Europe's Demographic Deficit
A Plea for a Child Pension System

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From: *De Economist* 153, 2005, pp. 1-45, Tinbergen Lectures

Electronic reprint 2006-07
June 2006

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De Economist (2005) 153:1–45
DOI 10.1007/s10645-004-8084-1

DE ECONOMIST 153, NO. 1, 2005

EUROPE'S DEMOGRAPHIC DEFICIT

A PLEA FOR A CHILD PENSION SYSTEM*

BY

HANS-WERNER SINN**,[1]

Summary

This paper considers the economic implications of the stalling birth rates and demographic development in Europe. To remedy for this it proposes a child pension system. This system allows additional pension facilities depending on the number of children raised. It should be a PAYG pension financed with an income tax. The main motivation for this is that parents have invested resources which also benefit society.

Key words: pension system, birth rate, human capital, demography

1 INTRODUCTION

Nothing is more important for Europe's future than the question of whether the continent will be able to solve its demographic crisis and if so how. If we fail to find an adequate solution, Europe will not have a future, and in that case being able to solve all the other problems will not matter very much.

You may think demography is not an economic problem. Well, I maintain it is, and I will try to convince you that this topic is, indeed, appropriate for a Tinbergen Lecture. I am very grateful to the Royal Netherlands Economic Association for inviting me to give this lecture and share my ideas with you. Ever since my student days I have been impressed by Tinbergen, whose theories were highly valued by my teachers. I would not have dreamt that I would, one day, be invited to give a lecture in his honour.

I am not aware that Tinbergen wrote in detail about demographic problems or pensions. I only found three pages on pensions in his book *Economic Policy: Principles and Design* where he warned against extending the pension system too much. In his times, demography simply was not an issue. However,

* 18th Tinbergen Lecture, Amsterdam, October 22, 2004.

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1 I am grateful to Lans Bovenberg and Peter Cornelisse for useful conversations about the Dutch pension system and Tinbergen's views on children and pensions. I thank Robert Koll, Regina von Hehl and Elsita Walter for careful research assistance, and Tobias Seidel, Michael Stimmelmayr, Martin Werding and Markus Zimmer for useful comments.

Tinbergen was concerned all his life with social and distributional problems. I am quite confident that he would have appreciated the topic of this lecture.

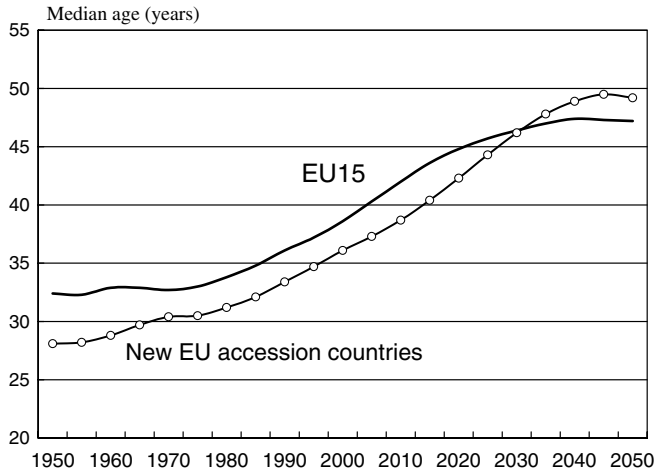
I will focus on the declining birth rates. Children have become a nuisance factor in many European countries. They cost money, restrict one's consumption options and imply a downward slide in social status. Life as a single person has become the norm, informal partnerships are replacing marriage, and if two people do marry, they are in no hurry to have children. They have their first child in their early thirties, and all too frequently no more children follow. The DINK family – dual income, no kids – is becoming increasingly popular. With two incomes and no kids, per capita income is five times what it would be with one income and three children.

With a few exceptions like France and Ireland, the problem affects most European societies. The large Italian and Spanish families are being dissolved, giving way to a new lifestyle with increased consumption standards and few of the traditional family burdens. At best, the Italian mammistas ensure a certain type of family coherence. Spanish, Italian and Czech women have fewer children than the women from all other developed countries in the world, rivalling only Switzerland, Germany and a few other EU countries as well as Japan. Europe's fun society is ageing, and it is ageing fast.

Elderly Europeans also participate in the enjoy-life society. Hordes of pensioners, using the income received from the European pay-as-you-go pension systems, cruise the seven seas on luxury liners and jet off to the remotest beaches of our planet. The pay-as-you-go pension systems have made Europeans world champions in tourism and created a breathtaking infrastructure with seaside resorts and leisure centres from the Canaries to the Maldives and the beautiful Pacific Islands.

Europeans pay high taxes and social security contributions. Almost nowhere else is so much deducted from the earned income of the active part of the population as in Europe in order to secure a comfortable income from transfer payments for the elderly. But when the DINK generation itself grows old, it will hope in vain to emulate their parents' pensioner lifestyle because there will be too few contributors to finance their pensions.

The whole problem has now gone beyond the perversion of values and extends to the viability of the state social systems and consequently also to the efficient functioning of the public administration. More and more people wish to benefit from the state pension systems while the group of contributors continues to shrink. The European pension systems are slithering into crisis. The marvellous promises of politicians and association representatives, who have preferred to ignore the demographers, have turned out to be empty. Insoluble redistribution battles between old and young are threatening to shake Europe's political system to its roots. Rather than becoming the world's most dynamic and competitive region, as the Lisbon agenda forecast, Europe may become the world's home for the elderly.



Sources: United Nations, Population Division, World Population Prospects: The 2002 Revision and World Urbanization Prospects: The 2001 Revision, (http://esa.un.org/unpp). 2004; Ifo Institute calculations.

Figure 1 – Median age of the EU population 1950–2050

The objective of this lecture is to raise a warning voice and help bring about a change in policy. This lecture presents the most important facts on Europe's demographic crisis, shows its consequences and tries to determine its causes. The analysis of these causes in turn yields implications for social and economic policies, which may yet succeed in averting the worst and perhaps again bring about a more balanced population structure over the long term.

2 THE FACTS

The ageing of the European population is illustrated in Figure 1, which shows the evolution of the median age for a number of European countries as well as the EU average. The median age is the age which separates the population into two equally large groups of older and younger people. It can be seen that the median age of those countries that in 2003 belonged to the EU was about 33 until 1975 but rose to 39 in 2000 and will rise to about 47 in 2035.

The graph also shows that the Eastern enlargement of the EU does not mitigate the problem. While the Eastern European EU countries currently have a median age 2.5 years below that of the old EU countries, their median age will be 2 years above that in 2050. Eastern Europe today is younger than Western Europe, but it is ageing much faster and will overtake Western Europe by 2035 in terms of the median age of its population.

In a world-wide comparison of median ages, as shown in Table 1, Italy, Switzerland and Germany trail behind Japan, which currently has the oldest

TABLE 1 – WHO IS THE OLDEST?

Rank	2000 Country/area	Median age
1	Japan	41.3
2	Italy	40.2
3	Switzerland	40.2
4	Germany	39.9
5	Sweden	39.6
6	Finland	39.4
7	Belgium	39.1
8	Bulgaria	39.1
9	Greece	39.1
10	Croatia	38.9
:		
12	EU15*	38.6
:		
14	EU25*	38.2
:		
19	United Kingdom	37.7
:		
21	France	37.6
22	Netherlands	37.6
23	Spain	37.4
:		
31	New EU accession countries*	36.1
35	Poland	35.2
36	USA	35.2

The table includes countries with more than 1 million inhabitants in 2000.
* Average (weighted with population sizes).
Sources: United Nations, Population Division. World Population Prospects: The 2002 Revision, Homepage (http://www.un.org/popin/data.html), 2004; World Bank, *World Development Indicators 2004*; Ifo Institute calculations.

population in the world. Note how low the median age of the United States is relative to Europe. America is still a young country by all standards. Small wonder then that it continues to exhibit such remarkable economic dynamism. What is the cause of this high and still increasing median age of Europeans? As Table 2 illustrates, part of the explanation is the high life expectancy of Europeans, i.e. the high average age at death.[2] In Europe, life expectancy is significantly higher than in the United States and much higher than in many other parts of the world, including the developing countries and

2 The life expectancy for a particular calendar year is defined as the average age at death of an age cohort born in 2004 which would result if this year's age-specific mortality rates remained constant throughout the lifespan of this cohort.

TABLE 2 – LIFE EXPECTANCY AT BIRTH IN 2003

European Union		Accession countries		Other countries	
Austria	78.9	Cyprus	77.5	Egypt	70.7
Belgium	78.4	Czech Republic	75.8	India	64.0
Denmark	77.4	Estonia	71.4	Iran	69.7
Finland	78.2	Hungary	72.2	Japan	81.0
France	79.4	Lithuania	73.5	Kenya	44.9
Germany	78.5	Latvia	70.9	Liberia	47.9
Greece	78.9	Malta	78.7	USA	77.4
Ireland	77.4	Poland	74.2		
Italy	79.5	Slovenia	75.9		
Luxemburg	78.6	Slovak Republic	74.2		
Netherlands	78.7	Acc. countries*	74.1		
Portugal	77.4				
Spain	79.4				
Sweden	80.3				
United Kingdom	78.3				
EU15*	78.9				

* Average (weighted with population sizes).
Sources: U.S. Bureau of the Census, *International Data Base*, (http://www.census.gov/ipc/www/idbprint.html), 2004, Table 10; World Bank, *World Development Indicators* 2004; Ifo Institute calculations.

Eastern Europe. Only Japan has a higher life expectancy. And European life expectancy is rising. Currently, every 8 years life expectancy rises another year.

However, this cannot be the only or even the main explanation for the increasing median age, since all available projections show that the EU25 population will not be rising. According to UN projections, it will increase slightly by about 5 million until 2010, and thereafter it will shrink, falling below today's level by about 2030. An increase in life expectancy in itself would imply that the population size is continuing to rise.

A projection of the European population is shown in Figure 2. Despite an assumed annual net immigration of about 654,000 people to EU25 countries from non-EU countries, this projection shows that the resident population in the EU25 countries will have declined by about 21 million by 2050 compared to 2000. By contrast, the US population is expected to increase by about 124 million, with an assumed annual net immigration of about 1.1 million. In the EU25 countries, only the number of citizens above 64 will rise until 2050. The expected increase is 51 million. This is slightly more than the respective number for the US which is 47 million.

The true cause of the particularly rapid ageing of the European population becomes evident in an international comparison of fertility rates. Figure 3

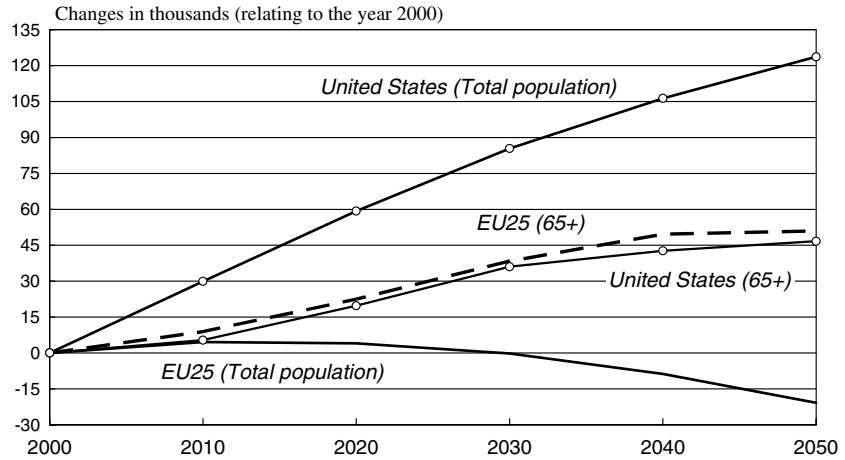


Figure 2 – The evolution of the total population and those aged 65 and older in EU25 and the United States. Note: Starting year 2000: Total population EU25: 452.1 million; of these, 71.3 million are 65 years and older; net immigration EU25 about 654.000 annually, cumulated national projections. Total population United States: 285.0 million; of these, 35.0 million are 65 years and older; net immigration about 1.115.000 annually. Source: United Nations, Population Division, World Population Prospects: The 2002 Revision, (http://www.un.org/popin/data.html), 2004; Ifo Institute calculations

gives an overview of the most recent fertility rankings available, using two alternative definitions of fertility. The left-hand scale shows the so-called fertility rate, i.e. the number of children per woman if the current age-specific birth rates of women stayed the same over time. The natural fertility rate that would keep the population constant is 2.08. One hundred women have to give birth to 101 girls to maintain the number of females in the population, since one percent of girls die before reaching reproduction age. But for every 101 girls that are born nature produces 107 boys. Thus 208 children are needed to preserve the population.

