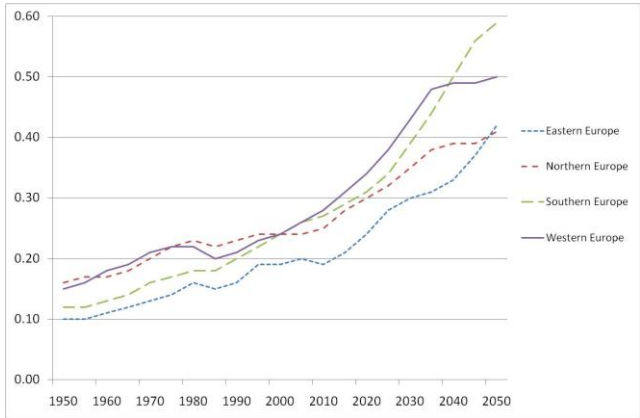
	1955-1960	1975-1980	1995-2000	2005-2010
Eastern Europe	67.0	69.0	67.9	69.7
Northern Europe	70.5	73.0	76.6	79.0
Southern Europe	66.3	72.8	77.3	79.7
Western Europe	69.5	73.2	77.8	80.3
United Kingdom	70.5	72.9	77.1	79.6
Italy	68.4	73.4	78.7	81.4
Spain	67.5	74.1	78.5	80.5
France	69.4	73.7	78.5	81.0
Germany	69.1	72.5	77.4	79.8

The direct consequences of these phenomena are the reduction in the total size of population and the dramatic change in the age structure of the population. In particular, population is projected to rise from 457 million in 2004 to a peak of 471 million in 2027, and thereafter to decline to 454 million in 2050. Significant falls are projected for Germany (−6%), Italy (−7%) and Poland (−12%).

The share of people aged 0-14 in the total population is projected to decline, and their overall number in the EU25 will drop by 19%, the share of people aged 15-64 in the total population is projected to decline by 16%, the population aged 65+ will rise sharply, by 58 million (or 77%), and the population aged 80 and more will rise by 174%.

The population ageing problem is resumed by Figure 1 which presents for concerning for different European zones the evolution of the old-age dependency ratio, i.e. the ratio between the population aged 65 and more and the population aged 15-64. This figure shows that population ageing concerns all of these zones, especially Southern Europe.

Figure 1: Evolution of the old-age dependency ratio (European zones)



2.2 Demographic evolution in the rest of the world

Among the countries of the rest of the world, China and Japan show the most spectacular population ageing process. In particular, the old-age dependency ratio in China is expected to increase from 11% in 2011 to 40% in 2050 and the population aged 65 and more is expected to triple in the same period. Life expectancy at birth is projected to increase from 73 to 80 years, and the one-child policy leads to a fall in the fertility rates (according to China’s Census, the fertility is actually 1.3).

Japan, which displays one of the lowest levels of fertility rates, is and will be the oldest country in the world. In addition, the population ageing is also very fast. Looking at the evolution of the old-age dependency ratio, the ageing process seems to begin in 1970 and to continue until at least 2050.

In India, the population growth rate has declined consistently from 2.25% in 1980-85 to 1.62% in 2000-05, and is estimated to be 0.25% in 2045-50. The life expectancy is expected to increase from 60 to 64 years in 2050. The increase in the old-age dependency ratio, in the period 2010-2050, is quite moderate.

Finally, concerning the United States, the old-age dependency ratio is expected to increase until 2030. After this date, the demographic problem seems to disappear.

Figures 2 and 3 show the evolution of the old-age dependency ratio respectively in these four countries and in the most important world zones.

Figure 2: Evolution of the old-age dependency ratio in some countries of the rest of the world

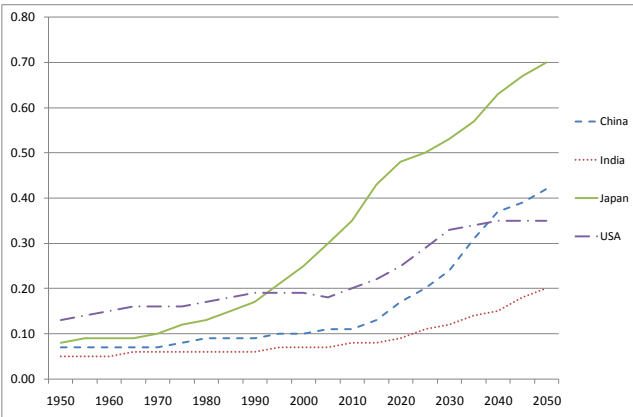
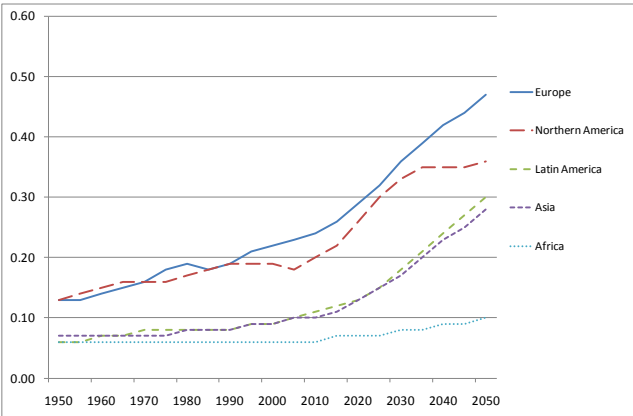


Figure 3: Evolution of the old-age dependency ratio in the world zones



Tables 3 and 4 show the evolution of the fertility rates and the life expectancy at birth in the world zones.

