4th International Research Conference on Social Security
Antwerp, 5-7 May 2003

"Social security in a long life society"

White or prosperous: How much migration does the aging European Union need to maintain its standard of living in the twenty-first century?

Michael CICHON
Chief, Financial, Actuarial and Statistical Services
with Florian Léger and Rüdiger Knop

The International Financial and Actuarial Service
Social Protection Sector
International Labour Office
Geneva

International Social Security Association **Research Programme**

Case postale 1, CH-1211 Geneva 22 Fax: +41 22 799 8509 e-mail: issarc@ilo.org Web: www.issa.int

White or prosperous: How much migration does the ageing European Union need to maintain its standard of living in the twenty-first century?

Michael Cichon
Chief, Financial, Actuarial and Statistical Services
with Florian Léger and Rüdiger Knop

The International Financial and Actuarial Service
Social Protection Sector
International Labour Office
Geneva

1. Introduction and objective

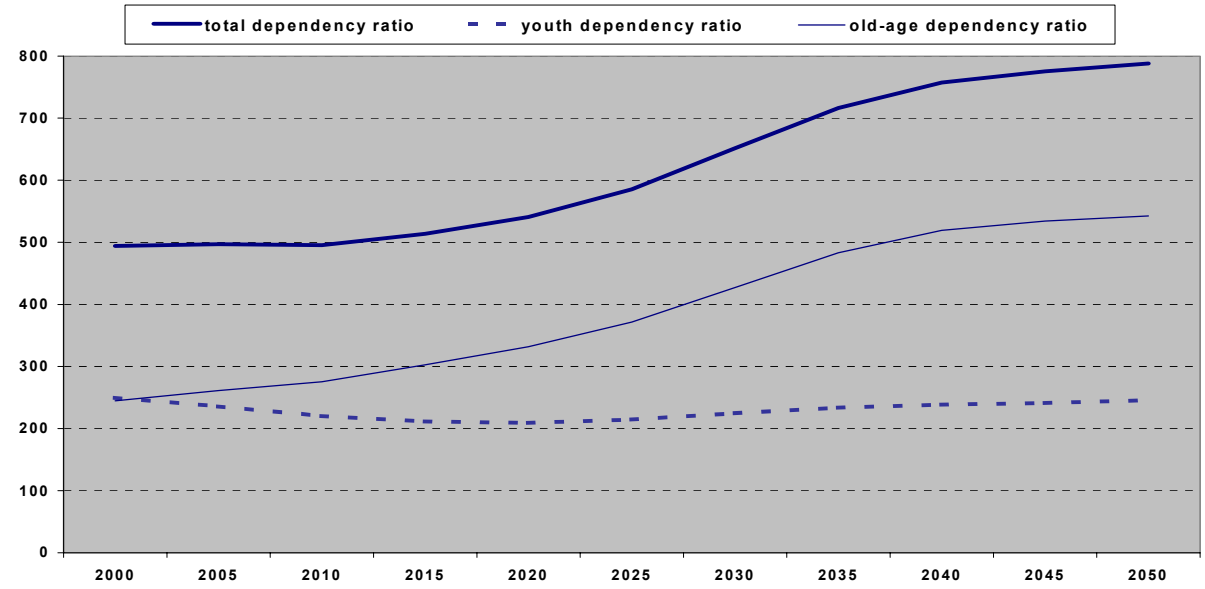
Europe is ageing rapidly. The facts are well known and hardly disputed. According to UN population projections:

- the proportion of those older than 65 of the total population in the European Union[1] in 2050 will be 30.3 per cent as compared to 16.4 per cent in 2000;
- the median age of the population will increase from 39 years in 2000 to 50 years in 2050;
- the demographic dependency rate (pop (0-14 and 65+) / (pop (15-64)) will increase from about 500 per 1,000 population in 2000 to slightly under about 800 per 1,000 in 2050 as shown in Figure 1.

In short, assuming constant labour force participation rates, an ever-increasing share of the population will be inactive due to old age; an ever-decreasing share of the population will have to earn the income and produce goods and services to provide them with income and the goods and services needed and that active group will itself become older and older. These developments will pose an obvious burden for the national social transfer systems and they will also affect long-term growth rates of the Union's economy.

[1] Data used in this paper still refer to the present 15 member States of the EU.

Figure 1. *Expected development of demographic dependency ratio in the EU, per thousand, 2000-2050*



The ILO, in its recent paper to the Second World Assembly on Ageing entitled “An inclusive society for an ageing population: The employment and social protection challenge”, stresses a series of policy measures which could ease the economic and fiscal tensions that are a consequence of ageing. The most relevant measures for this issue are:

- introducing a gradual and flexible transition from active working life to retirement as a means of giving older workers the opportunity to remain active longer should they wish;
- developing measures appropriate to national conditions and practice to enable older workers to stay longer in employment and to make it attractive for them to do so;
- developing mechanisms that keep social transfer systems in financial equilibrium by sharing the financial burden of ageing fairly between the active and inactive population;
- improving the management of the health cost implications of ageing for health-care systems.

