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EUROPE'S DEMOGRAPHIC EVOLUTION THROUGH TO THE YEAR 2050

The baby-boom generations that expanded the working populations of Europe's principal countries for thirty years are about to enter retirement. This is a transitory phenomenon. But falling fertility rates and longer life expectancy over the next half-century will restrict demographic growth to the retired population. In the majority of the seven countries studied here, the fall in the working populations and the number of young people will be sufficiently large to lead to a reduction in population sizes, that in some cases will be significant. Accompanying such baseline projections, alternative forecasts assuming higher fertility rates or immigration highlight the inertia of demographic trends and the inevitable tendency of workforces to fall relative to retirees.

Future demographic trends in the industrialised countries are characterised by marked ageing of populations. They raise a number of concerns related especially to their impact on social security systems and pensions. To gauge the sensitivity of European pension schemes to several demographic variables, the CEPII has carried out 50-year population forecasts for seven countries (France, Germany, Italy, the Netherlands, Spain, Sweden and the United Kingdom), which together account for 86% of the population of the 15-member European Union. As pension-scheme reform is widely on the agenda, this work provides an opportunity to restate the main characteristics of European demographics as well as the key variations across countries[1].

A Fall in Population Size

These forecasts are based on the most recent assessment of demographic trends carried out by the European Council[2]. The forecasting method used here is based on the so-called components method (see Box 1). The results of the baseline scenario are presented here, and assume that demographic characteristics observed in recent years persist (see Box 2). The assumptions about mortality, fertility and migration used in the baseline forecast are close to those adopted by the United Nations in its forecast made assuming constant fertility and in its average forecast: the forecasts made by the CEPII generally fall between these two UN forecasts[3].

From 1960 to 2000, the population of the seven countries of the study rose from 270 million to 323 million. Between 1960 and 1970, demographic growth was rapid (0.82% per year, on average), but then slowed down markedly during the thirty following years (0.33% per year, on average). In the decade running from 2000 to 2010, the population in four of the seven countries is set to fall, while a decline is likely to begin in the three other countries with the highest fertility rates, as of 2030 (see Table 1). It is therefore estimated that by 2050, the total population of these seven countries will stand at 286 million, or 37 million less than in 2000 (equivalent to an

Table 1 — Population of the largest European countries, on 1st January, 1960-2050 (baseline scenario), in millions

Year	France	Germany	Italy	Netherlands	Spain	Sweden	United Kingdom
1960	45.5	72.5	50	11.4	30.5	7.5	52.2
1970	50.5	78.3	53.7	12.9	33.5	8	55.5
1980	53.7	78.2	56.4	14.1	37.4	8.3	56.3
1990	56.6	79.1	56.7	14.9	38.8	8.5	57.5
2000	59.2	82.2	57.7	15.9	39.4	8.9	59.6
2010	59.8	80.5	56.2	16.3	38.4	8.7	60.1
2020	60.2	78.3	53.9	16.4	36.6	8.6	60.7
2030	60.4	75.7	51.3	16.5	34.3	8.6	60.7
2040	60.1	72.6	48.6	16.3	31.7	8.4	59.9
2050	59.5	69.4	45.4	15.9	28.5	8.3	59.1

Source: European Council and CEPII forecasts.

1. For a more detailed description of these issues see: "Projections démographiques de quelques pays de l'UE", Rakhsat Sleiman, *CEPII Working Paper*, No 2002-13, October 2003.
2. Source: *Evolution démographique récente en Europe*, 2000, Council of Europe Publishing.
3. They are, nevertheless, closer to the higher scenario provided by the UN for the Netherlands and Sweden, and closer to the lower UN scenario for Spain.

annual average fall of 0.24%). This contraction will affect all countries, save France and the Netherlands, and will be spectacular in Germany (with 13 million inhabitants less), in Spain (11 million less) and in Italy (12 million less).

BOX 1 — METHODOLOGY

The methodology used here — the components method — alters populations by age and by sex, based on assumptions of mortality, fertility and migration. The method starts by classifying a population by sex and by age, on 1st January in a given year. Survival probabilities through to the next age are then applied by age and by sex, to estimate the surviving population the following 1st January. Births for the year are calculated on the basis of the size of the female population and assumptions made about fertility. Lastly, the projected migration surplus, by age and sex, is then added to the surviving population. The calculation is repeated for every year, running throughout the forecast period.

