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**Working Paper**

## Demographic alternatives for aging industrial countries: increased total fertility rate, labor force participation, or immigration

IZA Discussion Papers, No. 1885

**Provided in Cooperation with:**

IZA – Institute of Labor Economics

*Suggested Citation:* Holzmann, Robert (2005) : Demographic alternatives for aging industrial countries: increased total fertility rate, labor force participation, or immigration, IZA Discussion Papers, No. 1885, Institute for the Study of Labor (IZA), Bonn

This Version is available at:

<https://hdl.handle.net/10419/33495>

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IZA DP No. 1885

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*World Bank and IZA Bonn*

Discussion Paper No. 1885  
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## ABSTRACT

### **Demographic Alternatives for Aging Industrial Countries: Increased Total Fertility Rate, Labor Force Participation, or Immigration \***

The paper investigates the demographic alternatives for dealing with the projected population aging and low or negative growth of the population and labor force in the North. Without further immigration, the total labor force in Europe and Russia, the high-income countries of East Asia and the Pacific, China, and, to a lesser extent, North America is projected to be reduced by 29 million by 2025 and by 244 million by 2050. In contrast, the labor force in the South is projected to add some 1.55 billion, predominantly in South and Central Asia and in Sub-Saharan Africa. The demographic policy scenarios to deal with the projected shrinking of the labor force in the North include moving the total fertility rate back to replacement levels, increasing labor force participation of the existing population through a variety of measures, and filling the demographic gaps through enhanced immigration. The estimations indicate that each of these policy scenarios may partially or even fully compensate for the projected labor force gap by 2050. But a review of the policy measures to make these demographic scenarios happen also suggests that governments may not be able to initiate or accommodate the required change.

JEL Classification: J11, I38, Q15

Keywords: demographic policy, aging, fertility rate, labor force, migration

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\* Revised paper prepared for G-20 Workshop on Demographic Challenges and Migration, Sydney, 27-28 August 2005. The paper has profited from very able research support by Johannes Koettl (Washington, D.C.), very valuable comments by the participants of the G20 seminar on migration in Sydney and of an internal Bank seminar in DC, by Rainer Münz (Vienna), and great support by Thomas Buettner and Patrick Gerland from the United Nations Population Division (New York). The findings, interpretations, and conclusions expressed herein are those of the author and do not necessarily reflect the views of the World Bank and its affiliated organizations or those of the executive directors of the World Bank or the governments they represent.

# 1 Introduction

Demographic developments—in particular, population aging and migration—are gaining increasing importance in the domestic and international policy debate. While essentially all countries in the world are aging, the demographic transition—rising life expectancy followed by falling fertility rates—is most advanced in the countries of the North. In these rich and developed economies, this process will lead to low or even negative population growth, a declining labor force, and a rising share of elderly in the population. In the countries of the South, the demographic momentum will, for some time, lead to rising numbers of births even as the fertility rate declines rapidly. In these poorer and developing economies, this will lead to a further rise in population and labor force, with the strongest ever youth cohorts entering the labor market.<sup>1</sup> Table 1 summarizes key demographic characteristics of world regions that have been selected for the aging of their population, projected change in population size, and current income level. China fits in this group with regard to demographic development, but not (yet) with regard to income level.

These discrepancies in demographic, economic, and, often, political development have already contributed to rising migration from the South to the North. Although most of the migration continues to be domestic and most of the 145 million official international migrants (175 million including refugees) migrated within regions in early 2000, the trend toward international and cross-regional migration is expected to continue and, perhaps, even accelerate (see table 2). The size and direction of international migration flows are driven by demographic, economic, and political gaps between countries and regions. The rising demographic gap between North and South, however, can also be seen as an opportunity for welfare-improving demographic arbitrage and a win-win-win solution (for migrant-sending and migrant-receiving countries and for the migrants themselves; see Holzmann and Münz 2004). The World Bank has started to investigate the role of migration as a development instrument for its client countries, with an initial emphasis on the role of remittances (see Maimbo and Ratha 2005, Caglar und Schiff 2005, and the 2006 issue of *Global Economic Prospects*: World Bank 2005).

Increased migration to the North over the last decades—and the economic and political fallout for some groups in the population—has made migration a politically charged topic in many countries. The recent terrorist events in the United States and Europe have quite likely strengthened the reservations that citizens in these countries have about further, more massive immigration. But in the absence of strong (managed) migration, low or even negative labor force growth, together with an ever higher share of elderly in the population, comes at a price for a country and her individuals. This is most visible with regard to retirement income and health care provisions, which rely on both labor force growth and a sufficiently high ratio of active population to beneficiaries. But the potential impact goes well beyond mere fiscal considerations and concerns issues of economic growth, national security, and international status.

This paper investigates the two main alternatives to continued or enhanced migration in order to compensate changes in the demographic shifts in the North: increased labor force participation and increased fertility rates of the domestic population. A scenario-like presentation of the main policy

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<sup>1</sup> See Chesnais (1990) for a good didactic presentation on the impact of demographic transition on population dynamics and age structure.

directions, the potential demographic quantities involved, and key policy requirements and implications is intended to distill the tradeoffs between these main alternatives to demographic policy. In order to do so, the paper progresses in three main sections. The first presents briefly the most recent demographic projection – medium variant - of the United Nations (UN 2005), outlines some conceptual considerations why one should, or should not, worry about demographic disequilibria, and presents the main alternatives for dealing with them. A key message of this section is that the sources of aging matter, while efforts to stabilize the demographic old-age dependency ratio, compared to growth of the labor force, may not. The second section presents three main scenarios for compensating low and negative labor force growth in the North: an instant move to total fertility replacement, enhanced labor force participation policies, and compensating immigration. A key message from these scenarios is that none of these policies alone may be able to compensate for the projected demographic changes. The third section reviews the policy implications for the demographic adjustment of instruments to increase the fertility rate, increase labor force participation, or accommodate higher migration flows. The key message from this section is that governments may lack the policy instruments to initiate or accommodate the required change. A summing-up and a few concluding remarks stand at the end. Summary tables are used in the text, while the annex contains more details.

Table 1. Key Demographic Indicators in Select World Regions

<i>Region<sup>a</sup></i>	<i>Total population (millions) 2003</i>	<i>Percent of total population in age group, 2003</i>				<i>Total population (millions)</i>		<i>Life expectancy at birth (years), 2000–05<sup>b</sup></i>	<i>Crude birth rate (per 1,000 population), 2000–05</i>	<i>Crude death rate (per 1,000 population), 2000–05</i>	<i>GDP per capita (U.S. dollars), 2003</i>	<i>GDP, purchasing power parity per capita (international dollars), 2003</i>
		<i>0–14</i>	<i>15–34</i>	<i>35–64</i>	<i>65+</i>	<i>2025</i>	<i>2050</i>					
China	1,300	22.7	33.9	36.1	7.3	1,441	1,392	71.5	14.0	7.0	1,090	4,958
Europe and Russia	745	16.6	28.4	39.7	15.4	724	669	74.1	10.1	11.4	16,394	18,247
High-income East Asia and Pacific	210	16.3	28.1	40.4	15.3	217	204	80.5	9.7	7.3	27,413	25,707
North America	324	20.8	27.7	39.2	12.3	388	438	77.6	13.7	7.9	36,257	36,608
Latin America and Caribbean	546	30.7	35.2	28.2	5.9	696	782	71.8	21.9	6.1	3,168	7,160
Low- and middle-income East Asia and Pacific	570	30.5	36.1	28.3	5.1	713	790	67.0	21.5	7.1	1,045	3,605
Middle East, North Africa, and Turkey	407	33.7	37.3	24.7	4.3	576	715	69.2	24.6	6.0	2,855	5,509
South and Central Asia	1,492	34.1	34.7	26.4	4.8	2,010	2,393	62.9	26.2	8.9	546	2,634
Sub-Saharan Africa	718	43.8	34.1	19.0	3.1	1,139	1,691	46.6	40.4	17.2	599	1,788
World <sup>c</sup>	6,314	28.9	33.5	30.4	7.2	7,905	9,076	65.4	21.0	9.0	5,775	8,207

Source: United Nations (2005):

a. Regional data are calculated by aggregating country data. Some data for small countries are not available.

b. Population-weighted average for region.

c. Numbers do not necessarily coincide with regionally aggregated data. See note a.