These measures might not suffice to maintain the individual standards of living in the EU. The question arises whether the problems could be solved through controlled immigration.

In 2000, the UN Population Division published a report,[2] which stated that for the present 15 States of the EU:

- about 47 million migrants would be needed to maintain the overall size of the population till 2050;

[2] See UN Population Division: "Replacement Migration: Is it a Solution to Declining and Ageing Populations?"

- about 79 million migrants would be needed to maintain a constant size of the age group 15-64; and

- about 674 million would be needed to maintain a constant old-age dependency ratio.

It is obvious that migratory flows of that order of magnitude might pose political problems within the EU as well as economic (brain-drain) problems in the exporting extra-EU countries. These model calculations are limited to a demographic analysis. These are in order to demonstrate the size of necessary replacement migration from a "population numerical" point of view. However, it is not really the potential loss of the overall population or numerical shift in demographic dependency ratios that can make convincing cases for a certain necessary level of replacement migration. Why would a smaller population be a problem for Europe as long as the standard of living and social protection in the Union can be maintained? The feeling that we have to be many to be strong might simply be archaic.

In order to ascertain the potential immigration needs of the current EU countries a more comprehensive combined demographic and economic analysis would be needed in order to assess:

- to what extent ageing without increased migration could reduce the per capita GDP and hence the standard of living and the social security of Europeans; and

- if and how planned migration could reduce the downward pressure of ageing on standards of living.

This paper aims at assessing the need for replacement migration in the EU under various demographic and economic scenarios. It serves the limited purpose of alerting the policy debate on the economic consequences of ageing and the size of the dimension of possible necessary replacement migration under various assumptions about domestic productivity and labour market developments and standard of living targets. The paper does not offer any comments on the political implications of migration or its desirability. We are only trying to show what real consequences xenophobia could have for the standard of living of the individual European citizen.

2. Methodological approach

Necessary simplifications

The methodological approach adopted here is largely based on projections and simulations of the population, the labour force, as well as employment in the EU (in its present composition, here called EU-15) as a whole on the basis of alternative economic scenarios. Some sweeping generalizations and simplifications have to be made to contain the complexity of the model to be used for the analysis.

The EU is thus considered here as one economy with no direct and indirect limitations to intra-economy migration and homogenous economic development across the Union. That is an obvious simplification, but country-based analyses are beyond the scope of this paper. Such analyses would require the development of long-term combined demographic and economic visions of the developments of individual countries. However, more detailed national analyses can be undertaken using the same principal methodology. Labour demand and productivity developments are not disaggregated by economic sector. This would only

be meaningful in detailed national studies. The purpose of the exercise is to alert policy makers to the potential size of the impact of ageing on economic development and the exploration of the potential contribution of migration to mitigate the effect. It cannot be the purpose of a technical paper to provide detailed demographic and economic analyses for each member country.

No detailed analysis of the impact of ageing on the different national social protection schemes and their potential expenditure is made here. That has been done elsewhere[3] and it was shown that Europe's social expenditure is not likely to explode during the next decades, if it succeeds to increase labour force participation rates and reverse decisively the trend to ever decreasing *de facto* retirement ages. Here the central indicator as to whether the Union can maintain its present standard of living is the maintenance of a target per capita GDP *growth*. This is justified as the share of total household consumption at GDP in EU-15 hardly changed over the observation period (i.e. it fluctuated between 57 and 59 per cent of GDP, see table A.1). Standards of living include for us standards of social security. It is assumed here that if a certain per capita average GDP across the Union's population can be maintained then required levels of social transfers can be maintained that achieve the present level of social security. If the latter should not be the case that would be a consequence of political choice rather than economic, financial or fiscal necessity.

Modelling philosophy

The model used here is fairly straightforward and based on the deterministic economic and demographic modelling philosophy that is used as a framework for the ILO's social budget model.[4] Its basic exogenous assumptions concern the demographic development, an assumed long-term growth path, as well as overall per worker productivity assumptions.

The basic philosophy is the following: target levels of long-term economic growth per capita of the population in the start year of the projection (i.e. 2000 which is the start year of the UN demographic projections used here)[5] lead to a calculatory overall economic growth rate for the economy as a whole and hence to a € amount of total real GDP for all projection years till 2050. The initial GDP per employed person is determined for the start year. Exogenous assumptions are made with regard to the annual growth of the GDP per employee, i.e. *cum granu salis* labour productivity. Labour productivity as used here thus includes potential increases in the total number of hours worked per capita per annum. Dividing total GDP amounts by the assumed product per employee returns total employment. Labour force minus employment results in unemployment or labour shortage. The aggregate numerical size of the labour force is calculated by applying labour force participation rates to the demographic structure. Alternative assumptions are made with regard to overall labour force participation rates. The latter mainly includes assumptions of the actual retirement ages and behaviour of the population. Overall unemployment, respectively labour shortages, are interpreted here as gross indicators for the absence or need for migration. This is of course a simplification, as even in times of high overall unemployment, a country might well need migration workers with specific skills as the recent introduction of the "green card" for computer specialists in Germany shows.