Demographic Ageing

If the populations of the seven countries are broken down into three major categories, which conventionally correspond to the ages of education (0-19 years), work (20-64 years) and retirement (65 years and more), then only the oldest category is set to grow in all countries. The population sizes of young and working people will fall (Table 2).

Table 2 — Population trends by age group, 2000-2050 (baseline scenario), variations in %

	0-19	20-64	65+	Total
France	-17	-7	53	0
Germany	-33	-25	42	-16
Italy	-40	-33	39	-21
Netherlands	-20	-11	85	0
Spain	-57	-41	60	-28
Sweden	-29	-10	35	-7
United Kingdom	-18	-7	50	-1

Source: CEPII forecasts.

These trends are caused by several phenomena. The first concerns the retirement of the post-war baby boom generations, which will be replaced by smaller working populations. This phenomenon will begin as of 2005-2010 and is already part of Europe's age pyramid. It is transitory, but will strongly characterise the following decades. At the same time, higher life expectancy, which is a long term structural phenomenon, will lead to a rise in the number of 65-year olds. Turning to the base of the population pyramid, it will continue to be characterised by lower fertility rates. These emerged in the mid-1960s onwards, and have reduced the size of the generations that will have children during the next fifty years. The calculations also assume that average fertility will remain at the low levels observed over the last five years. On top of these common characteristics, the demographic history of each country has shaped varying age pyramids. Although life expectancies have converged, fertility rates and migratory balances continue to show marked national characteristics, which in turn lead to differentiated outlooks. For France and

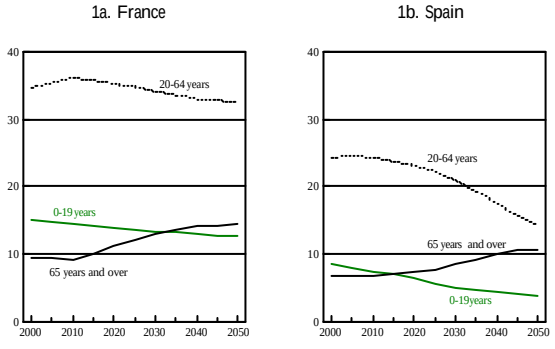
BOX 2 — ASSUMPTIONS USED IN THE DEMOGRAPHIC FORECASTS TO 2050 - BASELINE SCENARIO

- *Mortality:* Life expectancy rates by sex and by country are calculated by linear extrapolation of trends over the last fifteen years.
- *Fertility:* For each country studied, the total fertility rate (TFR) for 2001 to 2050 is equal to the average level observed over the last five years (1996-2000 or 1995-1999, depending on the availability of data). Similarly, the mean age of women at childbearing during the forecast period is equal to that of the last five years.
- *International migration:* It is assumed that the annual, net migratory balance for the period 2001-2005 will be similar to the average observed over the last five years.

	Total fertility rate	Migratory balance (in thousands)
France	1.77	43
Germany	1.35	204
Italy	1.21	118
Netherlands	1.62	31
Spain	1.18	41
Sweden	1.53	10
United Kingdom	1.70	115

the United Kingdom, the baby-boom ran through from the end of World War II to the mid-1960s and fertility rates are still amongst the highest in Europe. Their working populations will therefore carry on rising for several years before falling off slowly. In these two countries, and in the Netherlands, the number of elderly will overtake the number of younger persons in around 2035 (see Graph 1a). In contrast, Spain and Italy had a later baby-boom (between 1960 and 1975), which was followed by a sharper fall in fertility, and their demographic changes are set to be more marked. The fall in their working populations is already underway, and will be very significant: the elderly population will exceed the young population by around 2015 (Graph 1b). Germany, whose demographic history is different again, will also experience such changes. It should also be noted that for a certain number of countries (Germany, Italy, the Netherlands and the United Kingdom), the impact of migration in the baseline scenario is not negligible (see Box 2), and will moderate the trends described above: migration tends to raise working populations and that of young people.

Graph 1 — Persons per age group, 2000-2050 (baseline scenario), in millions



Source: CEPII forecasts.

Demographic ageing is therefore taking place everywhere, be it at different speeds. It is affecting the base of population pyramids (the fall in the number of young people) and the top (the rise in the retirees). Presently, the share of the 0-19 year olds remains greater than the 65 and over population, for all the countries studied. By 2050, it will be less in all countries, with strong differences emerging in Germany and Sweden, and even greater differences in Italy and Spain (Table 3). As for the working populations, they currently account for between 58.5% and 62.4% of the total populations of the countries studied. This range will fall to between 50% and 56.6%. While the burden of educating the young borne by working populations will fall only slightly (except in Sweden and Spain where it will fall more clearly), the costs generated by retirees will rise substantially.