Table 2. Global Estimates of Official Migrant Stocks, by Region, in 2000 (in Thousands)

<i>Receiving region</i>	<i>Sending region</i>							<i>World</i>
	<i>Africa</i>	<i>Asia</i>	<i>Europe</i>	<i>Latin America</i>	<i>North America</i>	<i>Oceania</i>	<i>Not allocated</i>	
Africa	11,534	382	231	9	6	4	—	12,165
Asia	1,980	34,895	3,229	351	288	58	331	41,131
Europe	2,291	4,073	34,919	350	441	69	5,788	47,931
Latin America	1	144	1,685	2,930	426	0	621	5,807
North America	701	8,330	6,193	14,710	959	147	1,587	32,626
Oceania	323	1,463	2,656	—	220	685	143	5,490
World	16,830	49,286	48,914	18,349	2,340	963	8,470	145,150

Source: Holzmann, Koettl, and Chernetsky (2005), based on Harrison (2004).— Not available.

## **2 What Are the Demographic Prospects? Should We Worry about Demographic Disequilibria? What Are the Possible Correcting Policies?**

What are the projected demographic changes and emerging demographic disequilibria? Should they give rise to worries and for what reasons? And what are the potential correcting policies countries have? This section sketches the projected demographic developments according to the most recent medium variant projection of the United Nations' 2005 projection and a classification of world regions (and countries) according to their projected demographic development. This is followed by a brief clarification of some conceptual issues regarding the implication of these projected shifts for the financing of public programs, in particular, pensions and health care. The section ends with a short presentation of the main corrective policies.

### **2.1 The Medium Variant of the UN 2005 Projection**

The most recent demographic projections by the United Nations and underlying assumptions for all the main variants confirm that a demographic transition is taking place worldwide (UN 2005). The expected increase in life expectancy in most countries (except those severely hit by HIV/AIDS), combined with falling fertility rates in countries with a total fertility rate above the replacement rate and continuing low rates in countries with a total fertility rate below the replacement rate, during the next 45 years—that is, until 2050—will substantially shift the demographic structure among countries and regions. The main common and distinct demographic changes are the following:

- All countries in the world are aging, and the change is sometimes most pronounced in middle-income countries (such as China). This projection applies to all definitions of aging, such as the level and change in average population age, old-age dependency ratio (typically defined as the ratio of persons ages 65 and older to persons ages 15 to 64), and share of elderly (ages 65 and older) in the total population.
- Due to the demographic momentum (that is, the path dependency of projected demographic developments in the near future as a result of current demographic structures), the total population in much of the developing world will continue to expand, as the strongest youth cohort ever enters the labor market. While the old-age dependency ratio will increase in low- to middle-income regions of Latin America, East Asia and the Pacific, Middle East, North Africa, and Turkey, South and East Asia, and Sub-Saharan Africa from as low as 0.06 (Sub-Saharan Africa in 2005) to as high as 0.29 (Latin America and the Caribbean in 2050), the total dependency ratio in these regions will either remain essentially unchanged or decline significantly (such as for Sub-Saharan Africa); see annex table A1.
- In the developed world in the “North” i.e. Europe plus Russia, the high-income countries of East Asia and the Pacific (Australia, Hong Kong, Japan, New Zealand, Republic of Korea, and Singapore), North America (United States and Canada), but also in China, the demographic projections under the medium variant foresee low or even negative demographic growth until 2050 and a substantial deterioration in both the old-age and the total dependency ratio within the next 45 years (annex table A1). For high-income countries in East Asia and the Pacific, the old-age dependency ratio is projected to reach 0.63 in 2050, and the total dependency ratio is projected to be 0.88.

- The effects of these demographic shifts are even more pronounced when considering the impact on the labor force (derived from projected population structure multiplied by the age and gender-specific labor force participation rate projections for 2010). For the medium variant, the labor force is projected to decrease until 2025 in Europe plus Russia and in high-income East Asia and the Pacific by 38 million and 6 million people, respectively. The decrease is projected to treble by 2050, including China, with a decrease of 89 million. And this projected change includes (moderate) migration assumptions. In a zero-migration scenario, the fall in labor force would be more pronounced for Europe and high-income East Asia and the Pacific (but not China, which is assumed to remain a net exporter of migrants); North America also would see its labor force decline by some 9 million people by 2050 (see annex table A2). Under the zero-migration variant, the labor force in the North is projected to lose some 244 million persons, while the labor force in the South is projected to add some 1.55 billion, predominantly in South and Central Asia and in Sub-Saharan Africa.

## 2.1 Some Conceptual Clarifications and Implications of Demographic Disequilibria

These projected demographic shifts—in particular, the dramatic aging of the population, together with low or even negative growth of the population and labor force, in many countries in the North—are giving rise to many speculations and pronouncements. They include issues of national and international security, shifts in economic power, and more down-to-earth consequences for the financing of national social programs, in particular, pensions and health care. Such public programs cater to the elderly in the population but are financed by the contributions and non-consumed income of the working population (whether they are pay-as-you-go financed or pre-funded). They already consume a major share of the general budget and national output in the richer (and less rich) countries in the North. Some estimated 15 percent of GDP, on average, goes to public pensions and health care in the Organisation for Economic Co-operation and Development (OECD) countries, and an additional 5 or more percentage points of GDP are needed for privately financed pension income and health outlays. The projected demographic shifts (in North and South) are rightly expected to put further pressure on these already stressed social programs and public budgets.

This subsection attempts to clarify some critical conceptual issues linked with population shifts and pension and health care programs in order to inform the following discussion of corrective demographic policy actions and general policy requirements. The issues addressed concern (a) the essential irrelevance of the type of funding when faced with demographic shifts; (b) the dependence of both pension and health care benefits on the explicit and implicit rates of return; (c) the dependence of the implicit (and explicit) rate of return on the demographic structure and dynamics of a country; and (d) the importance of the causes of aging (reduced fertility or longer life expectancy) for policy reaction.

For the financing of pensions and health care commitments, the *form of financing (pay-as-you-go or pre-funded) matters much less than often assumed*, if at all (see, for example, Holzmann, Hinz, and Bank team 2005). In the end, all of these outlays need to be financed out of current GNP, whether unfunded or pre-funded, and each generation of retirees and heavy consumers of health care needs the next generation to pay contributions or to buy the accumulated assets. The form of financing matters with regard to the quality of collateral at the microeconomic and macroeconomic level: Do the contributions and insurance premiums create property rights? And do they contribute to enhanced national savings and thus capital stock (domestically or internationally)? As a result,

policies that affect the number of individuals as payers of contributions or buyers of assets matter for the financial sustainability of these schemes.

*While the notional (pay-as-you-go) or actual pre-funding of pension benefits is easily understood, the pre-funding of health care benefits is often not.* Health care benefits—whether public or private—typically do not work as a spot insurance market in which the premium is determined by the current-period risk profile of the insured which is typically related to age. This would make health insurance unaffordable for most elderly, especially as preexisting conditions become more evident with each insurance year. As a result, the typical health insurance premium is above the current-period actuarial expenditure level at a younger age and includes a component of savings to finance future expected health care expenditures above current contribution revenues. This explicit or implicit intergenerational component makes both health care and pension benefits dependent on the explicit or implicit rate of return of these social programs. And these rates of return are closely linked to the demographic structure.

It is increasingly understood that *the explicit or financial rates of return are also dependent on the demographic structure and dynamics of a country.* The savers of assets for retirement income or health care benefits need the buyers of these very assets once they want or need to sell them. International diversification of these assets in view of asymmetric aging across countries helps at the margin, but it does not constitute a solution (Holzmann 2002). And the interconnectedness of capital markets makes national interest rates also dependent on global demographic trends (see McKibbin 2005). The implicit rate of return of unfunded systems is closely linked to the growth of the base of contributions (which depends on productivity growth/the growth of real wages per capita, and the labor force/the growth in the number of contributors). This standing result, based on Samuelson (1958) for two-generation OLG models, needs to be adjusted in three- and more-generation models and include an adjustment factor that takes into account changes in the numbers of years between when contributions are paid and benefits are received (see Settergren and Mikula 2005, and footnote 1). Hence projected demographic shifts will influence the internal (and external) rate of return and thus the capacity to deliver pension and health care benefits through three channels.