Table 3: Evolution of the Total Fertility rate in the world zones

	1955-1960	1975-1980	1995-2000	2005-2010
WORLD	4.89	3.84	2.79	2.52
AFRICA	6.66	6.57	5.23	4.64
ASIA	5.58	4.05	2.65	2.28
EUROPE	2.64	1.98	1.42	1.53
LATIN AMERICA	5.92	4.47	2.73	2.30
NORTHERN AMERICA	3.64	1.80	1.93	2.03
United States of America	3.71	1.79	1.96	2.07
China	5.48	2.93	1.80	1.64
Japan	2.16	1.83	1.37	1.32
India	5.90	4.89	3.31	2.73

Table 4: Evolution of the Life Expectancy at birth in the world zones

	1955-1960	1975-1980	1995-2000	2005-2010
WORLD	49.8	60.7	65.2	67.9
AFRICA	40.3	48.5	51.6	55.2
ASIA	45.0	59.8	66.2	69.0
EUROPE	68.0	71.2	73.1	75.4
LATIN AMERICA	54.2	63.1	70.6	73.4
NORTHERN AMERICA	69.8	73.3	76.6	78.2
United States of America	69.7	73.3	76.4	78.0
China	45.0	66.3	70.8	72.7
Japan	66.3	75.3	80.5	82.7
India	40.9	54.2	60.7	64.2

3. Overview of the pension systems

3.1 Pension systems in Europe

The large majority of pension systems in the EU27 are compulsory and public pension systems financed on a pay-as-you-go (PAYG) basis, i.e. current contributions are used for the payments of current pensions. Several countries have introduced occupational pension schemes, private mandatory (or quasi mandatory) schemes (in particular Denmark, Estonia, Hungary, Iceland, Netherlands, Poland, Slovak Republic and Sweden this scheme represents more than 40 of total mandatory pensions), and private voluntary schemes (in particular the United Kingdom and Ireland).

Most EU countries provide defined-benefit pensions (pension benefits depend on the amount of earnings and service years and are not directly linked to contributions) even if, recently, some countries (in particular Sweden and Italy) introduced a Notional-Accounts system.

Most pension schemes also provide early retirement, disability and survivors' pensions and minimum guarantee pensions (covered by general taxes).

A few EU countries introduced a “sustainability factor” or other mechanisms (depending on expected demographic changes such as the life expectancy at the time of retirement) in the computation of pension benefits (Germany, Slovenia, Finland, Italy, Portugal and Sweden).

Many pension reforms have been introduced during the last twenty years. Most frequently, reforms were parametric reforms (increase in the legal retirement age, modification of the indexation rule of pensions, introduction of a “sustainability factor”, increase in the contribution rate, etc...), while only few countries introduced structural reforms such as the introduction of a Notional-Accounts system (Sweden, Italy, Poland, Latvia).

3.2 Chinese pension system

The Chinese pension system, introduced in 1949, has been deeply reformed in the early years of the 1990s after the publication in 1997 of a report in which the World Bank recommends a multi-pillar system, with a significant fully-funded second pillar. This led to an attempt to build a multi-pillar system for the entire urban population with basic pensions, mandatory individual accounts and voluntary pension savings supported by tax concessions. The system was supposed to lead to a 58.5% replacement rate (20% from the first pillar and 38.5% from individual accounts).

However, the pension system is characterised by two relevant problems. First, current contributions were used to pay the pensions of current retirees, implying that the individual accounts became quickly empty, and second, only 55% of urban employees and 12% of rural workers paid contributions to the pension system in 2008. The low compliance may be explained by the high contribution rate (28% of wages) and by the fact that people do not trust the system. The consequence is that the size of the pension system is very low. Basic pension scheme for urban employees represents 2.5% of GDP in terms of expenditures and 2.7% of GDP in terms of contributions.

Given that previous reforms were not sufficient to construct a stable and financially sustainable pension system, some new reforms are considered, in particular the transition from the current system, which has become a pure PAYG system, to a Notional-Accounts system.

3.3 India

Various pension schemes exist in India and are largely privately managed at individual level, but they are limited only to the organised sector of the labour force. In 2004, a new reform was introduced (New Pension System, NPS) for all new public employees. The new system is a Defined Contribution based pension scheme similar to the individual retirement accounts in the USA. The same kind of reform was introduced by Chile, and later followed by other Latin American and Eastern European countries. Even if the parameters of the new pension reform are in line with best practice (the total contribution rate is 20%, the targeted replacement rate is 50%, participants may choose among

different investment options), the main problem is related to the fact that the participation to this system is mandatory only for new public employees, implying that only 13% of the workforce is currently covered by pension schemes. Another problem is that the gross replacement rates in India are significantly lower than the OECD average (40% vs. 60%).

3.4 Japan

The Japanese pension system is a mandatory public system that includes basic pensions (corresponding to 15.8% of average earnings and indexed on prices), social insurance (including health insurance, employee pension insurance, employment insurance, and workers' accident compensation insurance) and defined benefit pensions.

Several parametric reforms have been introduced (1985, 1990, 1994, 2000 and 2004) including the modification of the indexation rule, the increase of the legal retirement age and the introduction of an automatic mechanism (similar to the sustainability factor adopted in Germany) that modifies the amount of pension benefits in order to guarantee the viability of the pension system.