Table 3 — Population structure by age group, 2000-2050 (baseline scenario)

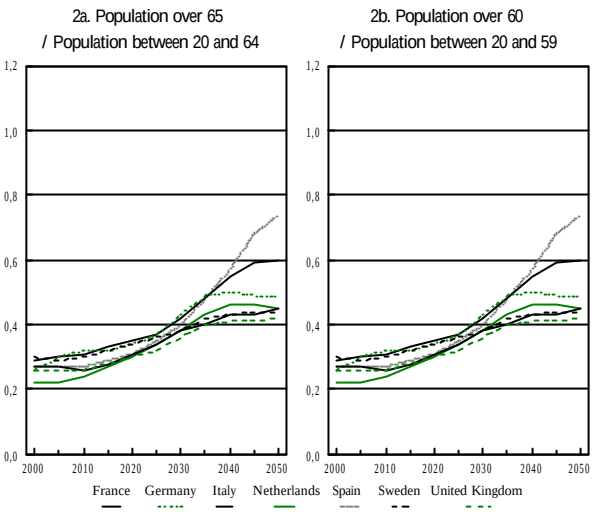
	2000			2050		
	0-19	20-64	65+	0-19	20-64	65+
France	25.6	58.5	15.9	21.2	54.5	24.3
Germany	21.3	62.4	16.2	17	55.6	27.4
Italy	19.8	62.3	17.9	15.1	52.9	31.9
Netherlands	24.4	62	13.6	19.6	55.3	25.1
Spain	21.7	61.6	16.7	12.9	50.1	37
Sweden	24.2	58.5	17.3	18.3	56.6	25.1
United Kingdom	25.3	59.1	15.6	20.8	55.6	23.6

Source: CEPII forecasts.

Dependency Ratios

To illustrate the economic and budgetary pressures resulting from demographic ageing, demographers use the economic dependency ratio of retirees: the number of people over 65 years old as a percentage of the working population (the 20-64 year old age group). This ratio will rise strongly in the coming half-century, especially during the years when the baby-boom generations will enter retirement. The ratio will be relatively stable until 2010, but will then rise significantly until 2035-2040 (Graph 2a). In other words, while there are at least 3.5 members of the working population for every retiree in the seven countries of the study today, this number will fall to 2.5, at best, by 2035, declining further to 1.7 in Italy and 1.4 in Spain by 2050. Furthermore, these figures do not take into account the fact that quite a significant share of the population aged 60-64 is in fact inactive, even though they are counted as part of the working population. Calculating the dependency ratios for the population aged 60 and over compared to a working population of 20-59 year olds, brings down the ratio even further: using this definition, the present ratio is 2.5 to 3 working persons for every person over 60, and this will fall to between 1 and 1.6 by the year 2050 (Graph 2b). Conversely, the above figures suggest that raising the age of retirement would reduce the demographic pressure on pension schemes for which the retirement age is 60, provided of course that people aged 60-64 are actually able to find effective employment.

Graph 2 — Dependency ratios, 2000-2050 (baseline scenario), in %



Source: CEPII forecasts.

Inevitable Trends

Further simulations have been carried out to illustrate the impact of fertility rates and migration, both structural phenomena affecting demographics, but occurring in different time periods and to see how they affect the inevitability of these trends. In a first scenario, the total fertility rate is fixed at 2.1 (i.e. the generation replacement rate) for 2001 onwards, for all countries, with all other parameters being held constant. In a second scenario, the migratory balance is increased significantly, being doubled for all countries except Italy, for which it is trebled, and for Spain where the increase is fivefold: all other parameters are again held constant[4].

Further simulations have been carried out to illustrate the impact of fertility rates and migration, both structural phenomena affecting demographics, but occurring in different time periods and to see how they affect the inevitability of these trends. In a first scenario, the total fertility rate is fixed at 2.1 (i.e. the generation replacement rate) for 2001 onwards, for all countries, with all other parameters being held constant. In a second scenario, the migratory balance is increased significantly, being doubled for all countries except Italy, for which it is trebled, and for Spain where the increase is fivefold: all other parameters are again held constant.