The right-hand scale gives the current number of births per thousand inhabitants. While there is no natural steady-state value of this number, with the current European age distribution, about 14.6 children per thousand inhabitants would keep the population constant.

EU countries, represented by the darker columns, cover the eight lowest ranks in an OECD-wide comparison of fertility rates and the five lowest ranks in births per 1000 inhabitants. The countries, which on both accounts rank very low among all OECD countries, are the Czech Republic, Italy, Spain, Austria and Germany.

A striking feature is that France has a significantly higher fertility rate. Possible reasons will be examined later.

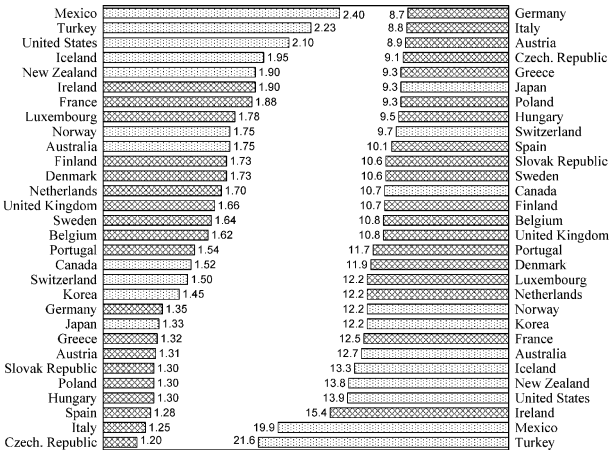


Figure 3 – Comparison of fertility rates (left) and birth rates per 1000 inhabitants (right) in the OECD countries in 2002. The fertility rate of a particular year is defined as the average number of births per woman, assuming that the age-specific fertility rates of this year stay unchanged throughout the life of a woman. The birth rate of a particular year is defined as the number of live births occuring during this year per 1000 inhabitants. Source: World Bank Group, World Development Indicators 2004

The Netherlands rank relatively high with a number of 1.75. Part of the reason for this good performance is the high fertility rate among non-natives. For example, Moroccans living in The Netherlands have a fertility rate of 3.3, African groups 3.0, and Turks 2.3. Foreign-born people in the Netherlands account for about one quarter (23%) of the new-born babies although their population share is only one tenth.[3]

There are remarkable differences among the two types of fertility accounts. Germany, for example, is number six from the bottom in terms of fertility rates, but holds the lowest rank worldwide in terms of births per thousand inhabitants. The latter is due to the small number of women of childbearing potential which itself results from the low number of births that the country experienced in the 1970s.

As Figure 4 shows, fertility rates have declined in most OECD countries, but the decline has not been simultaneous. In Germany, the fertility rate declined as sharply as in Italy, but the decline started about seven years earlier. Spain followed Italy with a lag of four years and Poland followed Spain another 11 years later. While in Germany the generation of potential parents is still around, Germany today has an exceptionally small number of people in their thirties. This is part of the explanation of the low number of births per 1000 inhabitants. History has long lasting implications. The low

3 Source: Dutch Statistical Office, 2004, data on request; Ifo Institute calculations.

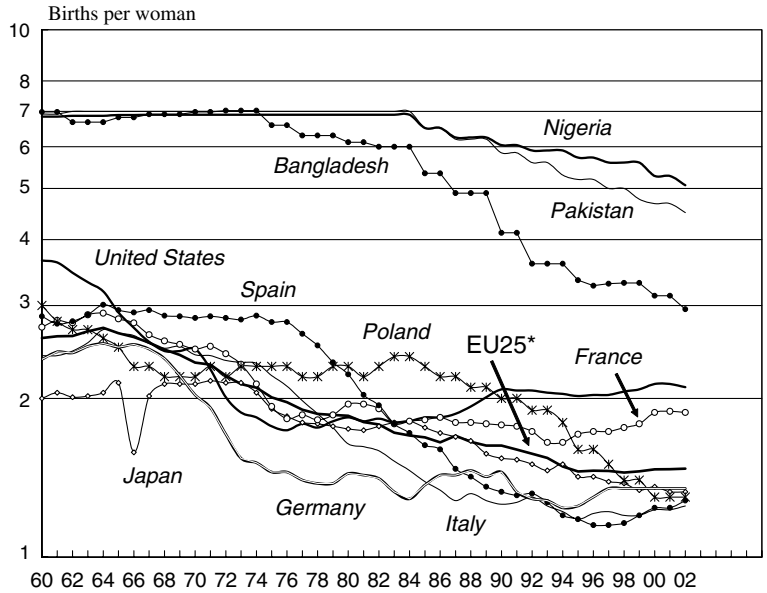


Figure 4 – Developement of fertility rates in an international comparison (selected countries). Note: Fertility rate defined as the average number of births per woman large specific total fertility rate). *Average: weighted with population sizes. Source: World Bank, World Development Indicators 2004; Ifo Institue calculations

fertility rates, which the country experienced in the 1980s, translate into a small number of women of childbearing age. It is foreseeable that Italy, Spain and Poland will be at the bottom of the birth-per-thousand-inhabitants scale in about 7, 11 and 22 years' time, respectively.

The decline of European birth rates is not a recent phenomenon. The development began already in about 1880. In the early 19th century, women had about five children or more, but during the last century, the birth rates declined in most countries to alarmingly low levels following the invention of modern contraception methods. Figure 5 shows the dramatic decline in the number of births in selected European countries over a period of more than 160 years.

The dramatic nature of this demographic change is illustrated by the EU15 age pyramid shown in Figure 6. It is obviously no longer a pyramid. Neither does it have the beehive shape characteristic of a population that just keeps reproducing itself on a constant scale shown by the shaded area in the figure. The European age pyramid has become a sort of Christmas tree whose branches cluster around the age group of about forty. The biggest cohort comprises those born in 1965, who were 35 years of age in the year 2000, the reference year of the pyramid and who are now (in 2004) 39 years old. This

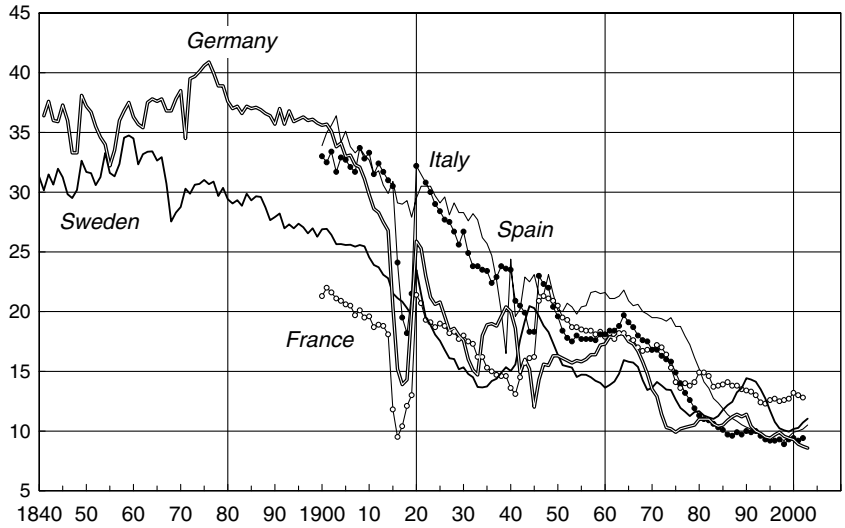


Figure 5 – Births per 1000 inhabitants. Source: National Statistical Offices, World Bank Group, Datasbase 2004

is the cohort of the baby boomers. They currently generate the residual economic dynamics still to be found in Europe, and they are paying for the pensions. In thirty years' time, these cohorts will be around seventy and all of them will be of retirement age. However, they will not be followed by other cohorts of the same size to support the aged. That is the problem.

While the above statistics show that such problems are not restricted to Europe, it seems that this continent is affected more severely than others. This is revealed by Figure 7 which compares the European and American age pyramids. Obviously, the United States also has a baby boomer problem. The baby boomers there are even several years older than in Europe because after the war, prosperity and confidence recovered earlier. However, the crucial difference to Europe is that the cohorts following the baby boomers are only a little smaller. Whereas in, in the year 2004, the EU-15 countries, the number of people of age 20 is 27% less than the number of people of age 40, in the United States the corresponding gap in the cohort sizes is only 10%. And whereas the population of the EU-15 countries is currently on third higher than the US population, the number of newly born babies in Europe is about the same as in the United States.

Figure 8 presents an international comparison of a key parameter of the age pyramid, the old-age dependency ratio, here defined as the number of those aged 65 and older in relation to those aged between 15 and 64. Shown is a country comparison over an entire century, from 1950 to 2050. The dependency ratio rises rapidly in all countries, but, with the exception of

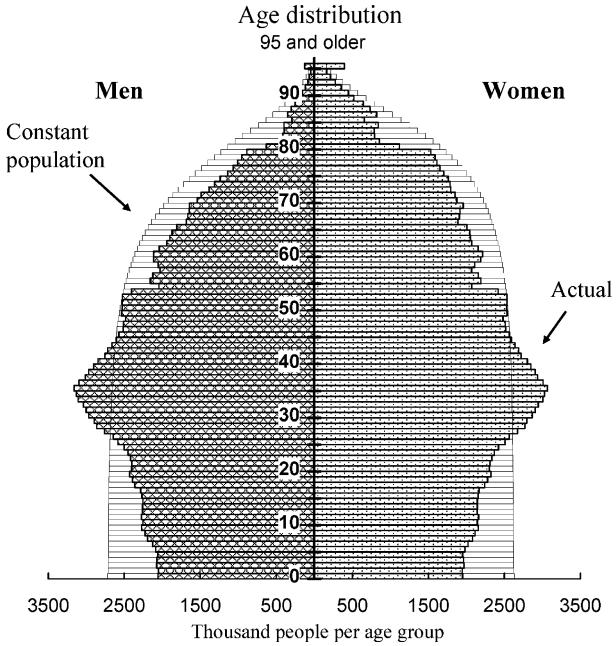


Figure 6 – Comparison of actual and constant population, EU15, 2000. Equivalent constant population with equal number of persons in the group 25–65. Source: Eurostat; Ifo Institute calculaitons

Japan, Europe clearly is affected much more strongly. While the EU15 dependency ratio rose from 14% in 1950 to 24% in 2000 and will continue to increase to 50% in 2050, in the United States it only increase from 13% in 1950 to 19% in 2000 and will go to 32% in 2050. Spain and Italy exhibit an extreme pattern. In 1950, when the classical Spanish family was intact, there were 100 people aged 15 to 64 and only 11 older people, but 50 years later, in 2000, there were already 24 older people and in 2050 there will be 68. In Italy, the respective numbers are 13, 27 and 65, which is not much better.

The Netherlands performs relatively better in this comparison. It has and will continue to have a much lower old-age dependency ratio than the EU average. However, even the Netherlands is facing severe problems. The old-age dependency ratio will rise from 20% in 2000 to 43% in 2035, i.e. it will more than double in only 30 years' time.

Because of the small number of children, some European countries and also the EU countries as a whole are ageing more quickly and in a more sustained way than nearly all other countries. Only Japan seems to be facing even more severe problems. While Japan will have the highest old-age dependency ratio in 2050 of all countries, EU countries hold the next eight places in a world-wide ranking (Table 3).