3.5 United States

The pension system in the US is a mix of defined-benefit and defined-contribution plans even if the role of the defined-contribution plans has increased during the last three decades: in 1980, 32% of active members of an occupational pension scheme were covered by a defined-contribution plan and this proportion doubled over the next 15 years to reach 64% by 1995, and grew further to 71% by 2003. In 2008, 46% of employees are members of an occupational pension scheme and 35% have personal plans. Because some people have both plan types, overall coverage of voluntary private pensions is 58%.

Voluntary private pensions represent 40-45% of the overall retirement-income package. In 2011, about 60% of American households nearing retirement age have 401(k)-type accounts which are the most common types of retirement-savings accounts. The benefit formula, used to compute public defined-benefit pensions, is progressive.

4. Projections of the pension expenditures until 2030

First of all, the evolution of the pension expenditure depends on the evolution of the old-age dependency ratio, i.e. the ratio between persons aged 65 and over and persons aged 15-64, of the coverage ratio, i.e. the ratio between the number of pensioners and persons aged 65 and over, of the employment rate, i.e. the ratio between the number of workers and the working age population, and of

the benefit ratio, i.e. the ratio between the average pension and the average wage. In particular, the results of the projections are very sensitive to changes in the productivity growth rate and to changes in the employment rate.

4.1 Projections concerning the European Countries

In 2006, the ECOFIN Council gave a mandate to the Economic Policy Committee (EPC) to update the pension expenditure projections, on the basis of a new population projection by Eurostat, which was released in April 2008. The projections were made on the basis of common macroeconomic assumptions and reflecting the current legislation in order to improve comparability across countries.

The projections of public pension expenditure show an increase of 2.4 p.p. of GDP over the period 2007-2060 in the EU countries. In particular, the public pension expenditure is projected to increase by more than 10 p.p. of GDP for some countries like Greece, Cyprus and Luxembourg, and to increase between 5 to 10 p.p. for Malta, Spain, Romania, Ireland and Slovenia. For the majority of the EU countries the projected increase is below 5%, while few countries are expected to reduce the pension expenditure over the entire period (Poland, Estonia, Denmark, Italy and Latvia).

Table 5: Pension projections in the EU-27 Member States, 2007-2050

	2007	2030	2050
Belgium	10.0%	13.9%	14.7%
Denmark	9.1%	10.6%	9.6%
Germany	10.4%	11.5%	12.3%
Ireland	4.0%	5.4%	8.0%
Greece	11.7%	17.1%	24.0%
Spain	8.4%	10.8%	15.5%
France	13.3%	14.5%	14.5%
Italy	14.0%	14.8%	14.7%
Luxembourg	8.7%	14.2%	22.1%
Netherlands	6.6%	9.3%	10.3%
Austria	12.8%	13.8%	14.0%
Poland	11.6%	9.4%	9.1%
Portugal	11.4%	12.6%	13.3%
Sweden	9.5%	9.5%	9.0%
United Kingdom	6.6%	7.6%	8.1%
Norway	8.9%	12.7%	13.3%
EU 15	10.8%	12.2%	12.9%
EU 25	10.3%	11.9%	12.8%

4.2 China

Simulations presented by Sin (2005) using the World Bank PROST model show that the Chinese pension system is not financially sustainable. Without any reforms, the system would require a 37% contribution rate to be sustainable. In order to provide an acceptable level of pension (40% replacement rate) it would be necessary to adjust the annuity factor by taking into account for the life expectancy at retirement, to increase the retirement age to 65 and to increase the coverage from the current 50% of urban population to a much higher level. Projections shows that pension expenditures will pass from 2.2% of GDP in 2010 to 2.4% in 2030 and 2.6% in 2050.

4.3 India

Considering that the demographic problem is not very severe in India and that the coverage level is low, projections show that the pension expenditure will pass from 1.7% of GDP in 2010 to 2.1% in 2030 and 0.9% in 2050.

4.4 Japan

Given the numerous reforms introduced, and in particular the one introduced in 2004 which reduces the value of pension benefits in order to maintain the viability of the pension system, the pension expenditure with respect to GDP will remain essentially constant (10.3% in 2010, 10.1% in 2030 and 11% in 2050).

4.5 United States

The pension expenditure with respect to GDP is expected to increase from 4.9% in 2010 to 6% in 2030, and then to remain constant.

Table 6: Pension projections in Advanced and Emerging Economies (Source: IMF, 2010)