First is the change in labor force. For some countries and regions, the impact of the projected fall in the labor force during the next 45 years is quite substantial (table 3). In Europe plus Russia, the impact would amount to a reduction in the (implicit) rate of return in the range of 0.7 to 0.9 percent annually. For North America, the assumed migration will add almost 0.6 percent annually to the rate of return during the next 45 years.

Second is the impact of aging on productivity growth. There are a number of reasons why an aging labor force may exhibit lower productivity growth per worker, taking into consideration knowledge creation and entrepreneurial spirit. Cross-country econometric evidence for 115 countries suggests that the share of the elderly population has a statistically significant impact on growth of real GDP per capita (IMF 2004: table 3.1). Using the coefficient from this research and the demographic forecast for advanced economies suggests a reduction in the annual real growth rate of GDP per capita of 0.5 percent, on average, by 2050—that is, per capita growth would be 0.5 percent lower than it would have been if the demographic structure had remained unchanged. Simulations with a general equilibrium model provide similar magnitudes of growth reduction per capita and per annum for OECD countries (Martins et al. 2005).

Table 3. Annual Growth Rates of the Labor Force, 2005–50

Percent			
<i>Country</i>	<i>Medium variant</i>	<i>Zero migration</i>	<i>Difference</i>
China	−0.28	−0.25	0.03
Europe and Russia	−0.68	−0.85	−0.17
High Income East Asia and Pacific	−0.56	−0.75	−0.19
North America	0.44	−0.12	−0.56
Latin America and Caribbean	0.83	0.95	0.12
Low and Middle Income East Asia and Pacific	0.79	0.86	0.07
Middle East, North Africa, and Turkey	1.36	1.38	0.02
South and Central Asia	1.25	1.29	0.04
Sub-Saharan Africa	2.32	2.34	0.02
Total	0.77	0.77	0.00

*Sources:* United Nations (2005); author's calculations.

Third is the impact of population aging on the ratio of assets to liabilities of unfunded pension systems. While aging increases the liability position, it also increases the asset position by increasing the average number of years between contribution payments and benefit disbursement.<sup>2</sup> In a non-financial (or notional) defined-contribution system, the liability position can potentially be isolated from population aging, while the asset position is improved, leading to a potential (small) gain in the rate of return to the system of some 0.1 percent a year. Hence, the more quasi-actuarial the structure of an unfunded pension system, the less detrimental the impact on the rate of return provided.

*Population aging can occur as the result of a reduction in the total fertility rate or an increase in life expectancy.* In the real world, both effects occur at the same time and have been of roughly similar magnitude in many countries in recent years. But the effects on social programs and hence the policy conclusions are not identical.

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2. In a notional defined-contribution system, the financial balance requires that the present value (PV) of assets (**A**) is greater or equal to liabilities (**L**) in each period. Liabilities consist of the accumulated notional accounts (**K**) and pension payments; the assets consist of the value of the reserve fund plus the value of contributions times the turnover density (**TD**)—that is, the product of the earnings-weighted average number of years participants have worked based on the age-earnings profile in period  $t$  and the payment-weighted average number of years payments have to be made in year  $t$  based on the payment profile in period  $t$ . See Settergren and Mikul (2005) and Palmer (2005). Annual deviations between assets and liabilities affect the (implicit or notional) rate of return ( $i$ ) that can be granted to plan participants. This return consists of the normal growth of productivity ( $g$ ) and the growth in the number of contributors ( $n$ ) plus the adjustment factor ( $a$ ).

$$(1) \quad PV(Lt) = PV(At)$$

$$(2) \quad PV(Lt) = \sum Ki,t + \sum Pj,\tau,t$$

$$(3) \quad PV(A_t) = TD * \sum c w_{i,t} + Fund_t$$

$$(4) \quad a = [PV(At)/PV(Lt)] - 1$$

$$(5) \quad i = g+n+a.$$

With a total fertility rate at the replacement level (which in highly developed economies is in the range of 2.05 to 2.1 children per woman, but can be as high as 2.64 in countries such as Namibia if mortality rates are high throughout the fertility period), population aging occurs through a fall in the age-specific mortality rate, which raises life expectancy at all ages. In developing countries, recent gains in life expectancy have occurred at young ages; in highly developed economies, the gains have occurred at older ages (60 and beyond), as the mortality rates at younger ages are already low. A gain in life expectancy of some 10 years at age 60—from 80 to 90—and deterioration in the (demographic) old-age dependency ratio from, say, 2:1 to 3:1 can be easily addressed by raising the retirement age by 6.6 years (and using only the remainder for an extended retirement period of 3.3 years). This would reestablish financial balance in the old-age income system and leave the internal rate of return largely unchanged.<sup>3</sup>

With a given life expectancy, population aging is driven by a fall in the total fertility rate. This also occurs when total fertility rates are falling and rates are above the replacement rate. If left constant, this situation leads to a constant population structure and a permanently growing population. At constant total fertility rates below the replacement level, the population structure also moves to a steady state, but the population is permanently shrinking. While the deterioration in the population structure and the resulting increase in the old-age dependency ratio can be corrected by an increase in the retirement age (as under rising life expectancy), the fall in both population and size of the labor force needs an additional correction to deal with the otherwise lower benefit level due to lower implicit rates of return.

The above estimates suggest that some countries and regions have an aging-induced deterioration in the internal rate of return for pension income of 1.3 percent a year (0.8 percent due to the smaller labor force and 0.5 percent due to lower productivity growth). Such calculations do not include the price effects for retirees of higher personal health care costs, which are likely to reduce income by a similar magnitude. Nor do they include the effects of lower rates of return on notional or actual pre-saving in health care insurance. Yet such a reduction in the annual rates of return over a whole life cycle has important implications for benefit levels. In a life-cycle setting, a 1 percentage point (100 basis point) lower rate of return translates broadly into a 20 percent lower pension benefit. The actual magnitude of a deteriorated rate of return may require compensation in a reduced replacement rate which exceeds 30 percent or more.

## 2.3 The Set of Corrective Demographic Policy Options

This subsection sketches the set of corrective demographic policy options, which is quite limited and includes essentially a higher total fertility rate (that is, more children per family) and higher labor force participation of the existing population, and increased immigration. There is, of course, a much larger set of potential non-demographic corrective policy options, such as enhanced productivity growth per employee or international diversification of investments. Although such policies may prove important, they are beyond the scope of this paper and are conjectured not to be full substitutes for the demographic policy options addressed here.

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3. The impact on the disability scheme should be small, as most individuals at age 60 have a health status equal to that of people aged 45–50 some 50 years ago. If people anticipate a later retirement, their lifelong investment in human capital should be higher and the age impact on productivity growth should be smaller.

*Higher total fertility rate.* Fertility rates at the beginning of the new millennium reached a new low in many countries and regions: Russia, 1.2; Europe and Japan, around 1.4; China, 1.7; and North America, almost 2.0. The medium demographic variant assumes some recovery in the total fertility rate for Russia, Europe, Japan, and China toward 1.85 and a slight fall for North America by the end of the projection period. In all cases, the replacement level would not be reached by 2050.

One potential policy option is to attempt to reach a replacement-level total fertility rate as soon as possible and keep it there. This would stabilize the labor force in the long term and, eventually, create long-term population growth, but solely through an increase in life expectancy (or immigration). The short- and medium-term effects, however, would be limited. The past decline in the total fertility rate has already reduced the number of women of child-bearing age, so the increase in crude birth rates would be limited. And any increases in the number of births would need some time before they have an effect on the labor market—that is, some 15, 20, and more years. Furthermore, this option would contribute to an immediate deterioration in the total (demographic) dependency ratio—that is, the sum of the youth dependency ratio (the ratio of ages 0–14 to ages 15–64) and the old-age dependency ratio (the ratio of ages 65+ to ages 15–64).

Section 3 investigates the quantitative effects of this policy option, and section 4 sketches potential policy measures to make it happen.