[3] See, for example, Cichon (1997).

[4] For more details on the model component please refer to Scholz et al. (2000), pp. 83-110.

[5] It has to be noted that the UN population projection already includes a yearly number of migrants of about 500,000.

The modelling analysis does not stop with the identification of a labour shortage. It assumes that the Union will try to close eventual labour gaps by three main alternatives or combined measures:

(a) migration;
(b) increased labour force participation;
(c) increased labour productivity.

Main modelling assumptions

Table A1 in the Annex provides some basic data on the economic developments in the EU (EU-15) during the decade 1991 to 2000. The key variables for the model are per capita growth and per worker productivity.

Looking optimistically into the future, we assume that the target GDP per capita rate (and hence the average per capita consumption level) should increase in real terms by about 3 per cent per capita per annum. We further assume that the productivity per worker can annually be increased by 2 per cent or 2.5 per cent. All these rates are close to the maxima observed during the chosen observation period (see table A1). The assumptions may appear over-optimistic, but more important than the absolute levels of growth and productivity increases are distances between the different growth rates. Projections with more modest per capita GDP growth rates of 2 per cent and productivity rates of 1.0 per cent respectively 1.5 per cent show similar results to the scenario described in this paper. The key variables in this model are linked by the following simple formulae:

(F.1) GDP growth per capita = employment growth + labour productivity growth – population growth

(F.2) Real GDP growth per capita = Consumption growth per capita = (proxy) increase of standard of living

For the first group of status quo projections (variant 1 and variant 2) we hence assume that the EU:

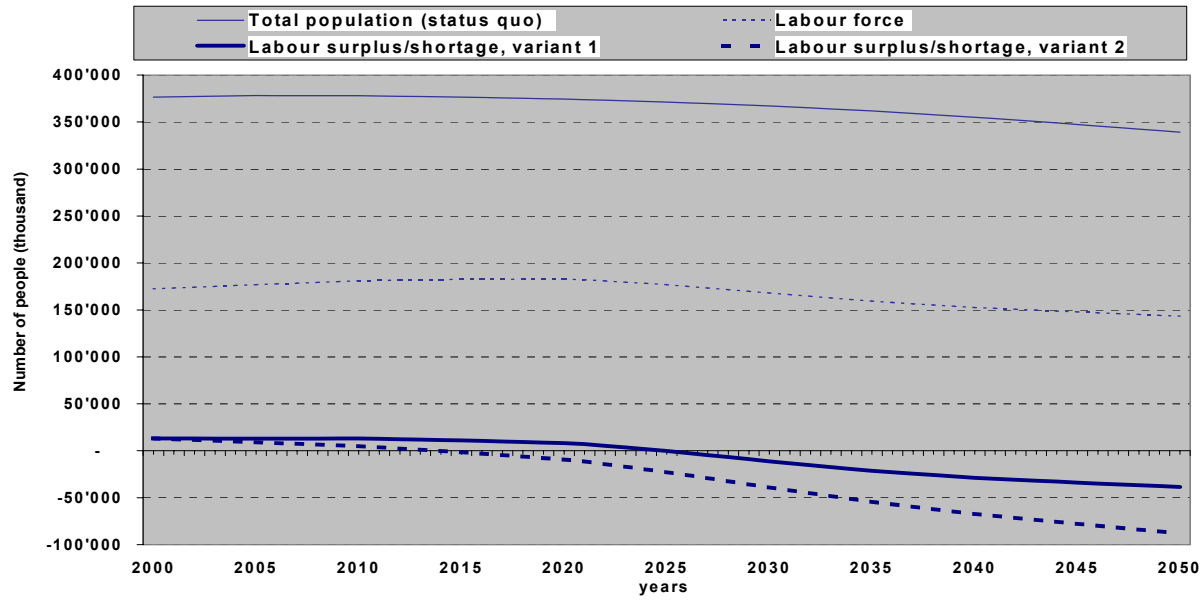
- wants to maintain a per capita real GDP growth rate of 3 per cent per annum;
- could achieve a rate of increase of productivity per employed person of 2.5 per cent **(variant one)** or alternatively 2.0 per cent **(variant two)**, even with an ageing workforce;
- could increase the labour force participation rates for women by about 1 per cent (not 1 percentage point!) per year for the next (about) 25 years till they reach a level of only 5 percentage-points less than that of males (i.e. 78 per cent of males of the age group between 15 and 64 are assumed to be active at the present *de facto* retirement ages);
- will not experience any general increase of effective retirement age; and that
- rate of “unavoidable” frictional unemployment would be 2.5 per cent for the whole period.