	2010	2015	2020	2030	2040	2060	Change, 2010 to 2030
<i>Advanced economies:</i>							
Australia	3.1	3.4	3.7	4.3	4.6	4.8	1.2
Austria	12.7	12.8	13.0	13.8	13.9	14.0	1.1
Belgium	10.3	10.9	11.8	13.9	14.6	14.7	3.6
Canada	4.7	5.1	5.6	6.3	6.1	5.9	1.6
Cyprus	6.9	7.6	8.4	10.0	11.9	14.4	3.1
Czech Republic	7.1	6.9	6.9	7.1	8.4	10.2	0.0
Denmark	9.4	10.2	10.6	10.6	10.4	9.6	1.2
Finland	10.7	11.8	12.6	13.9	13.6	13.3	3.2
France	13.5	13.5	13.6	14.2	14.4	14.2	0.7
Germany	10.2	10.1	10.5	11.5	12.1	12.3	1.3
Greece	11.6	12.2	13.2	17.1	21.4	24.0	5.5
Iceland	4.0	4.4	5.0	6.0	6.6	6.9	2.1
Ireland	4.1	4.3	4.6	5.4	6.4	8.0	1.3
Italy	14.0	14.0	14.1	14.8	15.6	14.7	0.8
Japan	10.3	10.8	10.6	10.1	10.7	11.0	-0.2
Korea	0.6	0.8	1.2	2.2	3.4	4.4	1.7
Luxembourg	8.6	8.9	9.9	14.2	18.4	22.1	5.6
Malta	8.3	9.1	9.3	9.3	10.5	12.0	1.0
Netherlands	6.5	7.2	7.8	9.3	10.3	10.3	2.8
New Zealand	4.7	4.8	5.3	6.7	7.7	8.0	2.0
Norway	9.6	10.8	11.5	12.7	13.4	13.3	3.1
Portugal	11.9	12.1	12.4	12.6	12.5	13.3	0.7
Slovakia	6.6	6.3	6.3	7.3	8.3	9.4	0.7
Slovenia	10.1	10.6	11.1	13.3	16.1	18.2	3.2
Spain	8.9	9.2	9.5	10.8	13.2	15.5	1.9
Sweden	9.6	9.5	9.4	9.5	9.4	9.0	-0.1
United Kingdom	6.7	6.8	6.9	7.6	8.0	8.1	0.9
United States	4.9	4.9	5.3	6.0	6.0	5.7	1.1
<i>Emerging market economies:</i>							
Argentina	5.9	5.7	5.6	6.3	7.2	8.6	0.4
Brazil	8.5	8.4	8.4	9.8	12.8	15.8	1.3
Bulgaria	9.1	8.6	8.4	8.6	9.5	10.8	-0.5
China	2.2	2.2	2.3	2.4	2.5	2.6	0.2
Estonia	6.4	6.2	5.9	5.6	5.4	5.3	-0.8
Hungary	11.3	10.9	11.0	11.0	12.2	13.2	-0.3
India	1.7	2.0	2.1	2.1	1.7	0.9	0.4
Indonesia	0.9	0.9	1.1	1.3	1.7	2.1	0.4
Latvia	5.1	4.8	5.2	5.9	6.1	5.8	0.8
Lithuania	6.5	6.5	6.9	8.2	9.1	10.4	1.7
Malaysia	2.9	3.3	3.7	4.6	5.2	5.8	1.7
Mexico	2.4	3.1	3.4	4.5	4.6	3.5	2.1
Pakistan	1.4	1.3	1.4	1.8	2.1	2.6	0.4
Philippines	1.1	1.2	1.3	1.6	1.8	2.0	0.5
Poland	10.8	9.6	9.7	9.4	9.2	9.1	-1.4
Romania	8.4	8.5	8.8	10.4	12.6	14.8	2.0
Russia	9.4	9.5	10.8	14.0	15.4	18.8	4.6
Saudi Arabia	2.2	2.4	2.7	3.6	4.9	7.1	1.4
South Africa	1.3	1.4	1.6	1.9	2.1	2.3	0.6
Turkey	7.3	7.4	8.4	10.5	10.4	11.4	3.2
Ukraine	12.8	13.6	15.2	18.8	20.9	24.2	6.0
<i>Average</i>	6.1	6.3	6.6	7.2	7.7	8.0	1.1
<i>Advanced</i>	7.4	7.8	7.9	8.5	8.9	9.0	1.1
<i>Emerging</i>	4.2	4.2	4.5	5.3	5.8	6.5	1.1
<i>G20</i>	5.8	5.9	6.2	6.8	7.2	7.4	1.0
<i>Advanced</i>	7.1	7.2	7.5	8.1	8.3	8.3	0.9
<i>Emerging</i>	3.8	3.9	4.2	4.9	5.4	6.1	1.1

5. The effect of the reforms on the generosity of the pension system

Recent pension reforms introduced to face the population ageing problem are producing and will produce very strong reductions in the generosity of the pension systems. For example, the gross replacement ratio will decrease from 90% to 67.9% in Italy, from 64.7% to 53.3% in France, from 47.9% to 43% in Germany, and from 40.6% to 33.9% in Japan.

As a result, the reforms will have an important effect on the disposable income of the households and then on the national disposable income.

Table 7: Gross and net replacement rates under pre- and post- reforms (Source: OECD, 2009)