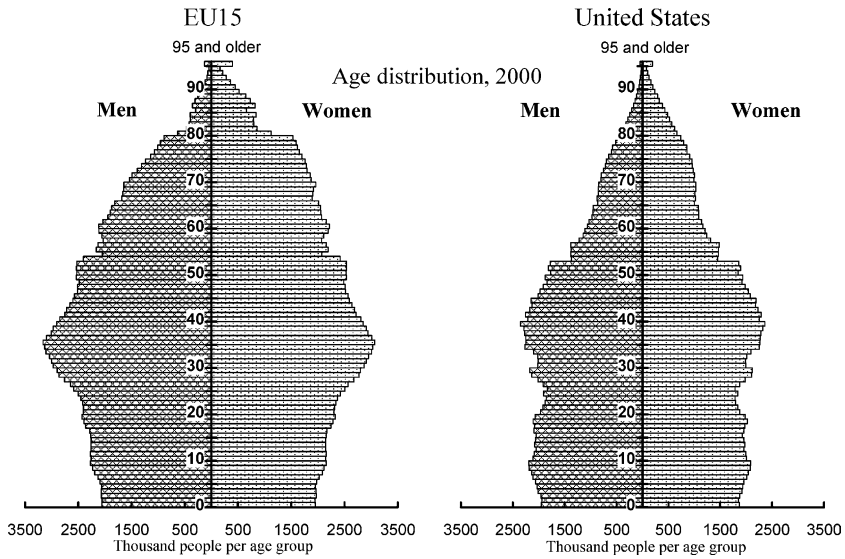


Figure 7 – EU15 and United States compared. Sources: EU15: Eurostat, National Statistics; Ifo Institute calculations; United States: US Census Bureau

3 THE CONSEQUENCES OF THE DEMOGRAPHIC CRISIS

3.1 *Pensions*

The consequences of the demographic crisis for the financing of the pay-as-you-go pension systems are obvious. All EU countries have such systems, and in nearly every country, except for the Netherlands and the UK, which also rely heavily on funded pensions, the pay-as-you-go pension contributes the lion's share to people's consumption in old age. Because of the rising old-age dependency ratio, the number of pensioners who must be supported by a given number of young persons in work is increasing, and that means either an increase in the social security contribution rate or a reduction in the level of pensions paid. The UN calculations shown in Figure 8 forecast more than a tripling of the EU15 and EU25 old-age dependency ratios within 100 years and almost a doubling in the period between 2000 and about 2040. And yet, if anything, this forecast seems to underestimate the rise of the old-age dependency ratio.

The most recent forecast for Germany by the German Federal Statistical Office, for example, suggests that the German old-age dependency ratio will more than double in the period from 2000 to 2035, the year in which the demographic crisis is forecast to peak. And this is true despite the fact that

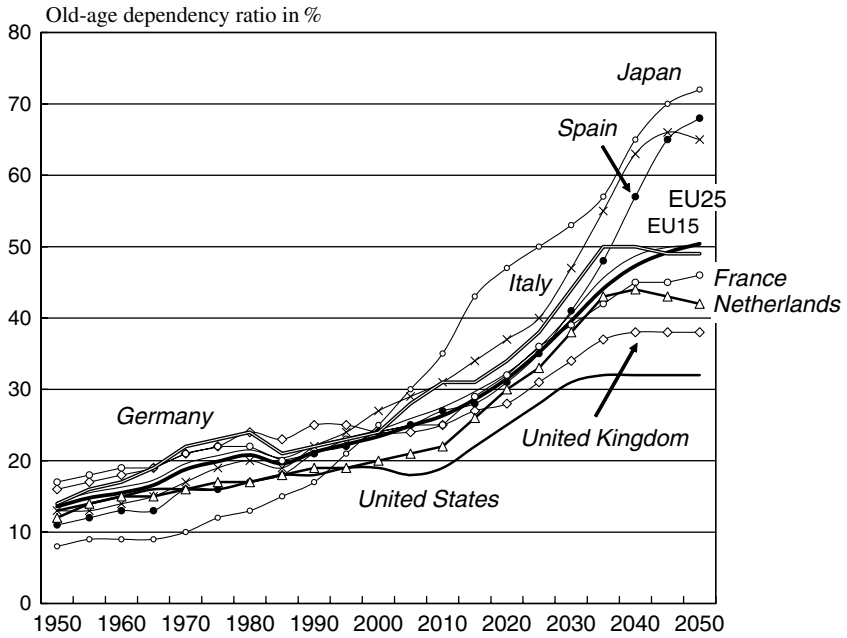


Figure 8 – Old-age dependency in selected OECD countries and the EU: A centenarian comparison. Old-age dependency ratio defined as the ratio of the population aged 65 and over to those aged 15–64. Source: United Nations, Population Division, World Population Prospects: The 2002 Revision, (http://www.un.org/popin/data.html), 2004; Ifo Institute calculations

the immigration of 200,000 people annually is assumed in the central forecasting variant.[4]

There is no need to work out a formal pension model to recognize that doubling the dependency ratio will mean either a doubling of the social security tax rate, or else a halving of pensions relative to gross incomes, i.e. the old-age replacement rate. Politicians can decide on a point within this range, but they cannot prevent the shortage of contributors, and in particular the dramatic crisis of the pension system.

Figure 9 shows the results of calculations that were made on the basis of the CESifo pension model for Germany, France and Italy, assuming that the legal framework in each respective country remains unchanged. The graphs show the average gross replacement ratio, i.e. the ratio between gross pensions and gross incomes, as well as the effective pension contribution rate with regard to gross wages. In all cases the gap between the replacement ratio and the contribution rate is narrowing, with the point of maximal proximity occurring at around the year 2035. The pension crisis will peak in these

4 See Federal Statistical Office, *9th Coordinated Population Forecast*, Wiesbaden 2000.

TABLE 3 – WORLD-WIDE RANKING: OLD AGE DEPENDENCY RATIO IN 2050

Rank	Country	Ratio as %
1	Japan	72
2	Spain	68
3	Italy	65
4	Slovenia	64
5	Greece	62
6	Czech Republic	59
7	Estonia	57
8	Latvia	56
9	Austria	55
10	Republic of Korea	55
15	China, Hong Kong SAR	53
17	EU25*	50
18	EU15*	50
22	Germany	49
29	France	46
40	The Netherlands	42
46	United Kingdom	38
56	United States	32
102	India	22

Old-age dependency ratio defined as the ratio of the population aged 65 and over to those aged 15–64. This table includes countries with more than 1 million inhabitants in 2000.
*Average (weighted with population sizes).
Sources: United Nations, Population Division, *World Population Prospects: The 2002 Revision*, (http://www.un.org/popin/data.html), 2004; World Bank, *World Development Indicators 2004*; Ifo Institute calculations.

countries because at that time the baby boomers born in the mid-1960s will be around 70 years old.

Despite this similarity, the countries mentioned plan to react quite differently to the crisis. In France, the replacement ratio is kept fairly constant. Therefore the contribution rate will increase from below 18.1% today to about 29.8% in 2035. In Italy, conversely, the contribution rate is being kept constant. Thus the replacement ratio will decline from today's 52.9 to 37.7%. Germany has chosen a middle path with an increase in the contribution rate from 20.4 to 31.4% and a decline in the replacement ratio from 45.0 to 38.5.

One must be mindful of the fact that the calculations refer to effective contribution rates including the hidden tax burden resulting from increased transfers out of the general government budget. While the effective contribution rate will reach the above mentioned 31.4% in Germany, the statutory German contribution rate will only reach about 25%. For obvious reasons, forecasts

based on statutory contribution rates are meaningless. They are used by politicians to calm down their voters, but otherwise they are of little use.

To understand the problems that the pay-as-you-go pension system will face, it is useful to interpret this system as an intergenerational redistribution mechanism. The pay-as-you-go system is a zero-sum game across the generations, making gifts to early generations at the expense of later generations. While the initial participants get pensions without having paid for them, later generations have to be satisfied with a rate of return below the market rate of interest. The rate of return that the pension system offers equals the growth rate of the sum of all contributions. This growth rate is below the market rate of interest if the economy is dynamically efficient or, equivalently, if an intertemporal general equilibrium prevails. Analytically, the contributions to the pay-as-you-go system can be split up into a savings component that generates the market rate of interest and an implicit tax that reflects the rate of return disadvantage. As I proved elsewhere, the present value of the implicit taxes to be paid by all future generations is exactly equal to the early gifts, and at each point in time, the then existing implicit pension debt in terms of claims accumulated by the respective living generation equals the present value of all implicit taxes to be borne by all generations from that point in time onwards.[5]

The implicit debt is rolled over from one generation to the next, but all future generations share its burden. For Germany an implicit debt-GDP ratio of 270% has been estimated.[6] As the European population shrinks, the debt will have to be serviced by fewer and fewer people and the implicit tax burden per person will rise.

The Ifo Institute made an attempt to measure the time paths of the implicit taxes in an intergenerational accounting system for selected OECD countries, considering all age cohorts from 1940 to 2000. Figure 9 shows the result of the calculations in terms of the implicit lifetime pension tax burden as a

5 In Sinn (1997) I argued that "any pension system, be it PAYGO or funded or a combination of both, is a zero-sum game for all the generations participating in the sense that the present value of all contributions equals the present value of all pensions." Similar statements can be found in Geanakopolos et al. (1988), Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft (1998) and Sinn (1998, 1999). The proofs about the present value equivalences of implicit taxes, explicit taxes, implicit debt and explicit debt including a discussion of transition strategies from a pay-as-you-go to a funded system were provided in my IIPF Moscow plenary lecture of August 1999, published as Sinn (2000). Doubts about the claim that the rate-of-return disadvantage of the funded system signals inefficiency of the pay-as-you-go-system were first raised by Lüdeke (1988). Breyer (1989) proved that a Pareto improving transition from a pay-as-you-go to a funded system is impossible under idealized conditions. For further discussions about the possibilities of Pareto improving transitions see Homburg (1990), Fenge (1995), Feldstein (1995) and Brunner (1996). Overviews of the literature can be found in Oksanen (2001, 2002), Lindbeck and Persson and Uebelmesser (2004b).

6 Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung (2003).

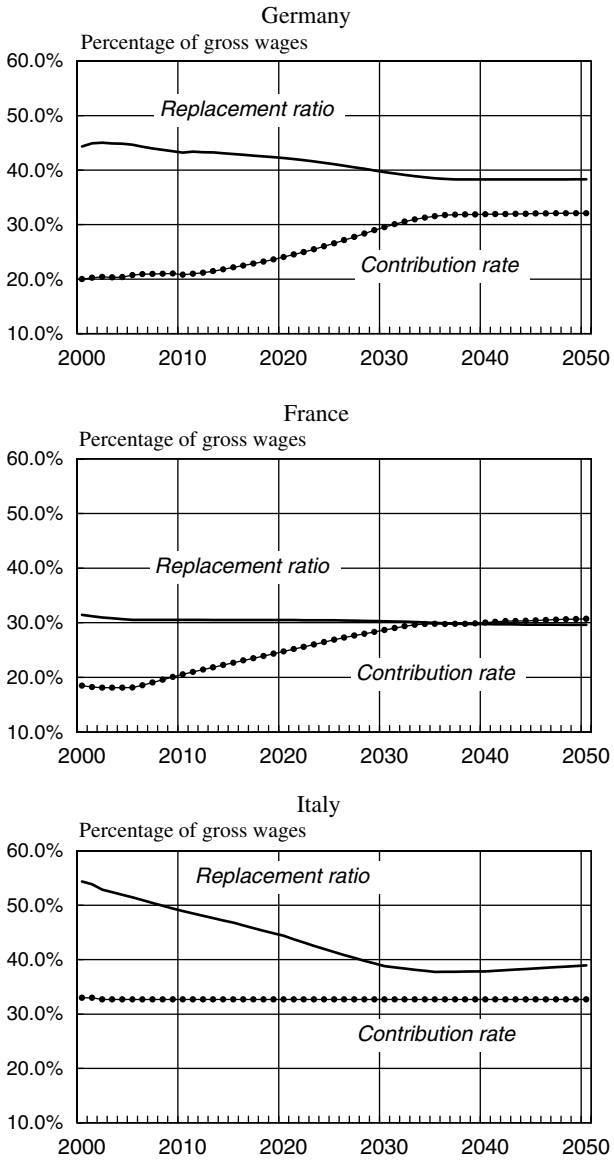


Figure 9 – Old age contribution and replacement rates in three European countries. Sources: CESifo Pension Model, Ifo Institute calculations by M. Werding