3. Model results

Static effects

Based on these assumptions labour shortage would reach substantial levels. The following figure shows the projected population in EU-15 till 2050, the total labour force and the projected static labour shortage under the 2.5 per cent productivity increase and the 2.0 per cent productivity increase.

Figure 2. *Demographic results, Static projection, 2000-2050*



Under the 2.0 per cent productivity (variant two), in 2050 the model produces a static labour shortage of about 88 million workers. Variant one would close the labour gap to some extent but would not abolish it. A static shortage of 38 million would remain. “Static shortage” means that the EU-15 as a whole does not take any corrective measures, i.e. there is no change in the labour force participation and no migration, i.e. import of additional workers.

The effect on the standard of living would be dramatic. GDP would drop to about 78 per cent of the expected real level by 2050 under the 2.5 per cent variant and to about 61 per cent under the 2.0 per cent variant. These figures describe the “ageing gap” of per capita GDP, the gap between the expected or target standard of living and the standard that is possible at a given productivity development, given demographic development without higher than “normal” levels of migration and labour force participation. The policy question that remains answered by this quantitative analysis is: Would the Union’s population accept that? If not, how would it react?

Dynamic effects

The key question of this paper is: What would happen now if Europe were to take corrective action through the import of labour rather than changing its labour force participation

behaviour, inter alia, through later retirement age, longer working hours, or switching to more productive work patterns?

What Europe cannot do is fill only calculatory labour shortage each year. The old German experience with "guest-workers" in the 1960s and 1970s will still hold true. That experience was summarized as follows: *We were calling workers, but people came.* Workers will not come alone; they will come with their family. That will lead to an increasing population. If one does not want to discriminate between the standard of living of the natives and the migrants then the same amount of per capita GDP as for the native population would be needed to feed the new additional population. As long as the newcomers have a lower dependency rate than the native population, the new incoming workers will still make a positive contribution to the closure of the ageing gap in per capita GDP.

To simplify the model, it has been assumed here that each worker called into the country has the average age 35. That is compatible with the statistical average age of adult non-EU immigrants in 1999.[6] It is furthermore assumed that each worker comes with a spouse of the same age who is immediately available to the labour market. Every second immigrant worker also has a five-year old child (Brücker, ibid.). This again is roughly in line with the statistical experience. A more dispersed distribution of the age structure and family status of immigrants would only change the results of the models marginally. It is furthermore assumed that the reproductive behaviour of immigrants immediately after immigration adapts to that of the native population.

What Europe can also not do is fill labour gaps at lightning speed – quasi-instantaneous. Workers need to be recruited and relocated. That takes time. The model assumes that each year t, the immigration authorities in Europe will allow enough workers in to fill the employment gap of t-1.

The recruited workers will then come with their families. Even if the accompanying spouses are entering the labour market instantaneously (to cover for some of the time-lag between the emergence of gaps and the filling process), the model is beginning to "chase its own tail" and the total population is spiralling upward. The reason is that, while closing last year's employment gap, the migrant workers and their families push overall consumption levels and hence the necessary GDP level up so that the structural labour gap of the native population is increased and next year's gaps and replacement needs are bigger than the static labour shortage of the native population. The Government would import a larger number of workers and their families and so on.