Individual/earnings	Gross replacement rate						Net replacement rate					
	Pre-reform			Post-reform			Pre-reform			Post-reform		
	0.5	1	1.5	0.5	1	1.5	0.5	1	1.5	0.5	1	1.5
Australia	46.2	23.1	15.4	67.0	41.6	33.1	55.3	30.4	21.8	80.2	53.1	41.8
Austria	90.0	90.0	85.9	80.1	80.1	76.4	98.4	99.2	95.1	90.5	90.3	86.3
Belgium	54.8	40.4	31.4	58.1	42.0	32.5	74.2	62.1	50.6	78.7	63.7	51.7
Czech Republic	72.1	45.0	32.9	79.2	49.7	36.4	86.7	58.1	44.6	95.3	64.1	49.4
Finland	69.9	66.2	65.2	66.5	56.2	56.2	75.9	71.4	72.4	73.2	62.4	63.8
France	64.7	64.7	58.4	61.7	53.3	48.5	79.7	78.2	70.8	76.2	65.7	60.2
Germany	47.9	47.9	46.5	43.0	43.0	42.6	56.4	66.6	66.4	59.2	61.3	60.3
Hungary	69.9	57.7	53.6	76.9	76.9	76.9	85.9	83.2	79.1	94.3	105.5	99.2
Italy	90.0	90.0	90.0	67.9	67.9	67.9	99.1	99.1	99.2	74.8	74.8	77.1
Japan	56.5	40.6	35.3	47.1	33.9	29.4	55.8	41.0	37.0	51.4	38.7	33.9
Korea	100.0	69.3	56.0	64.1	42.1	33.6	105.9	74.9	61.6	68.8	46.6	38.7
Mexico	72.5	72.5	72.5	55.3	36.1	34.5	73.4	76.5	83.2	56.0	38.0	39.6
Norway	62.5	51.9	41.9	66.2	59.3	49.8	80.4	62.0	52.3	76.7	69.3	60.6
New Zealand	77.5	38.7	25.8	79.3	41.1	29.0	77.5	38.7	25.8	79.3	41.1	29.0
Poland	81.2	62.9	56.8	61.2	61.2	61.2	97.1	76.9	69.7	74.4	74.9	75.0
Portugal	91.3	89.9	88.5	54.8	53.9	53.1	106.1	112.0	110.8	63.7	69.6	72.0
Slovak Republic	65.0	58.9	39.3	56.4	56.4	56.4	76.4	75.9	52.2	66.3	72.7	74.9
Sweden	82.5	78.6	76.5	76.6	61.5	75.6	84.5	80.3	81.9	79.3	64.1	81.2
Turkey	107.6	107.6	107.6	86.9	86.9	86.9	150.0	154.4	157.9	121.2	124.7	127.1
United Kingdom	41.1	29.7	20.6	51.0	30.8	21.3	51.9	39.8	28.3	63.8	40.9	29.2

6. The role of voluntary private pensions

People need voluntary pensions to complement their future retirement income in order to maintain living standards into retirement. In fact, mandatory private pension schemes provide a relatively low replacement rate and public pensions will be much lower for workers entering the labour market today than those offered to their parents and grandparents. This is why governments have to introduce policies to encourage private pension savings (compulsion, soft compulsion, facilitating access to private pensions, tax incentives).

Private pensions play a large and growing role in providing for old age. The OECD average for replacement rates from public schemes alone is 42%, compared with 57% with mandatory private pensions included. When voluntary private pensions are added, the average replacement rate is 64%.

Table 8: Gross replacement rates from public, mandatory private and voluntary private pension schemes (Source: OECD, 2011)

	Public			Mandatory private			Voluntary DC			Total mandatory			Total with voluntary		
	0.5	1	1.5	0.5	1	1.5	0.5	1	1.5	0.5	1	1.5	0.5	1	1.5
OECD members															
Australia	37.9	11.8	3.2	35.4	35.4	35.4				73.3	47.3	38.6			
Austria	76.6	76.6	72.3							76.6	76.6	72.3			
Belgium	60.1	42.0	32.7				15.6	15.6	12.3	60.1	42.0	32.7	75.7	57.6	45.0
Canada	61.2	38.9	25.9				30.8	30.8	30.8	61.2	38.9	25.9	92.0	69.7	56.7
Chile	18.8	3.2	0.0	41.3	41.7	41.8				60.0	44.9	41.8			
Czech Republic	80.2	50.2	37.4				11.3	11.3	11.3	80.2	50.2	37.4	91.5	61.5	48.6
Denmark	64.7	28.9	17.0	55.9	50.7	49.0				120.6	79.7	66.1			
Estonia	37.7	25.5	21.5	22.5	22.5	22.5				60.2	48.0	44.0			
Finland	66.4	57.8	57.8							66.4	57.8	57.8			
France	55.9	49.1	41.3							55.9	49.1	41.3			
Germany	42.0	42.0	42.0				16.9	16.9	16.9	42.0	42.0	42.0	59.0	59.0	59.0
Greece	95.7	95.7	95.7							95.7	95.7	95.7			
Hungary	44.4	44.4	44.4	31.4	31.4	31.4				75.8	75.8	75.8			
Iceland	63.0	15.0	5.1	81.9	81.9	81.9				144.9	96.9	87.0			
Ireland	57.9	29.0	19.3				37.6	37.6	37.6	57.9	29.0	19.3	95.5	66.5	56.9
Israel	38.9	19.4	13.0	61.3	50.2	33.4				100.1	69.6	46.4			
Italy	64.5	64.5	64.5							64.5	64.5	64.5			
Japan	47.9	34.5	30.0							47.9	34.5	30.0			
Korea	64.1	42.1	31.9							64.1	42.1	31.9			
Luxembourg	97.9	87.4	83.8							97.9	87.4	83.8			
Mexico	30.5	4.0	2.7	26.9	26.9	26.9				57.5	30.9	29.6			
Netherlands	58.5	29.2	19.5	34.6	58.9	67.0				93.0	88.1	86.5			
New Zealand	77.5	38.7	25.8				14.6	14.6	14.6	77.5	38.7	25.8	92.1	53.4	40.5
Norway	57.7	46.1	34.2	5.7	7.0	7.5	8.6	12.0	17.1	63.4	53.1	41.7	72.0	65.0	58.8
Poland	28.7	28.7	28.7	30.2	30.2	30.2				59.0	59.0	59.0			
Portugal	63.3	53.9	53.1							63.3	53.9	53.1			
Slovak Republic	26.0	26.0	26.0	31.6	31.6	31.6				57.5	57.5	57.5			
Slovenia	64.3	62.4	62.4							64.3	62.4	62.4			
Spain	81.2	81.2	81.2							81.2	81.2	81.2			
Sweden	45.6	31.1	22.8	22.7	22.7	45.9				68.3	53.8	68.7			
Switzerland	52.3	34.5	23.7	12.8	23.4	17.1				65.2	57.9	40.9			
Turkey	76.4	64.5	64.5							76.4	64.5	64.5			
United Kingdom	53.8	31.9	22.6				36.7	36.7	36.7	53.8	31.9	22.6	90.5	68.6	59.3
United States	51.7	39.4	35.3				38.8	38.8	38.8	51.7	39.4	35.3	90.5	78.2	74.1
OECD34	57.2	42.1	36.5							71.7	57.2	51.9	84.3	64.4	55.4
Other major economies															
Argentina	90.7	78.1	73.9							90.7	78.1	73.9			
Brazil	85.9	85.9	85.9							85.9	85.9	85.9			
China	97.9	77.9	71.2							97.9	77.9	71.2			
India	95.2	65.2	55.0							95.2	65.2	55.0	95.2	65.2	55.0
Indonesia	14.1	14.1	14.1							14.1	14.1	14.1			
Russian Federation	35.0	35.0	35.0	17.3	17.3	17.3				52.3	52.3	52.3	35.0	35.0	35.0
Saudi Arabia	100.0	100.0	100.0							100.0	100.0	100.0			
South Africa	15.1	0.0	0.0				33.1	33.1	33.1	15.1	0.0	0.0	48.2	33.1	33.1
EU27	58.3	49.0	44.6							70.1	61.6	58.3			