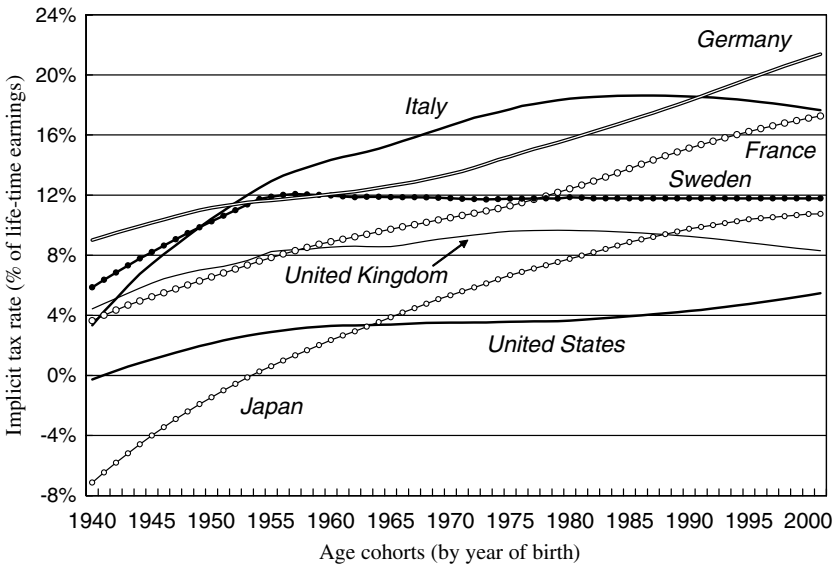


Figure 10 – Implicit pay-as-you-go taxes as a percentage of lifetime labour income. Source: Fenge and Werding (2004)

fraction of lifetime gross labour income. [7] The calculations, which refer to the legal situation of the year 2002, assumed country specific average labour income profiles, the average country specific retirement age as well as average probabilities of early retirement and payments to widows and orphans.

Figure 10 shows that the implicit lifetime pay-as-you-go tax rate increases sharply in all countries, with Italy and Germany alternately taking the lead. Italians born after 1965 have to sacrifice more than 16% of their human capital to redeem the implicit debt of the pension system and Germans more than 12%. Germans born currently will even have to give up more than 20% of their lifetime income. The implicit tax rate is rather low for people who are now in their forties in Britain and France. There it ranges from 6 to 10%. However, things will even change for these countries. Frenchmen who are now in their twenties will have to bear 12% and more, and even British 20-year-olds will have to pay 10%, although the British pay-as-you-go system was curtailed significantly by the Thatcher government.

Things are better in Japan and the United States, where the pay-as-you-go pension systems operate on a much lower scale than in Europe. In both countries, the implicit tax rates for people who are now 40 years old are only about 4%. However, the increase of the implicit tax rates for younger cohorts is particularly strong in Japan, approximating that of Sweden.

7 See Fenge and Werding (2004). For a similar study calculating implicit lifetime tax burdens for Germany alone see Sinn and Werding (2000).

One could argue that an intergenerationally fair pension system is characterised by flat curves of the implicit tax rates across the generations. Judged by this criterion, the US and Sweden perform well, albeit on different burden levels. With its 1998 reform, Sweden introduced a number of elements making the system actuarially fair and bringing it close to a defined benefit system, and with its 1983 reform, the US expanded its Social Security Trust Fund system. Both reforms have helped to make the tax curves flat across the generations.

3.2 *Fading Economic Dynamism*

The dire consequences of the demographic crisis are not restricted to the pension system. Europe's cultural and economic dynamics will increasingly flag. A study by Guilford (1967) showed that scientists of all disciplines attain their maximum performance at the age of about 35 on average.[8] As the European age pyramid of Figure 6 showed, the most heavily populated age groups in Europe are already around 40 years old today and hence already beyond this maximum. These age groups will still bring Europe a few years of dynamic growth, but after another decade today's 40-year-olds will have become 50-year-olds, and after two decades they will have become 60-year-olds. At those ages, there is less interest in exerting oneself than in preparing for retirement.

It is sometimes suggested that the depletion of the workforce due to ageing is of advantage to the labour market because it reduces the unemployment rate. This assumption is invalid. It originates from an excessively primitive and mechanical way of looking at economic activity and overlooks that ageing removes not only employees but also employers from the labour market. New businesses that create new jobs tend to be established by young people. In Europe, the average age of company founders is about 35 years, which coincides with the age of maximum scientific performance as mentioned above.[9] As Europe's most densely populated age cohorts are older than 35 years, the widespread ageing of the European population will not reduce unemployment. Quite to the contrary, one must fear an aggravation of the existing shortage of entrepreneurs and jobs. That a country of old people would have lower unemployment than a country of young employable people is a strange idea.

The ageing of the European population will further weaken the innovative power on which Europe's international competitiveness depends. As Figure 11 shows, Europe lags behind the United States in this regard and is catching up only rather slowly. The demographic crisis holds the risk that Europe will

8 See also Weinert (1997, p. 98) and Lehmann (1953). The literature measures a scientist's performance at a particular age by the number of citations generated within a given period by articles the author published at that age.

9 European Commission (2002), p. 32.

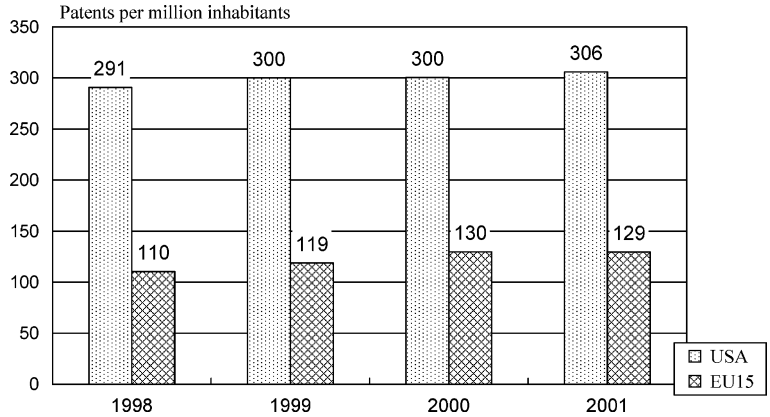


Figure 11 – Patent registration of domestic origin per million inhabitants: a comparison between the United States and EU15. EU15: Patent applications by inventors with EU15 residence to the European Patent Office. United States: Patents by investors with US residence granted by the US Patent & Trademark Office. Source: United Nations, Population Division, World Population Prospects: The 2002 Revision, (http.//www.un.org/popin/data.html), 2004; Ifo Institute calculations

never manage to break even with the US, despite the proud proclamations at the Lisbon Summit of March 2000.

Investors have foreseen these demographic problems and are already holding back. The stock markets, too, which are strongly influenced by the long-term profit expectations of investors, are already anticipating these developments. Only the shares of retirement homes will prosper. They will rise above the general trend, for retirement homes represent the future of the continent.

3.3 *The Road Towards Gerontocracy*

Under the impact of these demographic changes, Europe is gradually being transformed into a gerontocracy in which the old rule the roost. Even today no party can dare act against the interests of pensioners. This trend will be consolidated in the future.

In particular, it will not be possible to carry out reforms that effectively scale back the pay-as-you-go pension system. While such reforms help the young by reducing their implicit tax burden, they hurt the old who find themselves deprived of the claims they had been thought built up with their pension contributions. Based on the methodology that Sinn and Uebelmesser (2002) applied to Germany, Uebelmesser (2004a) estimated the time at which the political majority in favour of proportional pension and contribution cuts would be reached in Germany, France and Italy. The results are illustrated in Figure 12. The curve of the median age of voters specifies the particular

age that splits the enfranchised population into two equally large age groups. In a democracy, a decision that would not match the interests of the median voter would not be able to find a majority of votes. Therefore, the parties will always endeavour to develop programmes that approach the preferences of the median voter as closely as possible irrespective of their ideological bias. Today, in 2004, the median voter in France is 47 years old and in Germany and Italy 48 years old, but in 2030 the median voter will already be 53 years old in France, 55 years in Germany and 58 years in Italy. This shift will result in significant political change.

The diagrams also show the so-called "indifference age" as a function of time. The indifference age is that critical age level which separates winners and losers from a small proportional cut in both pensions and contributions for all consecutive periods of time. Older people, who are nearer their retirement age, would object to such a cut since they would be the losers. Younger people, however, would welcome it, as they would gain by having their implicit taxes reduced. The indifference age varies with time in a complicated way that depends on the characteristics of the pension system. If the median age falls short of the indifference age, the majority of the enfranchised population is "young", benefiting from a pension cut. If the median age is above the indifference age, a majority is "old", benefiting from a further expansion of the pension system.

The results shown in the graphs imply that today no strategic majority in favour of pension cuts is assured anywhere. All three countries are already in a situation where there is a rough balance of those who gain and those who lose from pension cuts, and in a foreseeable period of time the losers will be in the majority. In Italy, this period is already beginning, in Germany it will begin around 2012, and in France it will begin in 2014 at the latest. The European political system seems to be moving rapidly towards a gerontocracy.

4 THE ECONOMIC CAUSES OF THE DEMOGRAPHIC CRISIS

While the consequences of the demographic crisis are rather obvious, its causes are much less clear. Why have the fertility rates declined so much in Europe?

Traditionally, people had children because they liked sex, because they liked children and because they liked to be secure in their old age. Or to say it more bluntly, they had children because they could not avoid them, because they liked the consumption services children provided and because they saw children as an investment opportunity. The first of these reasons has lost its importance because of the availability of contraceptives. And, as will be argued below, the investment motive has been largely eliminated because of the public pension systems. Thus only the second reason, the consumption motive, remains. But this motive obviously is not strong enough to

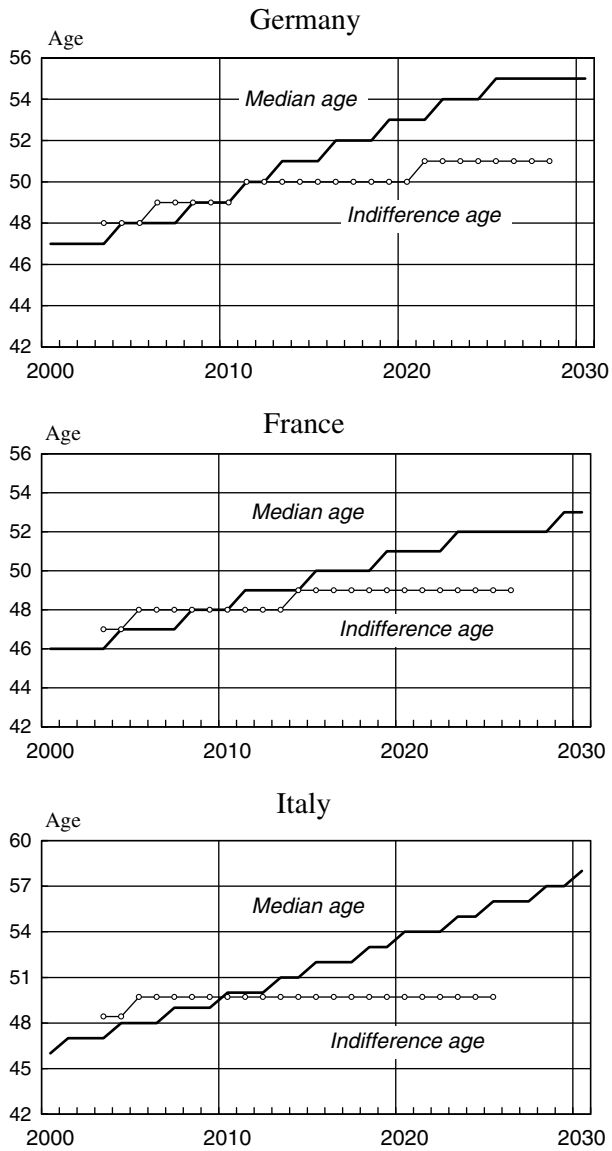


Figure 12 – When will the EU countries topple?. Source: Uebelmesser (2004a)

generate enough children to keep the population constant, in particular since the opportunity cost of raising children seems to have increased for a number of reasons over the last century.