4. A positive migratory balance for the whole population is made up of positive and negative balances for various age groups. The arrival of migrants is above all concentrated in the 15-35 year old age category, while there is a net negative balance for retirees, as more people return to their countries of origin. For this scenario, the balances, be they positive or negative, are multiplied by the same proportions for each age group.

The first simulation shows that given a replacement fertility rate (which is an extremely optimistic assumption under present circumstances), the populations of all countries will rise considerably (Table 4). This is especially true for the United Kingdom and the Netherlands (about 30% through to 2050, as compared to 13% for the other countries) given the relative size of child-bearing age groups in both countries during the period studied, and given the contribution of migrants to population growth in the baseline scenario.

Table 4 — The evolution of populations by age group, 2000-2050, variation in %

	Baseline scenario (reminder)				Scenario of SFR = 2.1				Migratory balance scenario			
	0-19	20-64	65+	Total	0-19	20-64	65+	Total	0-19	20-64	65+	Total
France	-17	-7	53	0	12	3	53	13	-1	2	56	10
Germany	-33	-25	42	-16	38	-3	42	13	-12	-7	49	1
Italy	-40	-33	39	-21	42	-7	41	11	-18	-5	60	4
Netherlands	-20	-11	85	0	33	11	87	27	18	19	101	30
Spain	-57	-41	60	-28	30	-9	65	12	-37	-17	93	-3
Sweden	-29	-10	35	-7	18	6	35	14	-20	0	40	2
United Kingdom	-18	-7	50	-1	40	21	51	30	23	31	58	33
Sweden	-29	-10	35	-7	18	6	35	14	-20	0	40	2

Source: CEPII forecasts.

With a fifty-year horizon, a rebound in fertility rates as of 2001 will obviously only affect the youngest age group in the short term, and will only affect the working age population progressively, as of 2021. In countries where a fall in the working population is set to occur after 2025 in the baseline scenario, such a fall would then be avoided and would even give way to a rising working population (in France, the United Kingdom, the Netherlands and Sweden). In contrast, the larger number of young people will arrive too late for Germany, Italy and Spain to prevent the fall in working populations already underway in these countries. Despite a rise at the end of the period (or a stabilisation in the case of Spain), the working age population will still be smaller in these three countries, in 2050 than it was in 2000.

Also a rise in fertility which does not expand the working population progressively until after 2021 will not have a significantly large enough impact on the dependency ratio to reduce the impact of the baby-boom generations entering retirement between 2010 and 2030. Nor will it produce the structural effect which greater life expectancy has on the number of retirees. The assumption on replacement fertility rates however would reduce the rise in the dependency ratio in the years 2010 to 2030, and would stabilise or even reverse it towards the end of the period. Overall, the rise in the dependency ratio is halved between 2000 and 2020 with respect to the baseline scenario, in several countries and notably in those where the fertility rate was particularly low (Table 5). Yet, it should be noted that in this scenario, the burden of educating the young rises significantly.

The rise in the population in the "migratory balance" scenario is, in most cases, less important than in the previous scenario (Table 4). But it does not just affect the young population: in this scenario, the working population rises as of the first year of the forecast, and especially for young workers. In contrast, the number of older persons falls, as migratory balances are more often negative for older people. As a result, a substantial rise in migration may partially offset, though not cancel out, demographic trends, as of the beginning of the period. Overall, by 2050, the dependency ratios will in most cases be very close to those of the previous scenario (Table 5).

Table 5 — Dependency ratios
(Population of 65 and over / Population between 20 and 64)

	France	Germany	Italy	Netherlands	Spain	Sweden	United Kingdom
2000	0.27	0.26	0.29	0.22	0.27	0.30	0.26
Baseline scenario							
2025	0.34	0.37	0.37	0.34	0.35	0.36	0.32
2050	0.45	0.49	0.60	0.45	0.74	0.44	0.42
Scenario with fertility at 2.1							
2025	0.34	0.36	0.35	0.32	0.32	0.35	0.30
2050	0.40	0.38	0.44	0.37	0.49	0.38	0.33
Scenario with migratory balance							
2025	0.33	0.34	0.31	0.30	0.32	0.34	0.28
2050	0.41	0.41	0.48	0.37	0.63	0.41	0.32

Source: Council of Europe and CEPII forecasts.

These scenarios provide evidence for the great inertia which characterises demographic phenomena. Even with strong, hypothetical assumptions, that are quite unrealistic for several countries, the basic underlying trends will continue. Apart from the uncertainties present in all forecasts, demographic data will provoke fundamental political debate, related especially to the financing of pension schemes and health services.

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