*Increased labor force participation.* A second option to correct for population aging with regard to the system dependency ratio (that is, the ratio of beneficiaries to contributors in the pension system) consists of increasing labor force participation—that is, increase the share of population participating in the labor market, including the elderly. The labor force participation rate differs substantially across regions, countries, and gender, which gives rise to the potential policy options of an increase beyond current levels. While such an increase in labor force participation can expand the total labor force and hence may compensate for a fall in population in potentially active age brackets, it requires more: If the active population continues to decrease, even a partial compensation will require a continuous increase in the labor force participation rate. And increased labor force participation cannot be allowed to translate 1:1 into increased social benefits as such an approach would postpone, but not solve, the underlying financing needs of such programs.

*Increased immigration.* A simple mechanism in quantitative terms to compensate for low or negative population growth is to import population from other countries. Such an approach promises a number of direct advantages for the migrant-receiving countries. First, most of the migration typically takes place among person's ages 25 to 35. Hence immigration immediately enhances the labor force, while only gradually contributing to a higher dependency ratio—first through their children and only much later through their receipt of pension benefits. Second, given an assumed elastic supply of migration-willing individuals in developing countries, this policy may, in principle, compensate extremely well for any population gap in quantitative terms and, with an appropriate filtering mechanism, may also compensate for a gap in skills and other characteristics. Last but not least, with appropriate policies and incentives, part of the migrant population may be induced to return to the sending country, if this is deemed important and useful. The experience with such gap-filling immigration approaches, however, has met its limits, to which we return in section 4.

### **3 Scenarios of Demographic Options to Compensate Gaps in Labor Force**

This section presents broad estimates of the extent to which, and the assumptions under which, the demographic gap in the North can be compensated for by the corrective policy options just outlined. To this end, the section relies on special scenario projections produced by the demographic division of the United Nations in New York. The reliance on these scenarios ensures consistency with the other projections used in this paper and by other authors internationally. However, it also limits the alternative policy scenarios that can be investigated.

#### **3.1 Instant Move to Replacement-Level Total Fertility Rate**

The first demographic option investigates the effect of an instant move to a total fertility rate at the replacement level. The possibility of such a move is clearly unrealistic, but it serves as a useful benchmark for less drastic policy options and provides highly interesting scenario projections. Table 3 presents the change in total population by main age groups for the two periods under investigation (2005–25 and 2005–50), calculated as the difference between the instant-replacement-level variant and the medium variant. Table 4 presents the effects, translated into changes in labor force, between these two scenarios and for 2025 and 2050. Both tables also include information about the regions in the South for reasons of completeness and interest.

Table 4 indicates the time-lagged effect on population growth of an instant move toward a replacement-level total fertility rate. For all regions, the impact on the young age group is proportionate to the distance to replacement level during the prior 20 years. The population surplus is moderate for North America, as actual fertility rate is close to replacement level, but is substantial for all other deficit regions. The population deficit is high for Sub-Saharan Africa, with a total fertility rate well above replacement, but is more moderate for other surplus regions in 2025. The impact on the active population group by 2025 is still small in both deficit and surplus regions.

By 2050 the impact on the young age group is, in aggregate, mitigated by the past total fertility rate in the medium variant. However, for fertility-deficit regions, the accumulated lagged effects of a higher total fertility rate under the baseline scenario become visible in the active population group: the projected population gain for this age group is more than 230 million. For the world as a whole, the overall population effect is mitigated by the dominant effect of reduced population for Sub-Saharan Africa under a replacement-level total fertility rate.

Table 5 translates changes in the size of population in 2025 and 2050 (for projected constant labor force participation rates as of 2010) into changes in total labor force numbers induced by the replacement-level total fertility rate compared to the medium variant. As expected, the impact on both projected initial-surplus and -deficit countries in 2025 is small. By this year, a higher or lower fertility rate during the previous 20 years has a limited impact. By 2050, the accumulated effect over 45 years is already well pronounced. For the initial-deficit regions, this amounts to a gain in total labor force of almost 200 million. For the initial-surplus regions, this amounts to a reduction in labor force of more than 380 million, a potentially welcome development in view of existing pressures on the labor market.

Table 4. Difference in Population between Instant-Replacement and Medium-Variant Projections, 2025 and 2050

Millions

<i>Period and region</i>	<i>Age 0–14</i>	<i>Age 15–64</i>	<i>Age 65+</i>	<i>Total</i>
<i>Difference by 2025</i>				
China	49.5	22.7	0.0	72.2
Europe and Russia	39.3	17.5	0.0	56.7
High-income East Asia and Pacific	11.0	5.2	0.0	16.3
North America	7.4	1.1	0.0	8.6
Latin America and Caribbean	–3.9	–5.9	0.0	–9.8
Low- and middle-income East Asia and Pacific	7.9	–3.2	0.0	4.6
Middle East, North Africa, and Turkey	–22.3	–11.4	0.0	–33.7
South and Central Asia	–49.3	–32.6	0.0	–81.9
Sub-Saharan Africa	–172.2	–55.3	0.0	–227.5
Total	–132.4	–61.9	0.0	–194.4
<i>Difference by 2050</i>				
China	83.6	114.3	0.0	197.9
Europe and Russia	53.7	80.4	0.0	134.1
High-income East Asia and Pacific	15.0	22.8	0.0	37.8
North America	14.6	15.3	0.0	29.9
Latin America and Caribbean	12.2	–6.1	0.0	6.1
Low- and middle-income East Asia and Pacific	21.7	14.6	0.0	36.3
Middle East, North Africa, and Turkey	–16.7	–44.3	0.0	–61.0
South and Central Asia	–10.6	–94.0	0.0	–104.6
Sub-Saharan Africa	–243.7	–337.2	0.0	–580.9
Total	–70.0	–234.1	0.0	–304.1

*Sources:* United Nations (2005); authors' calculations.

Table 5. Difference in Labor Force between Instant-Replacement and Medium-Variant Projections, 2025 and 2050

Millions

<i>Region</i>	<i>Difference by 2025</i>	<i>Difference by 2050</i>
China	11.4	96.8
Europe and Russia	4.1	61.9
High-income East Asia and Pacific	0.8	16.7
North America	0.4	11.3
Latin America and Caribbean	–2.6	–5.2
Low- and middle-income East Asia and Pacific	–1.2	10.0
Middle East, North Africa, and Turkey	–3.3	–27.6
South and Central Asia	–16.4	–72.6
Sub-Saharan Africa	–47.5	–283.6
Total	–54.2	–192.4

*Sources:* United Nations (2005); author's calculations.

### 3.2 Alternative and Combined Policies of Increased Labor Force Participation

The investigated policy options have as a starting point the demographic projections without any (net) migration. This baseline is used to obtain an unbiased estimate of the effects of three policy scenarios with regard to labor force participation. The investigated and estimated scenarios are the following:

- (1) *Benchmarking*. What would be the labor force effects if the countries and regions in the North would gradually increase their labor force participation rates to match those of countries with the highest rates in 2005? Three European countries (Denmark, Iceland, and Sweden) have rates well above those of other countries, including the United States, which comes close. Most countries are well below, in particular at higher age groups.
- (2) *Gender gap*. What would be the labor force effects if the labor force participation rate of women would approach that of men by 2050?<sup>4</sup> In some countries, there is hardly any difference between women and men with regard to labor force participation, especially in the younger and middle age groups. In quite a number of other countries, the labor force participation of women remains low, much lower than that of men.
- (3) *Retirement age*. What would be the labor force effects of a major increase in actual retirement age by 2050? The estimated effects assume an increase of five years by 2025 and of 10 years by 2050. Currently, the difference in actual retirement across countries and regions is substantial, which suggests a highly differentiated impact.
- (4) *Combined effects*. What would be the effect of all three policy measures combined: that is, gradually but jointly matching the highest labor force participation rates, eliminating gender gaps, and substantially increasing the actual retirement age?

The effects of these policy scenarios are detailed for each region investigated in annex tables A3–A6. This section summarizes the main results and key observations. Table 6 in the text presents the results by comparing the zero-migration benchmark and the four policy scenarios for the changes in the labor force between 2005–25 and 2005–50. Table 6, supported by the annex tables, suggests the following key observations:

- Overall, there are strong regional differences in the impact of the policy options, the options selected, and the time frame.
- A combination of all measures is able to keep the change in labor force positive in all regions by 2025, but even continued joint implementation of increased labor force participation is not able to compensate fully for the drop in active population in Europe plus Russia and the high-income countries of East Asia and the Pacific, once the projection horizon is extended to 2050. At least in these two regions, other policy measures would have to be added in order to stabilize the labor force. In the other two regions (China and North America), the combined measure would be sufficient to increase the labor force by 2050. But the drastic policies required to achieve this

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4. Assuming steady incremental change: 50 percent between 2005 and 2025 and 50 percent between 2025 and 2050.

may warrant the partial substitution of other measures (that is, an increase in the total fertility rate and migration).