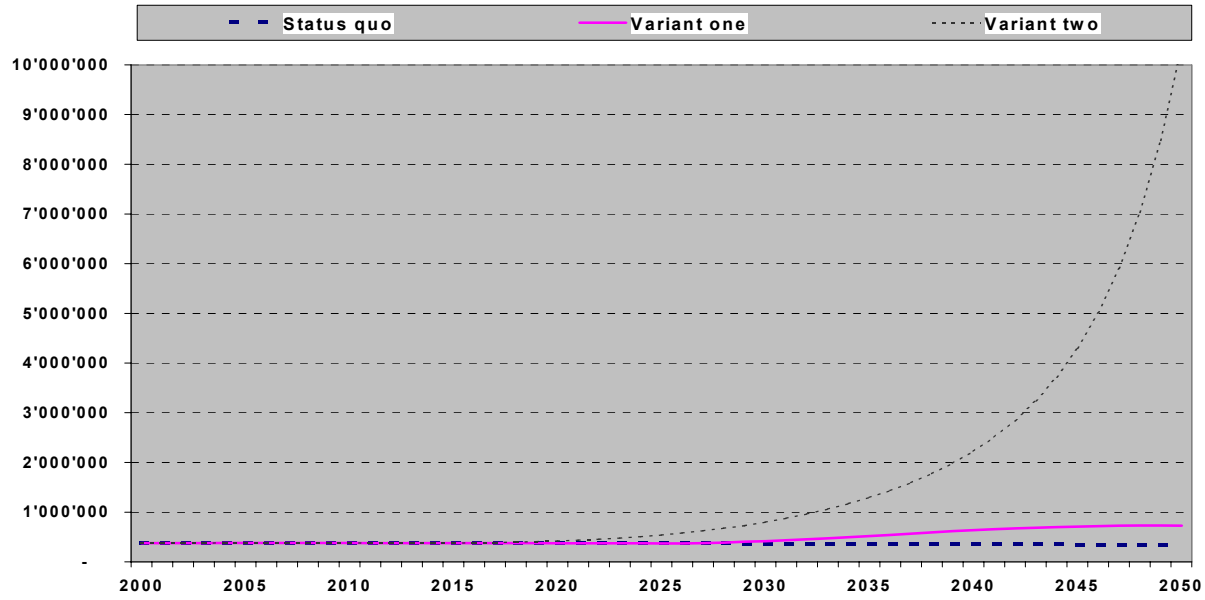
The results of the simulation are striking (figure 3). The main results are summarized in Annex table A.2. In an ever-increasing effort to fill the labour gap, the total population of EU-15 would have to grow exponentially to fill the employment gap. Under the 2.5 per cent productivity increase assumption (or in other words a distance of 0.5 percentage-point between the overall expected increase of the per capita GDP and labour productivity increases) the population would have to approximately double within the next 50 years, whereas under the 2.0 per cent variant the population would simply explode.

A one percentage-point distance in the expected rate of per capita growth per worker productivity would rapidly remove the labour surplus (i.e. unemployment in EU-15) but would not be sustainable in the longer-term run. However, over the years 1995-2000 a distance between the two rates of about 1.1 percentage-points was observed indicating that some of

[6] See H. Brücker (2002), table 2.5.

the economies definitely followed a low productivity-high employment strategy. Under variant one, the net increase of the population would be about 388 million, less than predicted by purely demographic calculations if one wanted to maintain the demographic dependency rates. This is still probably too high to be accepted by the EU-15 population.[7]

Figure 3. *Total population under the different scenarios and dynamic effect, in thousands, 2000-2050*



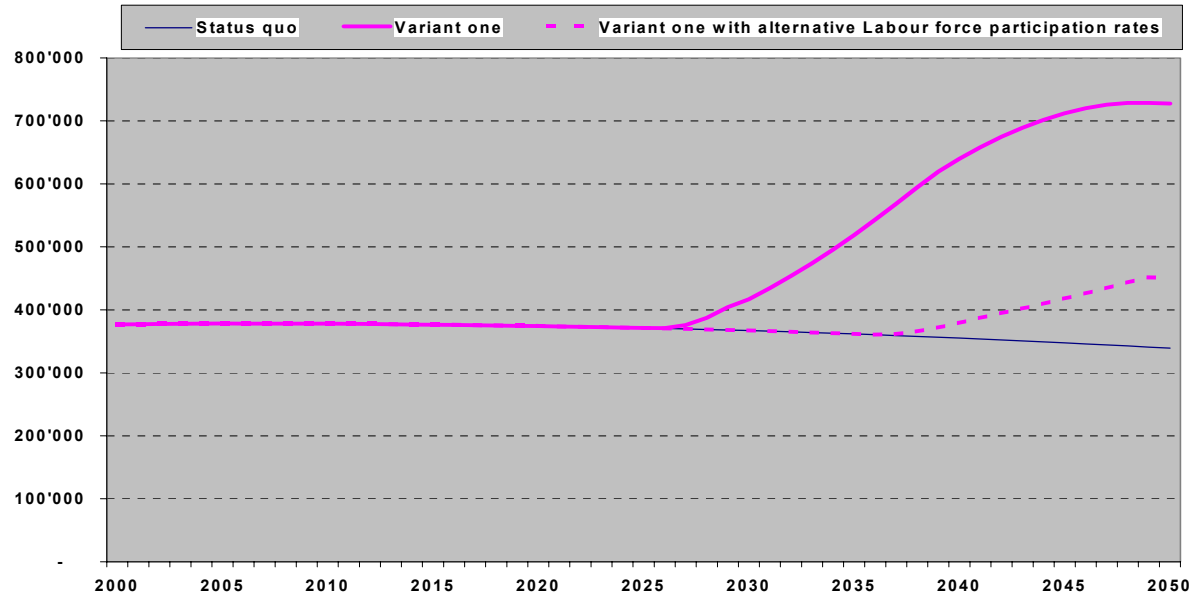
Another scenario

The EU countries would have one more option. They could increase the retirement age today from about 60 (de facto) to 65. A simple way to model the effects is to increase the labour force participation in the age group 15-64 by about 15 per cent. We assume that this would take place between 2021 and 2031. Doing so would result in building up an additional immigrant population compared to the status quo projections of about 112 million over 50 years. A figure that seems to be more manageable.