Of course, the low fertility rates are the result of a general change in attitudes to marriage, children, the role of women and other aspects of life,

which also have repercussions on fertility rates. However, the change in these attitudes may not be the cause, but rather itself the result of changed pharmaceutical and economic conditions. The Marxist slogan, which asserts that circumstances determine consciousness rather than the other way round, certainly also applies to the change in attitudes to children and family. As an economist, I fail to see another way of approaching the issue.

4.1 *Economic Incentives to Fertility: The Accession of the Saarland and the Former GDR to the Federal Republic of Germany*

It is sometimes argued that the decision to have children is not dependent on economic conditions. This, however, is certainly not true. How strongly this decision is determined by economic incentives is illustrated by looking at the development of birth rates in the German Democratic Republic, communist East Germany, after the introduction, in 1972, of a comprehensive incentive system to increase fertility. The incentives ranged from greater rights for working mothers via a broad range of childcare facilities from early infancy and more financial aid for young families to the provision of bigger and better housing for families with children.[10] This programme had an impressive impact, as shown in Figure 13. Whereas fertility evolved in a very similar way in the two German states up to about 1972, birth rates in the GDR rose significantly after the introduction of the programme. Only when it became foreseeable that the GDR would collapse and German unification was imminent, did fertility rates return to normal, and after unification they even fell below the west German level.

Similar evidence is provided by the accession of the Saarland – which had been placed under French administration immediately after the war – to the Federal Republic of Germany in 1957. Whereas birth rates there had remained at the comparatively high French level up to this point, they declined significantly after accession and increasingly approached the German average in the ensuing years, as illustrated in Figure 14.

This development was clearly due to the replacement, at accession, of the comprehensive French programme for promoting families and children with the comparatively meagre fiscal incentives offered by the West German government. Even today, French family policy is very much more comprehensive and generous than the German one, with the consequence that the French fertility rate amounted to 1.88 in 2002, far above the German rate of 1.35.[11]

10 Lampert (1976).

11 World Bank, *World Development Indicators* 2004.

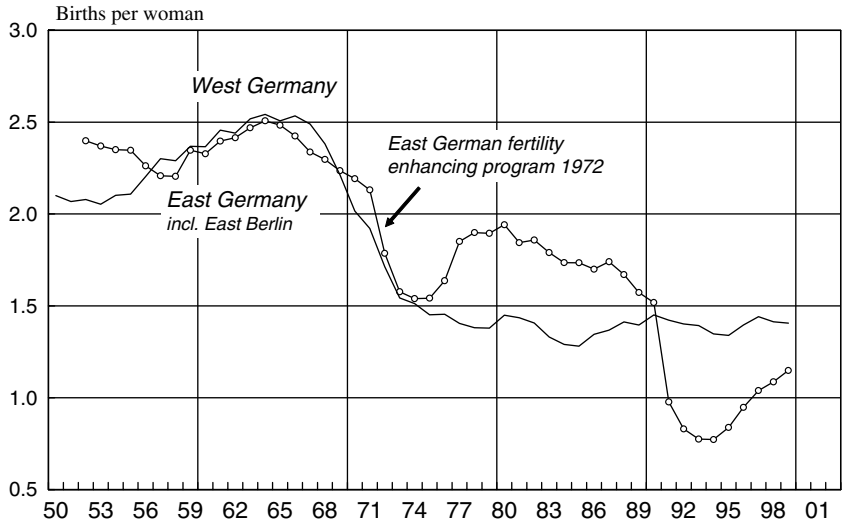


Figure 13 – Fertility rates in Germany since 1950. Note: Total fertility rate: sum of age-specific fertility rates per woman. Source: Federal Statistical Office, Special series 1, Series 1 1999, Special series 1, Series 1.1.2000-2002, 2004

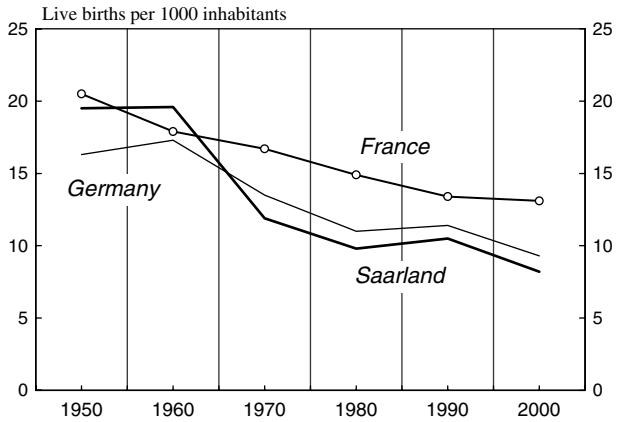


Figure 14 – Birth rates in the Saarland following accession to the Federal Republic of Germany. Source: Federal Statistical Office, Statistical Yearbook for the Federal Republic of Germany, various years and Statistical Yearbook for Foreign Countries, pp. 195 f

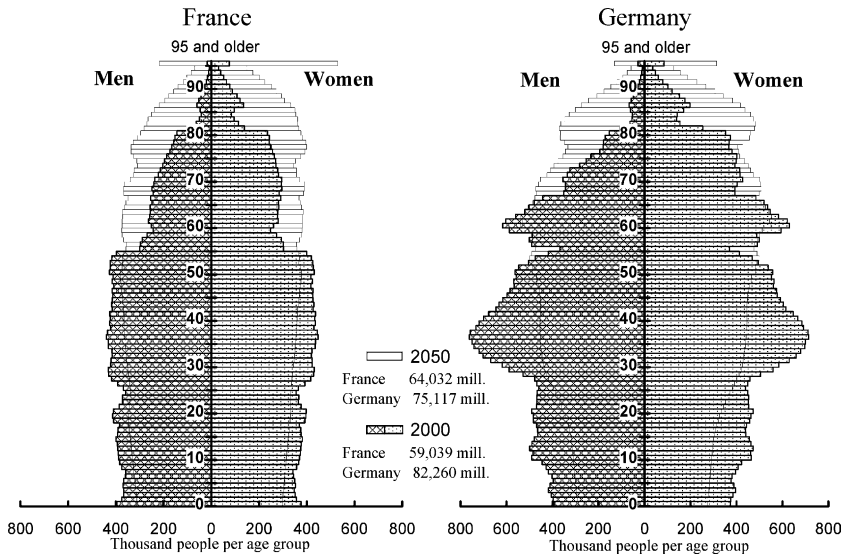


Figure 15 – The French and German age pyramids compared. Annual French net immigration: 50.000. Annual German net immigration: at least 200.000. Sources: France INSEE; Germany: Federal Statistical Office

4.2 *The Example of France*

One of the interesting aspects of European demographic development is the relatively high fertility rate of the French population that, in addition to Figures 3 and 13, becomes evident if the French age pyramid is viewed. Figure 15 shows the French pyramid in comparison to that of Germany in order to contrast two extreme examples.

Neither of the two pyramids deserves its name, since young age cohorts below the age of 25 are smaller than the cohorts in their thirties. However, for cohorts younger than 55 years of age, i.e. people born after the war, the French pyramid is much smoother than the German one. While France had managed to substantially increase the birth rates after the war, defeated Germany needed a considerably longer period of time, its birth rates peaking in 1964. And while the French age cohorts only gradually became smaller after 1964, the German cohorts shrank dramatically after the baby-boom generation. In Germany, the cohorts that today are around the age of 30 comprise 40% fewer people than the cohorts around age 40. In France, the cohorts around age 30 are only 12% smaller than those around age 40. The comparison also suggests that the population ranking will change between the two countries in the foreseeable future. As there are already more births in France

than in Germany today, in 50 years' time there will be more 50-year-olds in France than in Germany, not counting immigration and naturalisation.

To explain these striking differences is by no means straightforward. But it should be noted that, in addition to better kindergarten and crèche provision as well as the all-day schools offered in France, a different attitude with respect to the ability of families with children to pay taxes appears to prevail quite generally in the two countries. The French attitude has led, for instance, to including children in the way that a family's income tax is split among all members of a family (known as the *quotient familial*) rather than splitting it only between the two spouses as in Germany. The prevailing attitude in Germany is that the ability to pay taxes does not depend on the number of children and that the government should support child rearing with fixed subsidies that are equal for everyone. In France, in contrast, the opinion prevails that children reduce a family's ability to pay taxes, and families should therefore be aided by exemptions that reduce the indirect income tax progression. From the French perspective, the German system is unfair because it taxes families with equal per capita incomes differently and in fact implies a higher tax burden the higher the number of children, given the per capita income. In addition, these differences mean that in Germany the fiscal incentives to have children are concentrated on the poorer families right down to socially marginalized groups, whereas in France they remain considerable for the middle and higher income groups. The French approach is held to be preferable because it also favours children being born into and raised within intact middle-class families. This will give them a better education and assure that inheritance results in a fairer distribution of wealth, as it were automatically, without state intervention.

In particular, the French concept of tax splitting for children comes into full effect with the third child, as only this child is given full weight in the corresponding tax formulas.[12] This could be one of the reasons for the measurable success of French family policy, because many families, which have made a decision to have children, usually already plan to have two children. The financial incentive for the third child leads to a significant change in behaviour and has a relatively strong impact on birth rates.

Calculations by the Ifo Institute show that the state benefits accruing through child allowance and tax savings on the third child in France are significantly greater than in Germany in percentage terms. In France, a couple with three children and only one earner drawing an average industrial wage has a 9.1% higher net income than a couple with two children and the same gross income. The corresponding increase in net income resulting from an additional child is only 6.5% in Germany. If the second spouse also earns an income of one third of the average wage, the net income increase for the third

12 The first and second child are each allocated half weighting, the third one full weighting in the splitting formula.

child is 7.5% in France and 5.9% in Germany. The effect of the child tax quotient becomes particularly apparent if the earned income of the second spouse amounts to two thirds of the average wage: the additional increase in net income resulting from the third child is then 7.7% in France but only 4.8% in Germany. Families in France enjoy much higher tax relief if they opt for a third child than is the case in Germany, particularly if the wives also work.[13]

France also facilitates women's decisions to have children because with their ecole maternelle they offer a very comprehensive child-care system that significantly reduces the opportunity cost of mothers. Kindergartens and all-day nursery facilities affect the number of children because the lack of these facilities forces women to cut back their occupational activity. Faced with the alternative of children or a career, they increasingly opt for the latter. This means a considerable loss of income for those women who decide to have children. This loss of income probably represents the largest part of the costs of child rearing and is likely to be the main reason for the international differences in fertility rates. As Figure 16 shows, France is the OECD champion in terms of child care facilities.

However, other countries like Italy and Spain come close to the French degree of coverage, and their fertility rates are nevertheless extremely low. This suggests a more limited influence of this factor than many suspect.

4.3 *Women's Wages*

A similar remark applies with regard to women's wages. Higher wages for women mean higher opportunity costs for raising children, and to this extent they can be seen as contributing to the decline of birth rates over time. After all, as shown in Figure 17, the gap between male and female wages has significantly declined in at least some EU countries over the last decades.

However, it is nevertheless striking that birth rates are higher in France than in Germany despite the fact that the ratio of women's to men's wages appears to be higher in France. Perhaps this is because the higher wages provide women with the security they need to decide in favour of children, given that the liberalisation of divorce laws has reduced this security. The time consistent fertility rate in a situation of loose family ties may well be lower than the fertility rate with a firm commitment to marriage promises, an aspect that follows directly from the theory for which Kydland and Prescott were awarded the Nobel Prize in 2004, although these authors did not directly apply their theory to family decisions.