- The results signal quite different starting positions among the regions, leading to quite differentiated impacts on the labor force under the same policy scenario. For example, benchmarking of labor force participation rates has little effect on China in both periods, indicating a high level of participation for the main age groups. In contrast, this measure is highly effective in reducing the expected fall in the labor force in Europe plus Russia, indicating that labor force participation in countries that are not benchmarked in the region is quite low. However, eliminating the gender gap has large effects in China and the high-income countries of East Asia and the Pacific, but moderate effects in Europe plus Russia and in North America, confirming the traditionally low rate of female labor force participation in countries like Japan and Korea. Raising the actual retirement age is, in most but not all cases, the most effective policy measure to compensate (partially) for low or negative population growth.
- The aggregate effect of the combined measures on the labor force is impressive. In the regions with a potential deficit, it amounts to a projected gain in labor force of 175 million by 2025 and 335 million by 2050. This compares quite favorably with the estimated effects of an instant move to the replacement-level total fertility rate, which is only 17 million by 2025 and 187 million by 2050.

Table 6. Change in the Labor Force, by Policy Variant, 2005–25 and 2005–50

Millions

<i>Period and region</i>	<i>Zero-migration variant (baseline)</i>	<i>Scenario I (benchmarking)</i>	<i>Scenario II (gender gap)</i>	<i>Scenario III (retirement age)</i>	<i>Combined scenario I+II+III</i>	<i>Difference between I+II+III and baseline</i>
<i>2005–25</i>						
China	24	29	63	65	93	69
Europe and Russia	–46	–16	–28	–20	21	67
High-income East Asia and Pacific	–9	–5	–2	–3	5	14
North America	1	9	6	13	26	25
Total	–29	16	38	55	145	175
<i>2005–50</i>						
China	–85	–77	–14	4	62	146
Europe and Russia	–118	–69	–91	–72	–2	117
High-income East Asia and Pacific	–32	–28	–22	–21	–8	24
North America	–9	6	1	15	39	48
Total	–244	–168	–126	–75	91	335

Source: United Nations (2005); author's calculations.

### 3.3 Migration Needs to Keep the Labor Force Constant at the 2005 Level: The Magnitudes of Net and Gross Migration

At current labor force participation rates and in the absence of migration (the zero-migration variant), the labor force in Europe plus Russia will decline by 46 million during the period 2005–25 and by 118 million during the whole period analyzed, 2005–50 (tables 6 and 7). Labor migration might compensate for the whole “gap.” But, in this case, between 2005 and 2025, Europe plus Russia will have to add a net amount of 2.3 million migrants annually to its work force. And between 2025 and 2050, this number will have to increase to 2.9 million migrants annually.<sup>5</sup> Assuming that, at best, 70 percent of newly arriving immigrants join the work force,<sup>6</sup> the annual net gain from migration will have to be on the order of 3.3 million annually until 2025 and 4.1 million annually between 2025 and 2050. Under these assumptions, between 2005 and 2050, a net migration gain of 169 million people aged 15 to 64 will be required to add 118 million economically active migrants to the labor force of Europe plus Russia. This does not account for children below the age of 15 and elderly aged 65 or older, which would add another 15 to 35 percent.<sup>7</sup> This would lead to net migration well above European levels in the recent decades.

Table 7. Required Net and Gross Migration to Hold the Labor Force Constant, 2005–25 and 2005–50

Millions

<i>Period and Region</i>	<i>Net requirement of labor force</i>	<i>Non-active migrants aged 15-64</i>	<i>Dependents aged 0-14 and over 65</i>		<i>Returning and circulating migrants aged 15-64</i>		<i>Gross requirement of migrants</i>	
			<i>Low</i>	<i>High</i>	<i>Low</i>	<i>High</i>	<i>Low</i>	<i>High</i>
<i>2005-25</i>								
China	—	—	—	—	—	—	—	—
Europe and Russia	46	+20	+10	+23	+33	+131	108	219
High Income East Asia and Pacific	9	+4	+2	+4	+6	+26	21	43
North America	—	—	—	—	—	—	—	—
Total	55	+23	+12	+27	+39	+156	129	262
<i>2005-50</i>								
China	85	+36	+18	+42	+61	+242	200	406
Europe and Russia	118	+51	+25	+59	+84	+338	279	566
High Income East Asia and Pacific	32	+14	+7	+16	+23	+92	76	154
North America	9	+4	+2	+4	+6	+25	21	42
Total	159	+68	+34	+80	+114	+455	375	762

*Source:* United Nations (2005); author's calculations.

*Notes:* Net requirements based on zero-migration variant. Non-active migrants calculated assuming a labor force participation rate of migrants of 70 percent, as estimated in Münz and Fassmann (2004). Dependent migrants calculated assuming to amount to 15 to 35 percent of migrants aged 15-64. Returning migrants calculated assuming return migration rate of migrants aged 15-64 between one third and two thirds, as estimated in Holzmann, Koettl, and Chernetsky (2005).

— No migration requirement during this period.

5. The annual migration needs for EU25 alone are 1.3 million and 1.6 million, respectively.

6. This conclusion can be drawn from an analysis of the European Labor Force Survey showing labor force participation rates above 65 percent (ages 15–65) for West European immigrants living in another European Union member state as well as for Australian, Canadian, Japanese, and U.S. immigrants in the European Union (Münz and Fassmann 2004).

<sup>7</sup> This is the range suggested by migration data for European countries. See Migration Policy Institute (2005).

The corresponding magnitude for other regions with a potential deficit is less dramatic but, in aggregate, is still half that of Europe plus Russia. In the high-income countries of East Asia and the Pacific, they amount to 9 million and 32 million in 2005–25 and 2025–50, respectively. While China is projected to have a labor force surplus during the period 2005–25, to compensate the gap of 85 million by 2050 may require a total net migration of 121 million in the period 2025–50, or more than 4.8 million migrants annually. The equivalent values of total net migration remain small for North America, at 13 million, but are sizable for the high-income countries of East Asia and the Pacific, at 46 million.

When taking these dimensions into account, one might conclude that net immigration on the order of some 200 million people (compared to the starting population of 745 million in 2005) is beyond Europe’s integration capacity, even if immigration of such a large number is distributed over a period of 45 years. The same conclusion may be reached for the high-income countries of East Asia and the Pacific, which may need to absorb a total net immigration of some 60 million (compared to a starting population of 212 million in 2005). But in this context, net migration is not the only factor. Both for recruitment and for an assessment of integration capacities, we also have to take into account the absolute number of migrants. For this it is important to note that in the past many people migrating to Europe or other parts of the North did not stay for good; instead, they eventually returned to their country of origin. For example, during the 1990s, 88 percent of Polish nationals migrating to Western Europe returned to Poland (see annex table A7). During the same period, 63 percent of Turkish nationals migrating to Western Europe returned to Turkey (see annex table A8). These rates, however, tend to overestimate the total number of persons involved as available statistics on migration flows include circular migrants, who are represented several times.

We have to assume that circular movements and returns to the country of origin will remain an important element of future migration patterns. Under this assumption, admitting or recruiting a net amount of some 200 million migrants (as discussed for Europe plus Russia) may require a pool of some 280 million to 570 million of total migrants, depending on the rate of circularity and return. Such calculations suggest that admitting or recruiting labor migrants (and dependent family members) can only be one part of a policy mix addressing the medium- and long-term labor market problems of countries and regions with fertility deficits.

#### **4 Policy Implications of and Requirements for a Realization of Demographic Scenarios**

The demographic scenarios presented in section 3 investigate the magnitude of a potential measure to compensate for population aging and negative labor force growth in the North. While each of the broad policy approaches—higher fertility rate, higher labor force participation, and larger migratory inflows—may partially or even fully help to stabilize the labor force (or other objective variables) in the North, the actual policy measures with which to achieve such changes may not be available, effective or efficient, or may create problems of their own. This section sketches some of the key policy issues, including the identification of some important questions for future policy research.<sup>8</sup>

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<sup>8</sup> For broader issues of population policy, and the claim of its continued relevance for the developed and developing world, see May (2005).