The total assets in private pensions represented 79% of GDP in 2007 in the OECD countries. Half of OECD countries have built up public pension reserves to help pay for pensions. In these countries, public pension reserves are worth nearly 15% of GDP. However, it is important to bear in mind that these figures relate to 2007, before the impact of the financial crisis on asset values.

Table 9: Assets in private pension funds and public pension reserves (Source: OECD, 2009)

	Value of assets (% of GDP) 2007	
	Private pension funds	Public pension reserves
Australia	105.4	4.9
Austria	4.8	
Belgium	4.0	
Canada	55.3	7.9
Czech Republic	4.7	
Denmark	32.4	0.3
Finland	71.0	
France	1.1	1.9
Germany	4.1	
Greece	0.0	
Hungary	10.9	
Iceland	134.0	
Ireland	46.6	11.5
Italy	3.3	
Japan	20.0	26.2
Korea	3.1	23.9
Luxembourg	1.0	
Mexico	12.1	0.9
Netherlands	138.1	
New Zealand	11.1	7.8
Norway	7.0	79.7
Poland	12.2	0.3
Portugal	13.7	4.3
Slovak Republic	4.2	
Spain	7.5	4.5
Sweden	8.7	31.7
Switzerland	119.2	
Turkey	1.2	
United Kingdom	78.9	
United States	76.7	16.6
Total OECD	78.9	14.5
Unweighted average	33.1	14.8

7. The effect of the crisis

In 2008, private pension funds lost 23% of their investment's value in the OECD countries. In particular, in the United States which account for around a half of all private-pension assets in OECD countries, the loss was equal to 26%. Only Ireland, where the loss was nearly 38%, and Australia, with losses of 27%, showed a worse investment performance in 2008. In Belgium, Canada, Hungary, Iceland and Japan – real investments fell by more than 20%. Losses were only around 10% in Germany, the Slovak Republic, Norway, Spain and Switzerland. They were smaller still in the Czech Republic and Mexico.

Of course, private pension schemes face the most immediate problems from the fall in equity and property prices. The impact is obviously greatest in those countries where private pensions already play an important role in providing old-age incomes, such as Australia, the Netherlands and the United States. The investment losses directly affect individual defined-contribution pension accounts. The situation is particularly traumatic for older workers. Not only is it much harder for them to find a new

job if they become unemployed but they also have little time to wait for the value of their pension savings to recover before they have to start drawing down their assets.

But it is important to note that no country and no pension system are immune from the crisis. Public pension systems will also encounter financial trouble as contribution revenues dwindle and benefit expenditures increase in the wake of higher unemployment.

The crisis has reinforced the view that further reform is needed in both public and private pension schemes. Among the top priorities are careful reviews of public retirement income programs to ensure that they provide effective protection against poverty, both now and in the future. But another look also needs to be taken at the automatic pension adjustment mechanisms which many countries have introduced to link pension expenditures with life expectancy, wage growth or the level of assets in reserve funds.

In several OECD countries, there have been calls to move away from mixed pension systems back to an exclusive reliance on public pay-as-you-go schemes. In the Slovak Republic, for example, workers covered by the new defined-contribution plans have been allowed to switch back to the public system and similar roll-backs of reform have been proposed elsewhere in Eastern Europe. This is the wrong way to go. The financial and economic crisis has moved the centre of attention away from the demographic challenges that pension system are facing. But these challenges have not disappeared nor have they become less urgent to address. The crisis has made the need for changes: better regulation, more efficient administration, clearer information about the risks, switch to less risky investments as people near retirement and combining public and private, pay-as-you-go and funded, individual and collective elements, they will be thrown back to square one in their efforts to maintain prosperity in ageing societies.