13 See Meister and Ochel (2003).

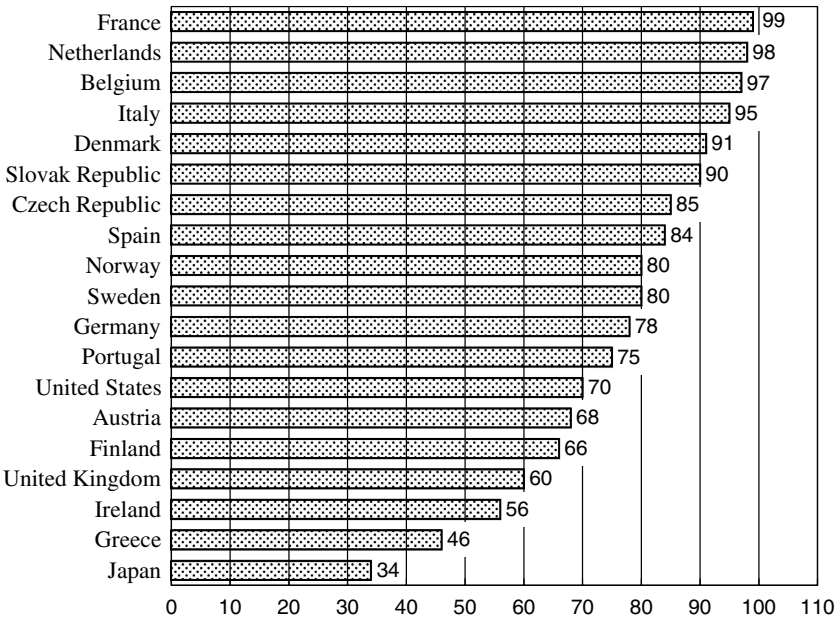


Figure 16 – Proportion of young children using formal child-care arrangements in selected countries (children aged 3 to mandatory school age) in %. The data (which refer to 1998–2000. United States: 1995) include both public and private provision, and cover the following types of formal child-care arrangements: group-care in child-care centres (nurseries, kindergarten, play-schools); residential care, including specialist services such as care for disabled children; childminders, based in their own home, looking after one or more children; care provided by a career who is not a family-member but frequently lives in with the family. Source: OECD Employment Outlook 2001, p. 144, Table 4.7

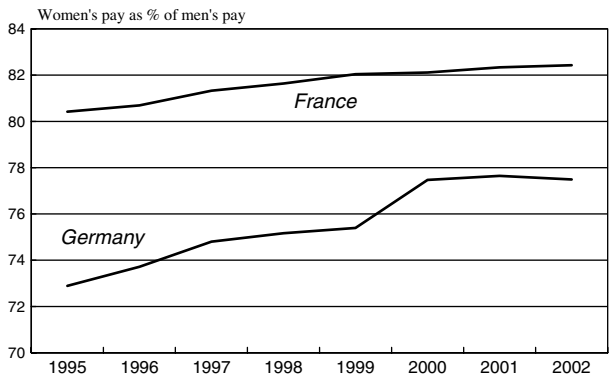


Figure 17 – France and Germany: gender wage ratio 1995–2002. Note: Average gross annual earnings for men and women in industry and services; full-time employees in enterprises with 10 or more employees. Source: Eurostat 2004, Theme Economy and Finance, Database

4.4 *Fertility Insurance and Moral Hazard*

Among the economic reasons for low European fertility rates, the pension insurance systems must be particularly stressed. Not only do these systems suffer from the consequences of the demographic crisis, they themselves may be among their principal causes. As I have argued elsewhere (Sinn (2004c)), pension insurance is an insurance against not being able to have children, and as any insurance it produces a moral hazard effect. In the case at hand, the moral hazard effect is the reduction in the number of children that people decide to raise.[14]

Traditionally, having children meant investing in human capital and living on the fruits of this investment in old age. This was a particularly strong motive for having children before the capital market became available as a means to save for old age. However even with a capital market the motive remained because the rate of return on human capital is much higher than the rate of return on financial capital.[15] While the capital market offers savers only the marginal return to capital, human capital investment offers a family also the infra-marginal return. Thus, having children meant being able to provide for one's old age much more easily than by investing in the capital market. By raising children people became richer in the same sense as an entrepreneur becomes richer who invests his resources in his own firm rather than in the capital market, capturing the infra-marginal returns not available to a financial investor.

Arguably, insurance against not being able to have children is the main economic justification of pay-as-you-go pension system. This system is fertility insurance, protecting people against the bad luck of not being able to have access to human capital investment, because they are infertile or do not find an appropriate partner. Even if one cannot have any children oneself, one does not have to suffer hardship in old age because one is sustained by other people's children. Fertility insurance by way of a pay-as-you-go pension system is an efficiency enhancing social contract.

However, as fertility insurance is implemented by way of socialising the fruits of human capital investment, it lowers the incentives to invest in this type of capital. The low European birth rates also reflect the moral hazard effect resulting from the fertility insurance that the pay-as-you-go pension system provides.

14 For related literature elaborating on the negative fertility effects of pay-as-you-go pensions systems in other contexts, see Werding (1998), Cigno and Werding (1998), Werding (2003) as well as the literature mentioned in the text below.

15 While the real rate of return offered by the capital market lies in the range of 4%, the rate of return of human capital investment concerning men has been measured to be between 6 and 9% for European countries and 10% for the US. See Harmon et al. (2001) for European countries and Card (1999) for the US.

The European pension insurance systems followed Bismarck's system, which was introduced in Germany in 1889. In the years and decades after the German reform, one European country after another introduced variants of the this system, and other parts of the world, including the United States, followed later, if on a smaller scale. Prior to the introduction of pension insurance, it was necessary in Europe to have children to secure one's financial needs in old age. Those without children had to beg for support from relatives and friends, an aspect that Bismarck described very vividly in his speech given to the Reichstag in 1881. This situation has changed, as financial security in old age no longer depends on having one's own children. It suffices if others have children who later pay the pensions. Most European pension formulas do not make pensions depend on the number of children in any significant way. Typically, the size of the pension depends on the overall contributions paid during one's working life or on the fact of being a citizen, but not on the number of children raised. Thus, one of the three above-mentioned motives for wanting to have children – sex, consumption and investment – has been eliminated by the pension insurance system.

It is true that the investment motive was also weakened by the gradual erosion of family ties during the process of industrialisation in the nineteenth century. However, it seems that the motive as such was still intact when Bismarck carried out his reforms. In Third World countries families are still induced to have children in order to secure their old age. The pay-as-you-go pension system finally eliminated this motive in Europe.

Nowadays provision for one's old age is no longer a motive for having children. No young couple thinks of old age security when considering to have children, although the actual economic link between the average number of children and well-being in old age is as strong as ever in the aggregate. The disappearance of the investment motive from the minds of people illustrates in all clarity the dramatic way in which the state pension system has influenced social norms.

It may not be an accident that Germany, the first country to introduce comprehensive pension insurance, now has the lowest number of births relative to its population in the whole world, and that Europe in general has such a poor fertility performance. Generations of Europeans since 1889 have found that they can manage quite well in old age even without children. And new living patterns, which are adapted to the new institutional circumstances, have spread from generation to generation by way of observation and imitation. Life as a single has become an attractive choice, and there has been a dramatic rise in the number of young couples who have no wish to have children, at least for the time being, and who see no reason to marry.

Formerly, childlessness jeopardized one's own life and had to be avoided at all costs. Today, childlessness represents a massive material gain that more and more people are claiming for themselves. The new car and the holiday on

the Maldives can be financed with the money which was saved by not raising children or which the wife was able to earn additionally because she opted to work rather than to have children. It is precisely the lower middle classes with their traditionally high birth rates who have discovered childlessness as a way of bettering themselves economically. Although the economic disadvantage arising from childlessness still exists today, it has been shifted diffusely onto society at large. Europe is ageing, its dynamism is slowing, the welfare state is in crisis, and yet the individual gains little by making a contribution to prevent this development.

The relationship between childlessness and pension insurance has been widely discussed and documented in the literature under the heading of the so-called social security hypothesis in the demographic sciences. Thus Ehrlich and Chong (1998) as well as Ehrlich and Kim (2001) showed in studies covering 57 countries that the introduction and extension of pay-as-you-go pension systems have had a significantly negative impact on the founding of families and birth-rates in the period from 1960 to 1992. Similar results were obtained by Cigno and Rosati (1996, 1997),[16] and Cigno et al. (2000) confirmed the hypothesis for Germany.

The pension insurance system insures against not having children by socialising children's capabilities. The degree of socialisation can be expressed in terms of the implicit taxes people have to pay during their lifetimes. As argued above in the context of Figure 10, these taxes can be expected to be between 5% (US) and 21% (Germany) of lifetime incomes for children born in 2000.

However, to assess the fiscal pension externality created by a child, not only this child's implicit tax, but also the implicit taxes to be paid by all of his/her descendants have to be taken into account. After all, the marginal decision for a child is not the marginal decision for this one individual, but the decision for a whole dynasty of individuals stretching to infinity. As I showed elsewhere, the present value of the implicit taxes paid by the dynasty founded with the birth of an additional child that would earn an average income and has the average number of offspring is equal to the present value of the gross pension contributions this child will pay into the system during his lifetime. The pension claims, which the child acquires during his working years, do not have to be subtracted, because these claims are taken care of by this child's own offspring.[17]

A very cautious calculation for a German participant in the pension scheme who has the typical lifecycle income pattern gave a present value fig-

16 With regard to the effects of pensions financed by proportionate contributions on private savings, however, the studies come to different results: Whereas Ehrlich and Chong as well as Ehrlich and Kim find a negative correlation, Cigno and Rosati find a positive correlation – with a somewhat different specification of the relevant variables.

17 See Sinn (1990, 1997).

ure of €90,000 in 1997 which would be about €100,000 in 2004 values.[18] The calculation was cautious because it was assumed that the contribution rate would always stay constant at its current rate of 20% despite the fact that the demographic crisis requires a substantial increase. The present value of €100,000 is a positive fiscal externality that parents, who opt for a child, contribute to other groups of society outside of their own offspring. It is equivalent to a child tax imposed by the state on the parents at the birth of their child, but deferred together with interest at the going market rate until the child has grown up. If the state were to offset the effect of this tax by a corresponding transfer payment of €100,000 at the time of the child's birth, then, undoubtedly, very many more children would be born.[19]

5 PASSIVE POLICY REACTIONS

What are the policy implications of these insights? The government policies which are being discussed as a reaction to the demographic crisis can be divided into passive and active policies. Passive policies try to cushion the consequences of the crisis for the state pension insurance scheme and the labour market. Active policies aim to increase the birth rate. This section considers the passive policy reactions.

5.1 *Raising the Retirement Age*

Among the passive measures, raising the age limit for drawing pensions is the most obvious one. Instead of early retirement and partial retirement schemes thought up by politicians to temporarily make the labour market statistics look better and so survive the next election, Europeans must work longer to compensate for the decreasing number of young contributors. It was ever thus in the history of mankind. Those who had no children to support them in old age had to carry on working until they dropped dead, and nothing has changed in this respect despite the socialisation of the children's contributions to parents.

The retirement age will certainly have to be raised considerably to cope with the demographic crises that are looming in Europe. However, according to calculations by the United Nations, the formal European retirement age

18 The following assumptions were made: starting employment liable to social insurance contributions at the age of 20 years; development of the annual earned income during the earnings phase following an average income profile derived from the German socioeconomic panel; consideration of the average probability of premature invalidity from the age of 54; definitive retirement at the age of 65; the average earned income of all contributors grows in real terms by 1.5% annually, a capital market interest rate of 4% in real terms and a contributions rate to social insurance of 20%, cf. Sinn (1997).

19 Even if one deducts the state subsidies for raising children including free schooling, one still obtains a net fiscal externality of about €39,000.

would have to be raised from 65 to 76 years if pensions and contributions relative to gross earnings in 2050 were to remain at 1995 levels. This retirement age is far beyond anything that seems feasible politically. With a reasonable increase in the retirement age of, say, two years, only a very limited contribution to alleviating the pension problem can be made.[20]

5.2 *Immigration*

A more comfortable alternative would seem to be the immigration of new contributors. And immigrants do, like children, make a positive fiscal contribution to the rest of society because they also pay the implicit pension tax needed to cover the gains of earlier generations. Permanent immigration, in which the children and grandchildren of the immigrants also remain in the country, definitely helps pension insurance. In the event of such immigration, the entire gross contributions made by the first generation of immigrants during their working lives can be regarded as net contributions to the fiscal system because their pension claims are financed by their own children. Calculations done for Germany show that currently a 20-year-old immigrant would generate a positive fiscal externality in the order of €195,000 in present value terms provided he and his children earn the respective average income.[21] However, immigration is not permanent in most cases, and immigrants do not earn average incomes. As early as 10 years after immigration, more than half of the immigrants have returned to their home country and the return migration rises to 80% after 25 years.[22] Such temporary immigration yields significantly smaller advantages for the pension system because the migrants retain their pension claims despite their return to their home country and these are not financed by their own children but by the collective of domestic contributors. An immigrant, who arrives at the age of 20, works up to the age of 65 and leaves no children in the domestic pension system, can be expected to contribute only about 40% of the original figure, or up to €80,000 if he earns the average domestic wage income. Given that immigrants typically earn below-average incomes and therefore make below average contributions to the pension system, the true fiscal externality is lower than this.