Figure 4 compares the total population needed under the 2.5 per cent variant and the combined 2.5 per cent variant with higher labour force participation rates. Another interesting outcome is that if one were to reduce per capita growth expectations to the level of the assumed productivity increase (say at 2.5 per cent), then there would be no labour shortage – neither with, nor without adjustments to the labour force participation rates. That means there would be no replacement migration needed.

[7] The share of the non-native population and their descendants would then only account for about 50% of the total population in EU-15 in 2050. Rowthorn (2003) seems to think that even a share of 20% might not be acceptable in Britain.

Figure 4. *Total population under status quo and variant one with and without the effect of alternative labour force participation rates, in thousands, 2000-2050*



4. Policy conclusions

The above quantitative analyses could map out broad directions for future policies. These policies have to find a compromise between accepting lower economic growth (and hence lower growth rates in the standards of living), accommodating replacement migration and investing in the increase of productivity of older workers. To all those who find the results of this relatively straightforward modelling exercise uncomfortable, we would advise having the results confirmed by second, third and many more opinions. Models should never be believed easily, and we are happy to qualify them as preliminary, but we still believe that they indicate policy choices and some conclusions, which will hold true. The essential choices are the following:

(1) Per capita real growth expectations (i.e. the per capita standards of living) in Europe that are more than a fraction of a per cent higher than productivity increases cannot be maintained in Europe without substantial migration – if the native population is not ready to increase its labour force participation.

(2) If growth expectations are substantially higher than productivity increases, necessary migration will explode.

(3) If growth expectations are in the order of 0.5 percentage-point higher than productivity and migration (i.e. the size of the non-native population migrated into Europe after 2000 and their descendants) and were to be kept in the order of 20 per cent of the total population in 2050, then the labour force would have to increase by about 15 per cent.

Conclusions appear to be straightforward. Ceteris paribus ageing leads to dropping per capita and overall growth rates and hence to an overall reduction of standards of living.

Migration alone will not be able to close the "ageing gap in GDP". Likewise, higher labour force participation of the native population will not be able to close the gap either. Most likely a combination of measures is necessary to maintain a decent standard of living in Europe. If we want to live and not just work, we would have to:

- revise our long-term standard of living expectations (compared to those experienced in the last decade) downwards, say to an average real growth of around 1.5 to 2 per cent;

- maintain a fairly high level of productivity increases of not less than 0.5%-points lower than the per capita growth rates, i.e. in the above case at least 1.5 per cent annually (that means use better technology or work more hours);

- increase labour force participation rates by at least 15 per cent (that means work more years); and

- accept that we will have to share our prosperous economic union with a substantial additional immigrant population that could easily make up a quarter of our native population in 2050.

All in all, that does not sound too bad. However, substantial changes in attitudes are needed in all four of the above dimensions. That is a challenge for all of us.

References

ILO (2002). "An inclusive society for an ageing population: The employment and social protection challenge", Report to the Second World Assembly on Ageing (Madrid, 2002).

Scholz et al. (ILO) (2000). "Social Budgeting", Geneva.

UN Population Division. (2000). "Replacement Migration: Is it a Solution to Declining and Ageing Populations?", New York.

Brücker, H. (2002). "Can international migration solve the problems of European labour markets?", in *Economic Survey of Europe*, No. 2.

OECD/EU: Fotakis, C. and Coomans, G. (2003). "Equilibrium in the Labour Market and Social Security Systems: Demographic Trends and the Contribution of Immigrants (Part I)", in *The economic and social aspects of migration*; Conference jointly organized by The European Commission and the OECD (Brussels, 2003).

Cichon, M. (1997). "Are there better ways to cut and share the cake: The European welfare states at the crossroads", in *Issues in Social Protection*, No. 3.