#### 4.1 What Can Governments Do to Increase the Fertility Rate of a Country?

While there seems to be some empirical understanding of the determinants of the fertility decisions of women (less of couples), there seems to be less grasp of what governments can do to influence such a decision in a cost-effective manner. Two sets of public instruments are typically evoked to foster a fertility decision: offer direct monetary or real transfers and reduce the opportunity costs of female labor force participation. A third set of measures seems to be the pet of only a few academics and politicians: reduce the negative fertility effects of existing social programs, in particular, pension schemes.

*Provide transfers in cash or kind.* A number of countries provide monetary transfers to families with children for reasons of income support, pro-natal considerations, or both. Such transfers include birth premiums, parental leave, family allowances that are sometimes differentiated by the number of children (for example, high for third and fourth child, but low or zero for any further child), and housing allowances or preferential access to housing (a measure that was widespread in Central and Eastern Europe under communist rule). The empirical evidence of such transfers indicates a low to moderate degree of effectiveness, if any.<sup>9</sup> There seems to be broad agreement that such transfers—in particular, if they are assumed to be only temporary and are introduced during periods of sluggish labor markets—may influence the timing and spacing of children. But the long-run effects on the total fertility rate of mere transfers on their own seem to be very small. Such a result should come as no surprise because the present value of such transfers is dwarfed by the direct costs of raising children and, perhaps more important for women in developed economies, by the opportunity costs of raising children if they negatively affect labor force participation and career opportunities.

*Reduce the opportunity costs of female labor force participation.* The limited effectiveness of traditional pro-natal instruments and the wish of many well-educated women to manage both a professional career and a family have focused attention on appropriate policy actions. A first set of measures concerns the access of families with children to day care centers (crèches, kindergarten, full-day schools)<sup>10</sup> or simply the availability of nannies or live-in maids at reasonable prices and non-intrusive administrative procedures. Here government actions can be very supportive and apparently equally effective if done via budget expenditures (Sweden) or market mechanisms (the United States), as both countries have a total fertility rate of similar magnitude. A second set of measures may be equally important, but more difficult for government policy to influence, at least in the short run. It concerns the link between the level of partnership in family decisions and child rearing and in the marriage and fertility decisions of women. Influencing such behavior through government action is much more difficult and controversial, and information about good and best practices is just beginning to emerge.<sup>11</sup>

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9. Reviews of cross-country and case studies of the link between fertility and social policy include Bjoerklund (2002); Drago, Scutella, and Verner (2002); Neyer (2003).

<sup>10</sup> For a global survey on the limited effectiveness of such measures which echoes the findings in many other studies, see Caldwell, Caldwell and McDonald (2005).

<sup>11</sup> For a review of OECD country experiences with reconciling work and family life, see OECD (2002, 2003, 2004a, 2005).

*Reduce distortions in the fertility decision.* There is a long-standing fear that a pay-as-you-go pension system introduces distortions in the fertility decisions of families. Indeed, there are good reasons to believe the pay-as-you-go system induces a moral hazard effect and reduces individual incentives to invest in human capital (see, for example, Sinn 2004 and Meier and Wrede 2005). The basic source of such an effect is claimed to be an externality inherent in a pay-as-you-go system. The old-age benefit is fixed at the individual level, often scarcely linked to one's own financial contribution and certainly independent of the contribution of one's children or whether one has any children at all. Therefore, individuals have little incentive to take such contributions into account when making fertility decisions and the incentive to form a family is affected by the implicit subsidy that defined benefits provide to single (childless) households. The empirical evidence seems to support the conjecture that public pension schemes have a negative impact on fertility rates. But while the effects seem to be statistically significant, the magnitude is small. For example, reducing the contribution rate in pay-as-you-go schemes by 25 percent would increase the worldwide (and U.S.) fertility rate by 0.1 percentage point, say, from 2.2 to 2.3 percent (see Ehrlich and Kim 2003).

#### **4.2 How Can Governments Support an Increase in the Labor Force Participation Rate?**

In our scenario calculations, an increase in labor force participation can be affected at three levels: raising the labor force participation of women closer to that of men, raising labor force participation for all workers and genders at all ages, and raising the labor force participation of elderly workers.

*Increase female labor force participation.* Reconciling work and family by increasing female labor force participation is closely linked to the policy measures discussed above. More basically, female labor force participation is closely linked to the education level and the incentives and aspirations of women to use their educational achievements. A successful inclusion in the labor market, however, contributes to a delay in the age of first birth. In many OECD countries, a substantial and increasing share of women (20 percent and more) are having their first child at the age of 40 and older. While this contributes to higher female labor force participation, having the first child at an older age risks also reduce the total number of children per woman.

*Increase the labor force participation rate overall.* The overall increase in the labor force participation rate is linked to the performance of the labor market and its capacity to handle the challenges and opportunities of globalization. Worldwide and also in OECD economies, there is a fear that globalization leads to job losses and lower wages. Unemployment remains stubbornly high in many countries in Europe plus Russia, job creation is high on the agenda of China (with some 200 million to 300 million internal migrant workers), and essentially all countries are concerned about the level of and increase in youth unemployment. As a result, the possibility of a general increase in labor force participation across all ages is linked closely to the capacity of a country to adjust to a globalizing world and to create jobs.

*Increase the labor force participation of the elderly.* Increasing the labor force participation of the elderly is high on the agenda of all countries as a means to deal with the issue of how to finance the pension scheme. As a necessary condition, this requires reforms of the pension system to make a postponement of retirement more attractive or simply to increase the minimum retirement age. In addition, however, employers must have an incentive to keep or hire elderly workers. This requires changes in the wage profile for the elderly and measures to keep their productivity high and rising. For the latter, the factual implementation of lifelong learning seems important, which in turn calls

for rethinking the contractual arrangements between trade unions and employers, such moving the negotiations beyond salaries and working time to training and life-long learning.<sup>12</sup>

### **4.3 What Can Governments Do to Accommodate Immigration Flows to Mutual Advantage?**

Filling labor force gaps in rich countries through migration seems to be an easy task in view of the excess supply of willing migrants from the developing world. Yet sentiments against migrants, especially in countries that have not traditionally received a large number of immigrants, and the discussion about the best approaches to integration indicate that the absorption of migrants into society is not easy, in particular if attempted on a large scale. Is it possible to call for workers alone, or is it necessary to call for and prepare future citizens? Is a short-term guest-worker concept feasible in view of the gross number of immigrants required, and is it sustainable in view of the experiences of Germany and elsewhere? Good answers to these and related questions are crucial if this demographic option is to be implemented successfully. In addition, many other policy areas need to be addressed. The three addressed here often receive insufficient attention.

*Adjust the economic environment.* Large-scale immigration over a long period of time is like a sequence of supply shocks to which the economy needs to adjust. As with other shocks, it is best absorbed in an economy with sufficient flexibility, including flexibility in the markets for goods, services, and factors of production. Public management and support of migration flows are needed and important, but they cannot substitute for private initiative. Such an approach seems to be successfully applied in the traditional recipients of immigration, such as the United States, Canada, and Australia.<sup>13</sup> If correct, this would call for a fundamental review and adjustment of the economic environment in many nontraditional recipients of immigration (in Europe and elsewhere) before further large-scale immigration is envisaged.

*Manage the skill mix.* Economic considerations suggest that the (net) benefits of migration and their distributive effects between and within countries depend on the skill composition of migrants as well as of the labor force in the sending and receiving countries.<sup>14</sup> Selecting migrants with appropriate skills creates benefits for the receiving country but risks hurting the sending country. While the discussion about brain drain has given rise to more positive views of brain gain and brain circulation, the skill composition of migrants and potential collaboration between sending and receiving countries are gaining importance. Such collaboration may extend to the formation of skills, co-financing of education, certification of skill levels, and acquisition of better information about skill levels (Holzmann and Munez, 2005). The experience in migrant-receiving countries suggests that they substantially underutilize the skill level of their migrants due to information

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<sup>12</sup> Over the last 2 years OECD has produce many studies on member countries which investigate employment policies in an aging society. See for example OECD (2004c).