20 United Nations, Department of Economic and Social Affairs, Population Division, *Replacement Migration: Is it a Solution to Declining and Ageing Populations?* New York 2001, p. 87.

21 The premises assumed in calculating this value correspond to those used in calculating the fiscal contribution of a child. However, the earnings phase starts immediately after immigration, cf. Sinn (1990, 1997). The published figure was €175.000 for 1997. Given the wage increases that have happened in the meantime today's corresponding figure would be the €195,000 cited in the text.

22 Sinn and Werding (2001).

It should also not be overlooked that immigrants do not merely relieve the pension system but also burden the state elsewhere. They benefit from the redistribution of wealth in favour of poorer contributors in healthcare insurance and from public benefits like social welfare, unemployment benefits and unemployment assistance, on which they tend to make above-average claims. In addition, and this is a very important effect, they are entitled to use the full range of public services which are available at no cost but represent a considerable burden to the state. These include schools, kindergartens, roads, bridges, parks and other elements of the public infrastructure all the way to the protection offered by the constitutional state via its judiciary and its police force. Although immigrants pay taxes for these services, these are insufficient to cover the actual costs incurred. With their below-average incomes, immigrants, in the European-style welfare state, receive more resources from the state than they pay for in the form of taxes and other contributions. Calculations made by the Ifo Institute in 2001 on the basis of the Socio-Economic Panel for the immigrants who had entered Germany up to that time showed that they incurred a net fiscal burden to the state averaging €2,400 per capita and annum during the first ten years, including the present value of the pension cash flow.[23]

It also becomes obvious that immigration offers no real solution to the pension problem when we realise how many people would have to immigrate in order to stabilise the pension system by keeping the old-age dependency ratio of the population constant. Assume, for the sake of argument, that all immigrants remain young and permanently available as contributors to the pension system and define the dependency ratio as the ratio of people 60 and older over those between 20 and 59. Then the EU15 countries would need a net immigration of 194 million people by 2035. The total number of people residing in the EU15 would then rise from today's 380 million to about 576 million.

However, the assumption that foreigners do not age is, of course, unrealistic. The people streaming in from abroad are not free of the demographic problems plaguing Europe. The immigrants will also get older and will at some time become pensioners without being able to ensure full pension compensation by their offspring. If the immigrant populations have the same age structure as the existing population, then nothing is gained, even if the whole world immigrates to Europe. Immigrants would have to be significantly younger than the Europeans. Calculations by the United Nations on the dimensions of the replacement migration needed to stabilise the EU15 pension system in which these effects are considered show a far more problematic picture. No less than 701 million migrants or an average of 12.7 million people per year would be needed up to the year 2050 to stabilise today's

23 Sinn et al. (2001), esp. p. 226 n. See also Sinn (2004a).

old-age dependency ratio.[24] The number of people living in the EU15 countries would accordingly have to rise to 1.2 billion in 2050. Three quarters of this population would then be made up of people having immigrated to the EU15 since 1995 and their progeny. These are astronomically high figures, which, of course, should certainly not be interpreted as a recommendation. Their enormity shows very clearly just how small a contribution to solving Europe's demographic problems can be expected from immigration. The effects are greatly exaggerated in public discussions and the topic is already being abused in order to bring cheap labour into the EU countries for quite different reasons.

5.3 *Real Capital to Fill the Human Capital Gap*

Among the prudent passive reforms designed to alleviate the consequences of the demographic crisis is the partial conversion of pension insurance from a pay-as-you-go system to a funded system. Every generation will eventually grow old and can continue to live reasonably well only by making the necessary provision in their youth. This means either forming human capital by producing and raising children or forming real capital by saving, to draw on later. A generation which has formed neither human nor real capital must starve.

In relative terms, Europeans are currently forming far less human capital than their forebears did for the reasons already mentioned. The relative loss of income which young people today are prepared to accept in return for raising children is significantly lower than it used to be. If they nonetheless want to avoid hardship in old age, their only option is to save considerable parts of their income today in order to secure a pension for themselves via capital formation because they can no longer expect such pension to be paid by the smaller number of future contributors. Real capital must be formed to the degree that human capital is lacking. This is the correct idea underlying the pension reforms that a number of European countries have introduced in recent years, including the Swedish reform of 1998 or the German reform of 2000, for example.[25] This idea may also be underlying the Dutch dual system which combines a pay-as-you-go state pension covering basic needs with a funded private system organised by the employers.

By contrast, the British system of funded pensions is offered as an alternative to pay-as-you-go pensions and was born out of the belief of a fundamental superiority of a funded system. Such a fundamental superiority is not obvious, however, since, as was mentioned above, the rate of return disadvantage is a sign of intergenerational redistribution rather than of ineffi-

24 United Nations, op. cit. Scenario V, pp. 86–87.

25 Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft (Scientific Advisory Council attached to the Federal Ministry of Economics, 1998).

ciency. There is no reform that respects the claims of the old that would be able to reduce the present value of the implicit tax burden of the pay-as-you-go system as is manifested in the rate of return disadvantage.[26] However, there are useful reforms that help master the imminent crises in the European pay-as-you-go systems by filling the gap in human capital with real capital and thus ensuring the well-being of the elderly in the 2020s, 2030s and 2040s.

Under German conditions, savings of 4% are already enough to form a stock of capital by 2035, the year in which the demographic crisis will peak, that is sufficient to finance about half of all pensions.[27] And they will cover half of the pensions by 2075, when all pensioners will have contributed to the funded supplementary pension insurance throughout their lives. The partial funding proposed by the Scientific Advisory Council attached to the Federal Ministry of Economics, which has now become law, does offer a feasible way of overcoming the problems plaguing the German pension insurance system and probably those of other EU countries.

However, the decision on complementary savings must not become optional for the contributors. The necessary savings will not be made voluntarily even if savings are subsidised heavily as in the German case. This is shown by the extremely low German participation rate of 19% (as of December 2003, two years after the reform) of those eligible for public support. The reason is not the fecklessness of the citizens but the interactions with the rest of the social system. A low earner obtains little benefit from saving voluntarily because he merely reduces his claim to the supplementary social benefit that he will get in old age anyway. In addition, the saver must always fear that in the event of additional pension reforms he will become ineligible to receive the pay-as-you-go pension in old age on the grounds that he already earns a capital income. Funded pension elements must therefore be made mandatory.

The Netherlands has provided a very good example in this regard, since in addition to a pay-as-you-go system that covers basic needs, it has a mandatory funded system to which both employers and employees make contributions. In addition, it has a huge pension fund for civil servants and teachers at all levels. The funds accumulated are about the size of the Netherlands' annual GDP.

6 THE CHILD PENSION

An alternative to reacting in a merely passive way to declining birth rates and cushioning the consequences for the social system elsewhere is to try and counter the causes of the population decline, i.e. to pursue an active population policy. This does not mean proposing a government population policy

26 See Sinn (2000).

27 Sinn (1999) as well as Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft (1998).

which interferes with people's free decisions and placing their choice of having children under state tutelage. It cannot be the role of the state to intrude in a guiding manner into family planning, just as it is not part of its job to tell its citizens which economic decisions to take. But that is the whole point. Today, the state intervenes quite massively in family planning via the pensions system by socialising children's contributions to pension insurance and thus quashing the natural economic motives for having children. This massive state intervention was introduced for different reasons, and certainly not with the intention of reducing the number of children. However, it does have this effect and distorts the decision to have children. To this extent, politics can no longer avoid the question of how to reduce these undesired distortions. Not more but less state influence on family planning is necessary.

6.1 *Socialising the Fruits and the Costs of Human Capital Investment?*

The idea of encouraging the desire for children by helping young families more in the future is not a bad one. The French example could be followed by other EU countries in order to bring the birth rates at least up to the French level. Thus the number of kindergartens per child of appropriate age could be raised in countries that are lagging behind France in this regard. Tax splitting for spouses could be extended by a child tax quotient on the French pattern or family compensation could be extended by cash payments. All these are sensible measures which are worth considering and will affects family planning.

However, the problem is that all of them represent double intervention by the state. State pension insurance smothers the desire for children whereas other, compensating state expenditures reawaken it again. To compensate for the effects of socialising the fruits of human capital investment, the state also socialises the costs of such investment. The overly dramatic fall in fertility rates could be avoided by expanding the degree of cost socialisation. Double intervention of this sort is the implicit rationale behind most western countries' child support policies.

In theory, it should make no difference whether the intervention that triggers a distortion is reduced or whether a second, compensating intervention is introduced instead. However, in practice the difference is great, as the second intervention never exactly offsets the first one, but adds further unintended distortions. Pension insurance, for example, creates artificial incentives for early retirement, for giving up work or turning to unreported work. Family allowances that work against pension insurance in terms of child incentives cannot correct these distortions. Instead they rather produce additional distortions elsewhere. For example, they involve artificial incentives for the immigration of people with many children and also encourage unreported work and a refusal to work by those who must finance these allowances with their

taxes. They may even, as is the case in Germany, create work disincentives for the recipients because the size of the allowances shrinks when income increases. Even though the incentive effects may cancel each other with regard to fertility choices, they will not be able to do so with regard to the other behavioural distortions created.

It is therefore better to retract the primary intervention in family planning implied by the pension system by reducing the degree of fiscal redistribution from families with children to persons without children.

6.2 *Differentiating Savings and Pay-as-you-go Pensions by the Number of Children*

One way of reducing the fiscal redistribution from parents to persons without children would be simply to scale down the pension system. But this strategy would not be compatible with the urgent need to master the pension crisis that is imminent for the twenties and thirties of this century. In a sense, more rather than less, social security pension is necessary today.

The partially-funded pension discussed above offers a possible approach. As pointed out, Europeans today form less human capital than earlier generations did and must now save additional real capital to make up for it. There is no way to avoid this conclusion. Raising fertility rates is essential for Europe in the very long run. It will bring new dynamism to the continent and help mitigate the pension problem. However, it will not be able to offer a real solution to the imminent crisis, because it simply comes too late. The baby-boomers are now forty, and for biological reasons they cannot have many more children. In 30 years time they will be seventy and claim their pension from the following generations which is not there in sufficient number. Thus, the baby-boomers must be asked to save now so they can live on their capital when old. They still have 25 years to accumulate funds to supplement their meagre pay-as-you-go pensions during 20 years of retirement.

Existing pension schemes with partial funding have taken into account the idea that the lack of human capital must be offset by additional real capital, but they have not been thought through to their final conclusion. They cure the symptoms of the European illness but not its causes. They do not reduce the disincentives to family plannings and they lead to almost intolerable burdens on those who, by raising children, are already paying the entire contribution to the financing of the pay-as-you-go pensions.

Instead of forcing an entire generation to accept their responsibilities collectively, the necessary savings could be required of those without children, whereas those with a sufficient number of children could be granted today's pay-as-you-go replacement rates despite the demographic crisis. After all, it is not they who caused this crisis. Those who fail to produce and raise children can reasonably be expected to feel at least some of the consequences of their

decisions. They can be asked to invest the resources that parents invest in their children in the capital market so as to buy themselves an additional pension rather than claiming more and more funds from other people's children.

Pensions of childless people should not be reduced to zero, however. This would negate their main economic function of providing insurance protection against the economic consequences of childlessness. Despite moral hazard in terms of neglecting the investment in human capital, some insurance is always optimal when people fear the risk of being infertile or not being able to find an appropriate partner.[28] Moreover, the childless actually do make a certain, if small, contribution to co-financing children via the tax system. However, it would seem appropriate not to guarantee them today's replacement rates despite the demographic distortions to come since in the presence of moral hazard effects full coverage insurance is not efficient.