Statistical Annex

Table A.1 *Historical structural economic data*

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Average Growth rates 1991 to 2000	Average Growth rates 1995 to 2000
Total population (million)	365.4	367.1	369.0	370.4	371.6	372.7	373.7	374.6	375.5	376.5	**0.33%**	**0.26%**
Total employment (million)	**154.5**	**152.7**	**149.5**	**149.3**	**150.4**	**151.3**	**152.7**	**155.5**	**158.2**	**161.0**	**0.46%**	**1.37%**
Employment growth		-1.17%	-2.10%	-0.13%	0.74%	0.60%	0.93%	1.83%	1.74%	1.77%		
Total number of non-employed (million)	210.9	214.4	219.5	221.1	221.2	221.4	221.0	219.1	217.3	215.5	**0.24%**	**-0.52%**
Total economic dependency rate (not employed pop/employed)	1.37	1.40	1.47	1.48	1.47	1.46	1.45	1.41	1.37	1.34		
GDP (constant 1991 prices, billion €)	**5'779**	**5'854**	**5'831**	**5'994**	**6'138**	**6'236**	**6'392**	**6'577**	**6'748**	**6'971**	**2.11%**	**2.58%**
real growth		1.3%	-0.4%	2.8%	2.4%	1.6%	2.5%	2.9%	2.6%	3.3%		
GDP (current prices, billion €)	5'779	6'025	6'042	6'334	6'588	6'920	7'288	7'632	8'017	8'524		
Per capita GDP (€)	**15'816**	**15'947**	**15'801**	**16'182**	**16'517**	**16'732**	**17'104**	**17'558**	**17'972**	**18'515**	**1.77%**	**2.31%**
Real per capita GDP growth		0.83%	-0.91%	2.41%	2.07%	1.30%	2.23%	2.65%	2.35%	3.03%		
Labour productivity (constant prices, €)	**37'405**	**38'337**	**39'001**	**40'147**	**40'810**	**41'216**	**41'859**	**42'298**	**42'657**	**43'298**	**1.64%**	**1.19%**
Productivity increase		2.49%	1.73%	2.94%	1.65%	1.00%	1.56%	1.05%	0.85%	1.50%		
Final consumption expenditure of households (billion €)	3'319	3'483	3'508	3'658	3'780	3'997	4'215	4'419	4'670	4'970		
In % of GDP	57.4%	57.8%	58.1%	57.8%	57.4%	57.8%	57.8%	57.9%	58.3%	58.3%		
Compensation of employees in billions (billion €)	3'068	3'209	3'211	3'289	3'393	3'537	3'699	3'846	4'065	4'336		
In % of GDP	53.1%	53.3%	53.1%	51.9%	51.5%	51.1%	50.8%	50.4%	50.7%	50.9%		