<sup>13</sup> For example the workshop paper by David Card (2005) suggests that immigrants do not harm the labor market opportunities of native workers. This more positive assessment about the impact of migration is in line with other more recent as well as older research results and contrast with divers and more negative findings of Borjas (e.g. 2003). Boeri and Brueckler (2005) claim that the resistance of EU countries against migration is the result distorted labor markets. Under such settings their argument goes migration may entail significant direct and indirect costs.

<sup>14</sup> For recent surveys of this topic, see Drinkwater and others (2003); Commander, Kangasniemi, and Winters (2003), Borjas (1999).

problems and uncertainties about the value of skills, including academic training, received abroad (for the Canadian experience, see, for example, Reitz 2005).

*Improve the portability of social benefits.* For a variety of reasons, a substantial share of migrants returns to their home country after years of work abroad. And governments of host and source countries may wish to encourage return migration for various reasons. For example, governments of migrant-sending countries may see return migration as highly beneficial for their development, essentially through remittances of production factors, including investment capital, return of human capital, and transfer of knowledge and skills. Governments of migrant-receiving countries may support return migration to stress the temporary nature of immigration for political reasons. Currently such decisions by migrants are very much distorted by lacking or incomplete portability of social benefits, in particular pensions and health care (see Holzmann, Koettl, and Chernetsky 2005). As a result, many migrants do not return to their home country because they do not want to lose their access to social programs, or they prefer to work in the informal sector in order to avoid contributing to these programs, payments that become, in essence, a mere tax.

## **5 Summary and Concluding Remarks**

There is broad agreement that population aging linked with low or negative population growth creates a major challenge for many countries and regions in the North, especially for Europe plus Russia, the high-income countries of East Asia and the Pacific, China, and, to a lesser extent, North America. Without further immigration, the total labor force in these countries is projected to decline by 29 million between 2005 and 2025 and by 244 million between 2005 and 2050. At the same time, population aging will accelerate, and the old-age dependency ratio will deteriorate further.

Although the full economic and social implications of such a dramatic shift in age structure are not yet clear, simple financial considerations suggest that a declining labor force and a deteriorating age structure will put further pressure on the financing of pension and health care programs. In addition, economic considerations suggest that a reduction in the implicit and explicit rate of return of pension and health programs could reach 1.5 percent and more annually.

To compensate for negative population and, in particular, labor force growth, countries have three main demographic policy options: move the total fertility rate back to replacement levels, increase the labor force participation of the existing population, and fill the demographic gaps through enhanced immigration.

Scenario calculations for the four potential-deficit regions suggest that each of these three options may assist in compensating for the demographic gap. Moving immediately toward a replacement-level fertility rate in 2005 would create an additional labor force of some 17 million by 2025 and 187 million by 2050. Increasing labor force participation rates through three combined measures (moving toward benchmark countries, closing the gender gap, and raising the effective retirement age by 10 years) would add an additional labor force of 175 million by 2025 and 335 million by 2050 in aggregate (but would not fully compensate Europe plus Russia and the high-income countries in Asia). And enhancing net migration by 244 million people by 2050 to compensate for gaps in the labor force seems easy to achieve in quantitative terms but is only part of the story. One needs to consider “migration overhead,” which includes inactive migrant workers and family members in the range of some 50 percent—that is, think about total net migration on the order of

more than 350 million (170 million in Europe plus Russia alone). The gross flows that take into account return and circular migration may more than double these already staggering magnitudes.

While the magnitudes involved are high and the underlying policy decisions drastic, even more limited numbers question the capacity of governments to create or accommodate the envisaged effects. Empirical evidence suggests that governments have limited policy instruments with which to increase the fertility rate. Increasing labor force participation for all implies more successful labor market policies at a moment when many countries are struggling with the implications of a more globalized world. And accommodating a substantially larger number of migrants every year requires a major review of domestic policies and a rethinking of integration policies—an area where good practices have been little analyzed or broadly discussed.

This sobering assessment suggests that no single policy approach will, on its own, contribute significantly to covering the population gap, especially in high-deficit countries. It suggests that more knowledge is needed about the effectiveness and efficiency of policy measures to influence fertility and labor force participation and to better accommodate migratory flows. It also suggests the need to investigate measures beyond demography or simply prepare for a shrinking population in a number of countries, which some claim has advantages on its own.

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## Annex Tables

Table A1. Dependency Ratios, by Region, 2005–50

<i>Ratio</i>	<i>2005</i>	<i>2015</i>	<i>2025</i>	<i>2050</i>
<i>Old-age dependency ratio<sup>a</sup></i>				
China	0.11	0.13	0.20	0.39
Europe and Russia	0.23	0.26	0.32	0.48
High-income East Asia and Pacific	0.24	0.32	0.41	0.63
North America	0.18	0.22	0.28	0.34
Latin America and Caribbean	0.10	0.11	0.15	0.29
Low- and middle-income East Asia and Pacific	0.08	0.09	0.13	0.26
Middle East, North Africa, and Turkey	0.07	0.08	0.10	0.22
South and Central Asia	0.08	0.09	0.11	0.20
Sub-Saharan Africa	0.06	0.06	0.06	0.08
<i>Total dependency ratio<sup>b</sup></i>				
China	0.41	0.39	0.46	0.65
Europe and Russia	0.47	0.48	0.55	0.74
High-income East Asia and Pacific	0.47	0.54	0.62	0.88
North America	0.49	0.51	0.57	0.62
Latin America and Caribbean	0.56	0.52	0.50	0.57
Low- and middle-income East Asia and Pacific	0.54	0.47	0.45	0.54
Middle East, North Africa, and Turkey	0.59	0.53	0.50	0.53
South and Central Asia	0.62	0.54	0.50	0.50
Sub-Saharan Africa	0.87	0.82	0.74	0.55

*Sources:* United Nations (2005); author's calculations.

a. Ratio of age group 65+ to age group 15–64.

b. Ratio of age group 0–14 plus 65+ to age group 15–64.

Table A2. Changes in Labor Force, 2005–25 and 2005–50

Millions		
<i>Variant</i>	<i>2005–25</i>	<i>2005–50</i>
<i>Medium variant</i>		
China	19.1	–95.8
Europe and Russia	–37.5	–98.4
High-income East Asia and Pacific	–5.7	–25.0
North America	19.3	37.8
Latin America and Caribbean	77.6	110.3
Low- and Middle-income East Asia and Pacific	93.7	128.1
Middle East, North Africa, and Turkey	82.0	141.3
South and Central Asia	292.2	514.3
Sub-Saharan Africa	211.3	591.7
Total	751.8	1,304.3
<i>Zero-migration variant</i>		
China	24.4	–84.8
Europe and Russia	–45.7	–118.2
High-income East Asia and Pacific	–9.0	–32.3
North America	0.9	–8.8
Latin America and Caribbean	85.4	130.0
Low- and middle-income East Asia and Pacific	99.5	141.3
Middle East, North Africa, and Turkey	83.3	143.9
South and Central Asia	303.2	536.2
Sub-Saharan Africa	213.5	598.2
Total	755.6	1,305.5

*Sources:* United Nations (2005); authors' calculations.

Table A3. Policy Scenarios: Total Labor Force in China, 2005, 2025, and 2050

Millions

<i>Scenario</i>	<i>2005</i>	<i>2025</i>	<i>2050</i>
<i>Base scenario</i>			
Total labor force (millions)	798.7	823.2	713.9
Index	100	103	89
Absolute change (millions, base = 2005)	n.a.	24.4	-84.8
Average age of labor force	37.2	40.8	41.2
Participation rate of 55–74 age group (percent)	42.7	41.7	39.2
<i>Scenario I</i>			
Total labor force (millions)	798.7	828.0	721.6
Index	100	104	90
Absolute change (millions, base = 2005)	n.a.	29.2	-77.1
Average age of labor force	37.2	41.5	42.8
Participation rate of 55–74 age group (percent)	42.7	46.3	47.2
<i>Scenario II</i>			
Total labor force (millions)	798.7	861.6	784.5
Index	100	108	98
Absolute change (millions, base = 2005)	n.a.	62.9	-14.2
Average age of labor force	37.2	41.5	42.8
Participation rate of 55–74 age group (percent)	42.7	48.8	52.8
<i>Scenario III</i>			
Total labor force (millions)	798.7	863.8	802.5
Index	100	108	100
Absolute change (millions, base = 2005)	n.a.	65.0	3.8
Average age of labor force	37.2	41.9	43.9
Participation rate of 55–74 age group (percent)	42.7	53.6	64.3
<i>Scenario I+II+III</i>			
Total labor force (millions)	798.7	891.7	860.4
Index	100	112	108
Absolute change (millions, base = 2005)	n.a.	93.0	61.6
Average age of labor force	37.2	43.1	46.1
Participation rate of 55–74 age group (percent)	42.7	62.4	82.3

*Sources:* United Nations (2005); authors' calculations.

n.a. Not applicable.