6.3 *The Three Pension Pillars: The Old Pay-as-you-go System, Child Pension and Savings*

A reform that considers these aspects would basically create a three-pillar pension system.

The first pillar consists of the existing pay-as-you-go pension. The internal structure and the conditions under which such a pension is paid would not be changed. Each country could basically keep its present system. However, the contribution rate as well as the percent of government subsidy, if any, would be fixed at today's level, and the demographics would work via the budget constraint. The replacement rate, which the pension system is able to provide, would gradually fall until the crisis years around 2035 in line with the increase in the old-age dependency ratio (see Figure 8). In countries such as Germany, the Netherlands, Italy or Spain, where the old-age dependency ratio will double in that period of time, this would mean that replacement rates are cut in half in relation to today's values, unless other measures such as an increase in the retirement age or an increase in the labour force participation of women are implemented.[29] The resulting pension levels will be far too low by today's standards. Thus additional pillars are necessary.

For those who raise children a "child pension" could be introduced as a second pillar. The child pension is a pay-as-you-go pension that is financed with an income tax paid by all members of society who earn an income on the grounds that all have parents. The tax liability is independent of membership in other pension systems and the pension claim is independent of

28 See Sinn (2004c).

29 According to calculations of the Ifo Institute, the German gross wage replacement rate would decline from 48 to 32% despite an increase in retirement age of two years and despite a substantial increase in women's labour force participation. A rate of 32% just happens to be the current level of social aid relative to average gross wages.

previous incomes and employment. In particular, it is independent of previous contributions to earlier generations' pensions. What counts is the number of children raised. Mothers who have not had jobs but raised children are entitled to the same pension as fathers who worked in the official labour market, for example.

The amount of tax necessary to finance the child pension is adjusted such that the sum of the pay-as-you-go pension and the child pension satisfies today's replacement rate for an average or standardised family with, say, three children. The standardised family could be the OECD type with one full-income earner working the normal number of years at the country's average wage and a partner who earns a further third of that income. The child pension only depends on the number of children raised. It neither depends on the pensioners' nor their children's incomes. Under the conditions of the German tax system, the income tax sufficient to finance the child pension has been calculated to be about 3.5% in the crisis year 2035. It would prevent an increase in the effective contribution rate from today's 19.5% of gross wages to 31.4% in 2035. The sum of contributions to the old pension system and the child pension income tax rate would be just 23%.[30] Today and during the next decade, the child pension would cost close to nothing, since nearly all baby boomers are still in the work force. The burden will arise only later, when the demographic crisis begins to operate and the replacement rate of the old pension system begins to drop such that the gap between it and the target rate that has to be closed will begin to widen.

Focusing on three children as a condition for receiving the full child pension is arbitrary, but it somehow follows the French idea of targeting family policies at the third child, which has turned out successfully in terms of raising the fertility rate. Individuals who have shared the cost of raising at least three children will get the full child pension, individuals who raised fewer children will receive proportionately less. They will have to save to compensate for the lacking child pension.

The third pillar is therefore mandatory private savings on well defined individual accounts that provide old age pension annuities rather than lump-sum cash payments upon retirement. The private banking and insurance industry would have to offer well-defined and publicly controlled financial instruments for that purpose. As explained above, saving is mandatory to avoid free riding on the charity of the welfare state. Mandatory savings are a certain fraction of income, regardless of whether this is earned income or transfer income received from the state. Under German conditions, a savings rate of 8% of gross income has been calculated by the Ifo Institute to be sufficient to maintain today's replacement rate of nearly 50% until the crisis

30 See Sinn (2004b, p. 397, Table 7.1).

years around 2035 despite fixing contribution and government subsidy rates at today's levels.[31]

Young people entering the labour market would automatically participate in the mandatory savings programme, but once the first child is born, one third of the accumulated savings is paid out and one third of the current savings obligation is waved. The second and third child have analogous financial implications, and mandatory savings are no longer required when the third child is born.

It would be clear to everyone that, in order to secure a sufficient pension in old age, he or she had to either invest in real or in human capital. Today's pension formulas hide the true economic situation from the participants because they establish pension claims on the ground of having provided pensions to earlier generations, although this provision makes no contribution whatsoever to securing one's own pension. Such contributions can only be made by raising children. Charitable acts for earlier generations do not matter. The combination of the child pension and mandatory savings accounts establishes a legal relationship between individual behaviour and pension levels that really exists in the economy. In such a system, everyone is free to make choices, but he/she will also be seeing the true economic consequences. Children will again acquire greater weight in life planning, and many undecided young couples will opt for children after all.

The savings obligations for the childless should be implemented by the European countries without delay, because the time for the accumulation of a compensatory stock of savings is short.

6.4 *Phasing in the Child Pension*

There are alternative ways of phasing in the child pension. It will be a political decision whether only those children should count for the pension claims of parents who are born after the implementation of the new pension law or whether children born before should also be considered. From an incentive perspective the former may be preferable, but from the point of view of justice, the latter seems advisable. For example, child pension entitlements could be awarded to parents in proportion to the number of years after the pension reform during which they still have children below a certain age, say below the age until which they are legally obliged to finance their children.

Such a rule would imply a gradual phasing-in period that avoids a premature burden on the working generation as well as a particular hardship for parents with older children. Parents with young children born before the reform would receive part of the child pension, and parents with older children would typically enter the pension age before the demographic distortions

31 This roughly matches the information cited above, i.e. that 4% savings would be able to cover 25% of pensions in the crisis years.

can be felt and before the replacement rate drops significantly below today's level. Whatever the transition rule implemented, the tax necessary to finance the child pension cannot be a burden until the old-age dependency ratio begins to change and the replacement rate begins to drop, which will not be the case before 2015 or thereabout.

6.5 *A Remark on the Dutch Pension Reform*

My proposal is not designed for the Dutch economy, as the Dutch pension system already has some of the elements other countries would still have to introduce. However, it does have implications for the new government's plan to make pension funds accessible for families. The Netherlands has a pay-as-you-go system that provides a basic pension for everyone plus a mandatory funded system that provides additional benefits depending on lifetime savings, which are themselves a fixed proportion of income. The funds are subjected to cash flow rather than income taxation. Savings are tax exempt, and only withdrawals are taxed. The accumulated funds were originally accessible only at the time of retirement. However, the plan is to make the funds accessible at earlier stages of life under well-defined conditions, for example, for the purpose of setting up a family and allows for the conversion of real capital into human capital.[32]

This is a good modification. However, the caveat is that, if young families make use of this plan, they reduce their pensions without receiving any compensation. The pension contributions made by the grown-up children are not going to their parents but are socialised and available to all retirees, regardless of whether or not these have raised children. The conversion of real capital into human capital is a conversion of private real capital into social human capital. All the problematic incentive and justice problems discussed above apply.

The problem could be solved by amending the Dutch reform plan with the child pension system. An additional pay-as-you-go pension financed with taxes to be paid by the children, handed out to parents in proportion to the number of children they raised, could make up for the pension losses resulting from early liquidation for the purposes of family formation.

6.6 *The Counterarguments*

There are a number of arguments that, outside the Netherlands, could be raised against the proposed reform.

For example, the proposal may be rejected on the grounds that young childless citizens are already sacrificing resources for their own pensions by

32 See Bovenberg (2004).

paying their pension contributions, so that it is unfair to force them to pay twice by also saving for a funded pension. This argument fails to recognise that it is a normal duty of every generation to make *two* contributions in the generational context: in the active phase of life one must provide for both one's parents *and* one's children. The first of these two comes in the form of pay-as-you-go pension contributions which flow to today's pensioners in full. But the second contribution is not made by many people because they decide not to have children. Seen in this way, it is certainly fair to insist that these people also make a second contribution, if only in the form of savings. They thereby secure the pension whose full financing can no longer be expected of the few future contributors, and parents receive a larger part of the pension contributions paid by their own children. In any case, to ask those who raise several children to save for their old age would subject them to a triple burden. As pay-as-you-go pension contributors they now provide for the old, as parents they finance the pensions of all future pensioners, and as savers they must also finance their own pensions. One of these burdens is too much.

People who would like to, but cannot, have children may find the child pension unfair, because it effectively means that in addition to their bad luck they will receive a lower aggregate pay-as-you-go pension in old age than parents do. While understandable, such people should see that they do have the ability to save simply because they do not have children, do not have to finance them and do not have to sacrifice work time to raise them. They should accept that it is only fair that they invest the resources in the capital market that other people invest in their children. They have the ability and the necessary funds to do so.

It could further be argued that the child pension should not only be based on the number of children, but also on the income they are able to earn and on the contributions they are making to the pay-as-you-go system. Taken to the extreme, this argument simply means that the public pension system should be scaled down and replaced with mandatory intra-family transfers. There is much to be said for such a modification. However, such a sophisticated reform is unlikely to be politically expedient. It could also be countered by the argument that the differences in children's income levels resulting from their parents' own efforts are minimal, given that schooling is mandatory and state financed. Such differences apparently result largely from congenital differences in intelligence and performance that parents can modify only to a very limited extent. Comprehensive insurance for parents with respect to such differences would therefore appear to be appropriate.

Faced with the idea of differentiating pension claims by the number of children, it may be objected that people do not act sufficiently rationally to anticipate the pension implications for their old age when they decide to have children. A system of child benefits seems much more effective insofar as it provides young families with the needed financial means immediately after

the birth of their children. Young couples would see that others with children enjoy the financial help of the state, and they would therefore react accordingly with respect to their family planning.

The careful reader will know that this argument is invalid simply because the pension system proposed here also provides the financial means when they are needed. To repeat: the auxiliary savings plan is mandatory for all income earners without children, but as soon as a child is born a third of the accumulated savings is paid out and a third of the current mandatory savings is waved. The child pension would provide the funds exactly at the right time, and everyone would know that children provide more funds without reducing the living standard in old age. In this regard there is no difference to child benefits.

The main difference, however, is that a child benefit system makes no contribution to fund the pensions of the childless and is a compensating double intervention that cannot perfectly correct the distortions resulting from the first one, the socialisation of children via the pay-as-you-go system. The child pension system kills two birds with one stone, something which according to Tinbergen is impossible in policy making. It reduces the first intervention in the sense of scaling down the degree of socialisation of human capital, thus re-establishing some of the natural incentives for having children. And it funds the pensions of the childless, thereby solving the imminent pension crisis.

7 CONCLUDING REMARKS

In a sense, this lecture comes too late, for the most heavily populated European age cohorts are just entering their fifth decade. These cohorts will no longer beget the children that Europe needs if it is not to depart from the world stage as an economically dynamic region. However, by combining the idea of partial funding with a re-establishment of fertility incentives it offers a way to solving the imminent pension crisis that will peak around 2035 and at the same time paves the way for a more fertile development of the population in the longer run.

A pragmatic approach to the topic of family planning and fertility is urgently needed to limit the damage threatened by Europe's ageing societies. It will also require the governments to change course, for the systems of social security have separated the fate of the individual from the consequences of his family planning and have contributed decisively to changing society's value placed on the family and to the Europeans' lack of children. It is right for the state to contribute more to the cost of raising children and also to consider children more in taxation. The increased provision of kindergartens, the transition to all-day schools and the child tax quotient system on

the French pattern are measures which are useful and will have the desired success.

However, it must not be ignored that some of these measures are being justified by the idea of double state intervention and could thus involve undesirable side-effects. There is considerable evidence that the state would do well to retreat by reducing the degree to which the pension contributions paid by children to their parents' generation are socialised. Those who have no children can invest the money saved in the financial markets in order to secure a pension whose full payment cannot be expected to be paid by the children of others. This could be the model for a new pension reform in which the contribution rates of the existing pension systems are fixed despite the demographic distortions and the additional payments needed to safeguard the living standard of the elderly come either as child-dependent pay-as-you-go pensions or as funded pensions based on one's own savings.

This reform demands more courage from the politicians and the representatives of the pension insurance systems than is evident today. Awareness among the electorate is not sufficiently advanced in this respect. Plenty of water will flow under the bridges of Europe before forceful political measures are taken. But the politicians and association representatives, who deny the importance of this issue or dismiss it with weak legal argument are placing the future of Europe in jeopardy.

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