Table A.2 *Main modelling results - Simulating replacement migration in Europe*

figures in thousand, otherwise indicated		2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Status quo												
Population under 15		59'251	59'506	55'666	52'549	50'795	50'205	49'926	49'218	48'153	47'177	46'605
population > 65		65'729	66'012	69'571	75'257	80'595	86'938	95'000	101'815	104'881	104'557	102'951
population 15-64		251'970	252'606	252'721	248'729	242'955	234'206	222'350	210'808	202'066	195'731	189'758
Total population		**376'950**	**378'123**	**377'958**	**376'534**	**374'344**	**371'349**	**367'276**	**361'842**	**355'100**	**347'465**	**339'314**
Labour force	Male	96'259	96'637	96'765	95'288	93'120	89'787	85'207	80'716	77'292	74'809	72'507
	Female	76'202	80'183	84'242	87'095	89'371	87'047	82'672	78'445	75'264	72'960	70'751
	Total	**172'461**	**176'820**	**181'006**	**182'382**	**182'492**	**176'834**	**167'880**	**159'161**	**152'555**	**147'769**	**143'258**
Variant one (2.5 per cent productivity)												
Population under 15		59'251	59'506	55'666	52'549	50'795	50'205	62'149	86'443	110'154	116'285	102'984
population > 65		65'729	66'012	69'571	75'257	80'595	86'938	95'000	101'815	104'881	104'557	102'951
population 15-64		251'970	252'606	252'721	248'729	242'955	234'206	259'429	330'386	424'783	491'045	521'761
Total population		**376'950**	**378'123**	**377'958**	**376'534**	**374'344**	**371'349**	**416'579**	**518'644**	**639'818**	**711'887**	**727'696**
Labour force	Male	96'259	96'637	96'765	95'288	93'120	89'787	99'416	126'500	162'482	187'678	199'367
	Female	76'202	80'183	84'242	87'095	89'371	87'047	96'459	122'942	158'219	183'041	194'537
	Total	**172'461**	**176'820**	**181'006**	**182'382**	**182'492**	**176'834**	**195'875**	**249'442**	**320'702**	**370'718**	**393'904**
Variant two (2.0 per cent productivity)												
Population under 15		59'251	59'506	55'666	52'701	61'172	88'734	146'386	247'965	431'201	840'718	2'088'710
population > 65		65'729	66'012	69'571	75'257	80'595	86'938	95'000	101'815	104'881	104'557	130'397
population 15-64		251'970	252'606	252'721	249'300	277'994	364'315	555'296	943'863	1'690'093	3'350'298	8'124'839
Total population		**376'950**	**378'123**	**377'958**	**377'258**	**419'762**	**539'987**	**796'683**	**1'293'643**	**2'226'175**	**4'295'574**	**10'343'946**
Labour force	Male	96'259	96'637	96'765	95'506	106'551	139'666	212'797	361'393	646'472	1'280'486	3'104'532
	Female	76'202	80'183	84'242	87'295	102'260	135'404	206'465	351'226	629'511	1'248'848	3'029'329
	Total	**172'461**	**176'820**	**181'006**	**182'801**	**208'811**	**275'070**	**419'262**	**712'619**	**1'275'983**	**2'529'335**	**6'133'861**
Economic model												
Target per capita GDP Growth			3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Per capita GDP real (2000=100) €		22'000	25'504	29'566	34'275	39'734	46'063	53'400	61'905	71'765	83'195	96'446
Target total GDP status quo (Billion €)		8'283	9'644	11'175	12'906	14'874	17'106	19'612	22'400	25'484	28'907	32'725
Resulting total target GDP growth			3.1%	3.0%	2.9%	2.9%	2.8%	2.8%	2.7%	2.6%	2.5%	2.5%
GDP achievable with domestic workforce variant one (billion €)		8'283	9'644	11'175	12'906	14'874	17'081	18'347	19'680	21'342	23'389	25'655
GDP achievable with domestic workforce variant two (billion €)		8'283	9'644	11'175	12'789	14'129	15'116	15'844	16'585	17'551	18'770	20'090
In percent of target variant one		100.0%	100.0%	100.0%	100.0%	100.0%	99.9%	93.6%	87.9%	83.7%	80.9%	78.4%
In percent of target variant two		100.0%	100.0%	100.0%	99.1%	95.0%	88.4%	80.8%	74.0%	68.9%	64.9%	61.4%
Labour productivity growth			2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Labour productivity per employee €		53'439	60'461	68'406	77'396	87'566	99'073	112'092	126'822	143'487	162'342	183'675
Labour productivity growth			2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Labour productivity per employee €		53'439	59'001	65'142	71'922	79'407	87'672	96'797	106'872	117'995	130'276	143'836
Labour market scenarios												
Frictional unemployment			2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
possible domestic Employment		168'149	172'400	176'481	177'823	177'929	172'413	163'683	155'182	148'741	144'075	139'677
Needed employment variant one		155'000	159'502	163'358	166'751	169'865	172'656	174'968	176'625	177'603	178'065	178'170
Needed employment variant two		155'000	163'449	171'545	179'442	187'318	195'107	202'614	209'595	215'972	221'893	227'520
Total labour Surplus/shortage variant one		13'149	12'898	13'123	11'071	8'064	-243	-11'285	-21'443	-28'862	-33'990	-38'493
Total labour Surplus/shortage variant two		13'149	8'950	4'936	-1'620	-9'388	-22'695	-38'931	-54'413	-67'231	-77'818	-87'843
Total labour replacement by migration needed variant one		-	-	-	-	-	243	11'285	21'443	28'862	33'990	38'493
Total labour replacement by migration needed variant two		-	-	-	1'620	9'388	22'695	38'931	54'413	67'231	77'818	87'843
Annual Labour replacement migration needed variant one		-	-	-	-	-	243	2'209	2'030	1'479	1'019	893
Annual Labour replacement migration needed variant two		-	-	-	1'334	1'580	2'870	3'268	3'112	2'573	2'122	2'006
Dynamic model												
Target GDP, Variant one (billion €)		8'283	9'644	11'175	12'906	14'874	17'106	22'245	32'107	45'916	59'225	70'183
Necessary employment		155'000	159'502	163'358	166'751	169'865	172'656	198'455	253'164	320'004	364'818	382'105
Labour Force		172'461	176'820	181'006	182'382	182'492	176'834	195'875	249'442	320'702	370'718	393'904
Maximum employment		168'149	172'400	176'481	177'823	177'929	172'413	190'978	243'206	312'684	361'450	384'057
Labour surplus/shortage		13'149	12'898	13'123	11'071	8'065	-243	-7'477	-9'958	-7'320	-3'368	1'952
Annual Replacement migration in LF		-	-	-	-	-	243	7'477	9'958	7'320	3'368	-
Target GDP, Variant two (billion €)		8'283	9'644	11'175	12'931	16'679	24'873	42'543	80'083	159'761	357'371	997'632
Necessary employment		155'000	163'449	171'545	179'787	210'043	283'710	439'503	749'335	1'353'961	2'743'174	6'935'913
Labour Force		172'461	176'820	181'006	182'801	208'811	275'070	419'262	712'619	1'275'983	2'529'335	6'133'861
Maximum employment		168'149	172'400	176'481	178'231	203'591	268'193	408'780	694'804	1'244'084	2'466'101	5'980'515
Labour surplus/shortage		13'149	8'950	4'936	-1'556	-6'452	-15'517	-30'723	-54'531	-109'878	-277'072	-955'399
Annual Replacement migration in LF		-	-	-	1'556	6'452	15'517	30'723	54'531	109'878	277'072	955'399