8. Lessons from CAM model simulations

Using the CAM model, two scenarios have been built to analyse the impact of the pension reforms on the macroeconomic activity at the medium and long run. The first one is focused on the developed countries where pension reforms reducing the generosity of the system are implemented, while the second one considers the progressive launching of pension systems in emerging countries.

8.1 Scenario 1: Gradual decrease in pension spending in developed countries

According to the projections of various institutions, as it has been summarised above, pensions expenditures with the prevailing legislation would increase around 1.5% of GDP over the period 2011-2030 in most of the European countries, around 1% in United- Kingdom and 0.5% in the USA. Facing these imbalances, we suppose that governments implement a fiscal policy aiming at simultaneously

increasing the social contributions and decreasing the pension spending. In particular, in the CAM model, the increase in the social contributions is modeled as an increase in the government income while the decrease in pension spending is modeled as a decrease in government expenditures.¹

We assume that this reform is progressively implemented to reach ex-ante equilibrium in 2030, as noted in the following tables. The magnitude of the reform is larger in Continental Europe and other developed countries than in the UK and in the US.

Table 10: Change in public expenditures (in % of GDP) with respect to the baseline implemented in the CAM model

	Continental Europe	UK	USA	Other developed countries
2013	-0.05	-0.03	-0.02	-0.05
2020	-0.34	-0.23	-0.11	-0.34
2030	-0.75	-0.5	-0.25	-0.75

Table 11: Change in government revenues (in % of GDP) with respect to the baseline implemented in the CAM model

	Continental Europe	UK	USA	Other developed countries
2013	0.05	0.03	0.02	0.05
2020	0.34	0.23	0.11	0.34
2030	0.75	0.5	0.25	0.75

Simulation results show that the reduction of the government expenditures has a direct negative impact on the global demand, which is equivalent to considering that the reduction of pensions induces a direct and equal reduction of consumption. This is a strong hypothesis which overestimates the negative impact of the pension reform, but not unrealistic as the propensity to consume pension benefits is high. The results reported in Table 12 show the short run and the long run effects with respect to the baseline, concerning GDP, employment, public and private balance and the current account.

The reduction of pension benefits and the increase of social contributions have as expected a larger negative impact in countries where the policy is more restrictive. GDP decreases with respect to

¹ Another solution would have been to consider the decrease in pension spending as a reduction in transfers to families that can be treated as a tax paid by the households. Given that in the CAM model there is no variable measuring the households' disposal income, the negative impact of this tax appeared underestimated.

the baseline by 4% in the long run in Continental Europe, by 3% in the UK and by 1.6% in the US. The public balance in % of GDP improves with respect to the baseline by 1.5% in Europe, 1% in the UK and 0.5% in the US, which is consistent with the ex-ante targets. In spite of the deterioration of the private saving, the current account improves slightly in Europe (around 0.3% of GDP) thanks to imports reduction. The slowdown is transmitted in the rest of the world, especially in China (- 1.3% for the GDP), Japan (-0.6%) and East Asia (-0.9%), which are more open, while their current accounts deteriorate moderately.

Table 12: Impact on GDP, employment and current account (Scenario 1)

	GDP		Employment		Public balance		Private balance		Current account	
	2013	2030	2013	2030	2013	2030	2013	2030	2013	2030
USA	-0.04	-1.64	-0.02	-0.59	0.03	0.46	-0.03	-0.45	0.00	0.01
North Europe	-0.13	-3.63	-0.04	-0.98	0.10	1.65	-0.09	-1.27	0.01	0.38
South Europe	-0.12	-3.96	-0.03	-1.01	0.09	1.32	-0.08	-1.19	0.01	0.13
Central Europe	-0.13	-4.02	-0.04	-1.03	0.10	1.53	-0.08	-1.26	0.01	0.27
United Kingdom	-0.08	-3.01	-0.02	-0.81	0.06	0.99	-0.06	-0.78	0.01	0.21
East Europe	-0.12	-4.69	-0.02	-0.90	0.10	1.67	-0.09	-1.35	0.01	0.32
China	-0.03	-1.29	0.00	-0.07	0.00	0.01	0.00	-0.18	0.00	-0.17
India	-0.01	-0.41	0.00	0.01	0.00	-0.01	0.00	-0.07	0.00	-0.09
Other South Asia	-0.02	-0.63	0.00	0.02	0.00	-0.02	0.00	-0.13	0.00	-0.15
Japan	-0.01	-0.62	0.00	-0.13	0.00	0.03	0.00	-0.13	0.00	-0.11
Other Developed	-0.11	-3.66	-0.03	-1.00	0.09	1.46	-0.09	-1.05	0.00	0.41
West Asia	-0.02	-0.62	0.00	-0.04	0.00	-0.02	-0.03	-0.12	-0.03	-0.14
North Africa	-0.02	-0.63	0.00	0.00	0.00	-0.02	-0.01	-0.14	-0.02	-0.15
Other Africa	-0.01	-0.52	0.00	0.00	0.00	-0.01	-0.02	-0.10	-0.02	-0.11
East Asia High Income	-0.02	-0.87	-0.01	-0.23	0.00	0.00	0.00	-0.16	0.00	-0.16
Former Soviet Union	-0.01	-0.56	0.00	-0.03	0.00	0.00	-0.02	-0.13	-0.02	-0.12
South America	-0.01	-0.36	0.00	0.02	0.00	0.00	-0.01	-0.10	-0.01	-0.10
Central America	-0.01	-0.66	0.00	-0.03	0.00	0.01	-0.01	-0.16	-0.01	-0.15
Other East Asia	-0.02	-0.66	0.00	0.01	0.00	-0.02	-0.01	-0.13	-0.01	-0.15

$$\text{Impact on GDP} = \frac{(\text{GDP in scenario} - \text{GDP in baseline})}{(\text{GDP in baseline})} \cdot 100 ; \text{Impact on Employment} = \frac{(\text{Employment in scenario} - \text{Employment in baseline})}{(\text{Employment in baseline})} \cdot 100$$

$$\text{Impact on current account} = \frac{(\text{Current account in percent of GDP in scenario} - \text{Current account in percent of GDP in baseline})}{(\text{Current account in percent of GDP in baseline})} \cdot 100$$