Table A4. Policy Scenarios: Total Labor Force in Europe and Russia, 2005, 2025, and 2050

Millions

<i>Scenario</i>	<i>2005</i>	<i>2025</i>	<i>2050</i>
<i>Base scenario</i>			
Total labor force (millions)	371.8	326.1	253.6
Index	100	88	68
Absolute change (millions, base = 2005)	n.a.	-45.7	-118.2
Average age of labor force	39.2	41.1	41.0
Participation rate of 55–74 age group (percent)	25.6	24.4	23.6
<i>Scenario I</i>			
Total labor force (millions)	371.8	355.7	302.8
Index	100	96	81
Absolute change (millions, base = 2005)	n.a.	-16.1	-69.0
Average age of labor force	39.2	42.2	43.3
Participation rate of 55–74 age group (percent)	25.6	35.3	44.5
<i>Scenario II</i>			
Total labor force (millions)	371.8	343.3	280.6
Index	100	92	75
Absolute change (millions, base = 2005)	n.a.	-28.5	-91.1
Average age of labor force	39.2	41.6	42.0
Participation rate of 55–74 age group (percent)	25.6	28.6	31.3
<i>Scenario III</i>			
Total labor force (millions)	371.8	351.5	299.6
Index	100	95	81
Absolute change (millions, base = 2005)	n.a.	-20.3	-72.2
Average age of labor force	39.2	42.8	44.7
Participation rate of 55–74 age group (percent)	25.6	38.2	51.4
<i>Scenario I+II+III</i>			
Total labor force (millions)	371.8	392.8	370.2
Index	100	106	100
Absolute change (millions, base = 2005)	n.a.	21.0	-1.6
Average age of labor force	39.2	44.2	47.1
Participation rate of 55–74 age group (percent)	25.6	53.3	81.4

Sources: United Nations (2005); author's calculations.

n.a. Not applicable.

Table A5. Policy Scenarios: Total Labor Force in High-Income Countries in East Asia and the Pacific, 2005, 2025, and 2050

Millions			
<i>Scenario</i>	<i>2005</i>	<i>2025</i>	<i>2050</i>
<i>Base scenario</i>			
Total labor force (millions)	43.8	43.4	33.9
Index	100	99	78
Absolute change (millions, base = 2005)	n.a.	−0.4	−9.8
Average age of labor force	39.8	43.0	43.7
Participation rate of 55–74 age group (percent)	40.9	38.7	38.2
<i>Scenario I</i>			
Total labor force (millions)	43.8	46.0	37.8
Index	100	105	86
Absolute change (millions, base = 2005)	n.a.	2.3	−5.9
Average age of labor force	39.8	43.2	43.9
Participation rate of 55–74 age group (percent)	40.9	43.0	45.0
<i>Scenario II</i>			
Total labor force (millions)	43.8	46.2	38.3
Index	100	106	88
Absolute change (millions, base = 2005)	n.a.	2.5	−5.5
Average age of labor force	39.8	43.5	44.6
Participation rate of 55–74 age group (percent)	40.9	44.0	47.8
<i>Scenario III</i>			
Total labor force (millions)	43.8	46.1	39.0
Index	100	105	89
Absolute change (millions, base = 2005)	n.a.	2.4	−4.8
Average age of labor force	39.8	44.4	46.6
Participation rate of 55–74 age group (percent)	40.9	50.4	61.5
<i>Scenario I+II+III</i>			
Total labor force (millions)	43.8	50.8	46.5
Index	100	116	106
Absolute change (millions, base = 2005)	n.a.	7.0	2.7
Average age of labor force	39.8	45.1	47.7
Participation rate of 55–74 age group (percent)	40.9	60.7	81.3

*Sources:* United Nations (2005); author's calculations.

Table A6. Policy Scenarios: Total Labor Force in North America, 2005, 2025, and 2050

Millions

<i>Scenario</i>	<i>2005</i>	<i>2025</i>	<i>2050</i>
<i>Base scenario</i>			
Total labor force (millions)	171.1	171.9	162.2
Index	100	100	95
Absolute change (millions, base = 2005)	n.a.	0.9	−8.8
Average age of labor force	39.8	40.9	41.4
Participation rate of 55–74 age group (percent)	40.8	35.4	36.0
<i>Scenario I</i>			
Total labor force (millions)	171.1	179.7	177.0
Index	100	105	103
Absolute change (millions, base = 2005)	n.a.	8.6	5.9
Average age of labor force	39.8	41.4	42.3
Participation rate of 55–74 age group (percent)	40.8	40.6	46.5
<i>Scenario II</i>			
Total labor force (millions)	171.1	177.3	172.2
Index	100	104	101
Absolute change (millions, base = 2005)	n.a.	6.2	1.2
Average age of labor force	39.8	41.2	41.8
Participation rate of 55–74 age group (percent)	40.8	38.1	41.3
<i>Scenario III</i>			
Total labor force (millions)	171.1	184.5	186.0
Index	100	108	109
Absolute change (millions, base = 2005)	n.a.	13.4	14.9
Average age of labor force	39.8	42.6	44.5
Participation rate of 55–74 age group (percent)	40.8	50.1	65.0
<i>Scenario I+II+III</i>			
Total labor force (millions)	171.1	197.1	209.8
Index	100	115	123
Absolute change (millions, base = 2005)	n.a.	26.0	38.7
Average age of labor force	39.8	43.3	45.6
Participation rate of 55–74 age group (percent)	40.8	58.7	81.9

*Sources:* United Nations (2005); author's calculations.

n.a. Not applicable.

Table A7. Ratio of Official Outflows to Inflows of Polish Nationals for Select Host Countries, 1992–2001

Percent											
<i>Country</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>Average</i>
Austria							95.5	95.3	87.2	91.5	92.9
Belgium	33.3	42.9	25.0	37.5	33.3	45.5	45.5	33.3	45.5	6.9	30.4
Denmark	16.2	19.5	23.6	23.6	19.1	18.6	15.4	32.7	15.0	13.3	19.2
Germany	83.1	135.4	83.7	81.0	92.5	98.4	91.6	80.9	81.3	81.7	90.2
Netherlands		92.3	25.0	0.0	20.0	27.1	23.8	25.7	16.0	18.3	26.4
Norway	33.3	66.7	33.3	50.0	50.0	50.0	50.0	38.5	41.7	22.7	41.7
Total	82.5	132.8	82.1	79.1	89.9	95.5	88.9	79.8	78.9	77.2	87.9

*Source:* OECD (2004b).

Table A8. Ratio of Official Outflows to Inflows of Turkish Nationals for Select Host Countries, 1992–2001

Percent											
<i>Country</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>Average</i>
Austria							64.4	51.4	51.4	45.5	52.5
Belgium	22.2	24.0	22.2	24.0	20.0	35.7	25.0	27.3	14.3	10.0	21.5
Denmark	18.2	28.6	33.3	25.0	8.3	20.0	16.7	18.2	22.2	22.2	20.0
Germany	50.0	67.1	72.6	58.7	59.4	82.1	94.0	86.8	79.4	65.8	69.4
Netherlands	19.8	21.8	37.2	33.3	23.4	16.9	17.6	16.7	13.3		21.8
Switzerland	54.7	62.5	78.9	71.1	73.5	79.3	88.5	50.0	46.4	35.5	63.7
Total	46.4	61.0	68.2	56.5	55.5	73.9	81.1	73.5	67.2	59.2	63.0

*Source:* OECD (2004b).