8.2 Scenario 2: Establishment of pension systems in emerging countries

In this second scenario, we assume that pension systems are progressively implemented in emerging countries (China, India, CIS, South America, East and West Asia). In each country or zone,

pension expenditures and social contributions increase progressively to 8% of GDP in 2030.² The impact is strongly positive³ thanks to the positive effect on consumption. In the long run, GDP increases by 26% in China, 16% in India and 15% in East Asia with public balances remaining almost equilibrated and current balances slightly deteriorated, due to the increase of the demand. This positive effect is then transmitted to the developed countries (between 1 to 2% increase of GDP in the long run) with an improvement of their current accounts, thanks to the growth of the world demand.

Table 12: Impact on GDP, employment and current account (Scenario 2)

	GDP		Employment		Public balance		Private balance		Current account	
	2013	2030	2013	2030	2013	2030	2013	2030	2013	2030
USA	0.02	0.70	0.01	-0.62	0.03	0.52	-0.02	0.00	0.01	0.52
North Europe	0.05	1.06	0.01	-0.11	0.10	1.46	0.00	-0.48	0.10	0.98
South Europe	0.02	1.10	0.01	0.00	0.10	1.55	-0.07	-0.32	0.03	1.23
Central Europe	0.06	2.32	0.02	0.21	0.10	1.49	-0.05	-0.40	0.05	1.08
United Kingdom	0.02	0.53	0.01	-0.34	0.07	1.00	-0.04	-0.25	0.02	0.75
East Europe	0.06	1.53	0.01	-0.06	0.10	1.45	-0.06	-0.28	0.05	1.17
China	0.82	25.68	0.05	1.96	0.00	-0.21	-0.19	-1.78	-0.18	-1.99
India	0.67	16.17	0.03	0.85	0.03	0.44	-0.12	-0.99	-0.09	-0.55
Other South Asia	0.08	2.85	0.00	-0.18	0.00	0.08	0.02	0.62	0.02	0.70
Japan	0.09	4.71	0.03	0.92	0.00	-0.18	0.01	0.73	0.01	0.55
Other Developed	-0.01	-0.67	0.00	-0.80	0.10	1.49	-0.02	-0.58	0.08	0.91
West Asia	0.64	14.18	0.08	1.89	0.01	0.35	0.01	-0.94	0.02	-0.59
North Africa	0.06	2.34	0.00	-0.07	0.00	0.06	0.08	0.59	0.09	0.65
Other Africa	0.06	2.31	0.00	-0.07	0.00	0.04	0.12	0.56	0.12	0.60
East Asia High Income	0.77	18.40	0.22	5.55	0.00	0.02	-0.15	-0.32	-0.15	-0.30
Former Soviet Union	0.61	13.41	0.06	1.76	0.03	-0.09	-0.02	-0.64	0.01	-0.73
South America	0.63	13.26	0.07	1.16	0.03	-0.11	-0.03	-0.37	0.00	-0.48
Central America	0.05	2.13	0.01	-0.25	0.00	-0.02	0.04	0.46	0.04	0.44
Other East Asia	0.65	15.12	0.03	0.50	0.01	0.31	-0.03	-0.87	-0.02	-0.56

$$\text{Impact on GDP} = \frac{(\text{GDP in scenario} - \text{GDP in baseline})}{(\text{GDP in baseline})} \cdot 100 ; \text{Impact on Employment} = \frac{(\text{Employment in scenario} - \text{Employment in baseline})}{(\text{Employment in baseline})} \cdot 100$$

$$\text{Impact on current account} = \frac{(\text{Current account in percent of GDP in scenario} - \text{Current account in percent of GDP in baseline})}{(\text{Current account in percent of GDP in baseline})} \cdot 100$$

² We make the assumption that in a pension system sufficiently developed pension benefits must represent at least 8% of GDP.

³ This positive effect may be however overestimated as the increase of social contributions has only limited negative effects with the CAM specifications, while pension expenditures have a direct effect on demand with the implicit hypothesis that they are fully consumed.

8.3 The AUGUR scenarios

Three AUGUR scenarios can be related to the pension system issues. In the reduced government scenario, the generosity of the pension system will be strongly reduced and the role of the voluntary private pensions will be promoted. This will lead to increasing inequality and a slowdown of the activity, as it is partly illustrated in scenario 1.

In the regionalisation scenario, more diversity will remain in the pension systems of the world regions with a preservation of the PAYG system in Europe and a more private one in the USA and Anglo-Saxon countries, while emerging countries will remain backward.

In the global governance scenario, more convergence will appear with more developed pension systems in the emerging countries and a positive impact on growth and employment with reduced world imbalances, as illustrated in scenario 2.

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