

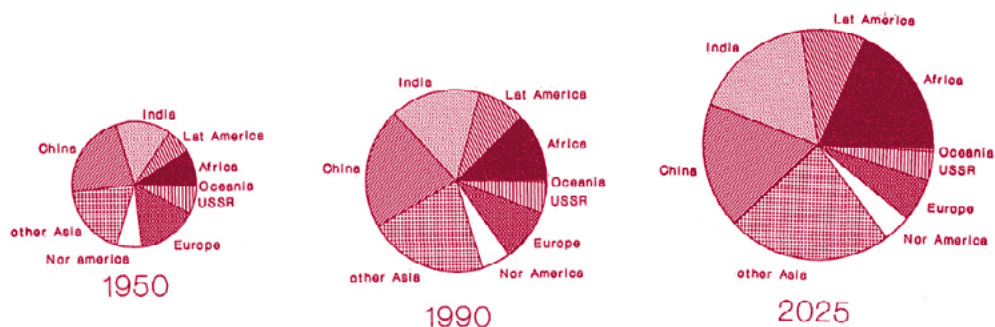
Policy Brief

# DEMOGRAPHIC DECLINE AND THE ROLE OF IMMIGRATION

By **Lorenzo Beadle**

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Figure V. Distribution of population among major areas of the world, 1950, 1990 and 2025.



**Lorenzo Beadle** is a member of the research team that has developed this report for Club de Madrid and the Leir Institute, under the supervision of Fletcher School Professor **Katrina Burgess** and Fletcher School Professor and Club de Madrid Member **Carlos Alvarado**.

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# EXECUTIVE SUMMARY

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Within the next ten years, deaths will surpass births across the OECD, ushering in a century of shrinking populations and rising old age dependency ratios; without sizable immigration, labor shortages, slower growth and mounting pension costs are inevitable. Yet the scale of immigration required to maintain today's growth and pension promises is politically unlikely and risks "brain drain" from sending countries. Immigration therefore cannot single handedly solve demographic decline, but it can meaningfully ease fiscal pressure when paired with productivity gains, healthier ageing, and inclusive labor market policies that raise participation across all age groups. Policymakers must weigh these trade offs now, designing immigration and complementary economic strategies that balance domestic needs with global equity as the world navigates an unprecedented era of demographic divergence.

# INTRODUCTION

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Within a decade, the number of deaths in **OECD countries** will exceed the number of births. Under hypothetical net-zero migration, this means that the OECD's collective population will be in decline for the remainder of the 21st century. At the same time, over 440 million people worldwide have expressed a desire to move to the United States, Canada, Germany, Spain, France, the United Kingdom, or Italy—nearly 40 percent of the receiving countries' collective population.

The future balance between net migration and natural increase will depend on policy choices and the prevailing economic conditions in countries of origin and destination. A demographic equilibrium (or surplus) as a result of net migration is no guarantee. ***This brief discusses how the macroeconomic challenges posed by demographic decline in Europe and the United States may be affected by immigration flows in the coming decades.***

Two concepts in demography are crucial to frame this discussion:

1. the replacement birth rate or **replacement rate**, defined as the number of live births per woman that results in a long-run stable population (this number is 2.1). If a country's fertility rate falls below the replacement rate, with net-zero migration the population will shrink year-on-year.
2. the **dependency ratio**, defined as the ratio of economically dependent members of a population (younger than 15 or older than 64) to economically productive members of a population (15–64, working age). The dependency ratio summarizes a country's labor market needs—as it rises above 1, pension outlays, demand for caretaker and healthcare services, and labor shortages in certain sectors will also grow.

These two concepts are important to interpret the data and discourse concerning fertility-related risk and fertility-affecting policy.

# GLOBAL FERTILITY TRENDS

Global population projections are underpinned by the **demographic transition model**, which envisions the trajectory of a population in four phases as elaborated in Figure 1.

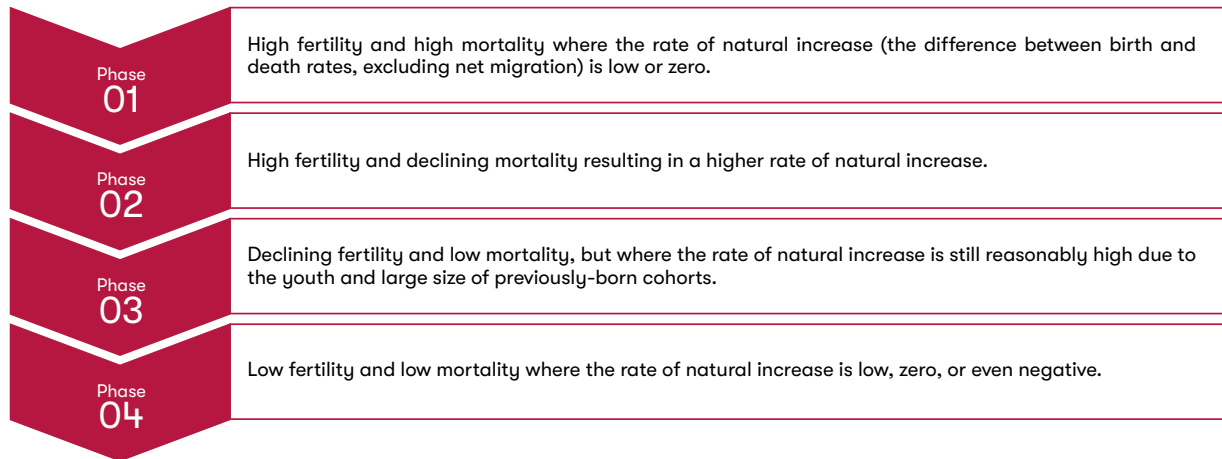


Figure 1: Demographic Transition Model

Broadly speaking, the world is in the third phase, but this disguises significant heterogeneity: some countries are in the second phase, while others are in the fourth.

The demographic transition model is also limited by its lack of a definite unit of analysis. One could speak of demographic transition at the level of the entire world, of continents, of regions, of countries, of ethnic groups, of subnational divisions, or of even smaller clusters. Policymakers must be aware that the selection of just one unit of analysis may mask significant heterogeneity, which might make the sources of future growth unclear. For example, describing the world as “in the third phase” does not tell us anything about the geography of demographic transition, which is the pertinent question when assessing where immigrants might come from and where they may be needed.

Furthermore, the speed at which a population will shift between these phases is uncertain—population projections are inherently probabilistic. The UN offers a low-fertility variant and a high-fertility variant of its **projected global populations by 2100**, with a difference of over 7.3 billion people

between the two variants.

According to the UN’s 2024 World Fertility Report, the global fertility rate stands at **2.2** (just slightly over replacement). The UN’s World Population Prospects for 2024 suggests that the global population is likely to peak at **10.3 billion** in the 2080s before slowly declining to **10.2 billion** by 2100 as the global fertility rate likewise falls to **1.8**. While the pace of this decline is uncertain, the UN has **high confidence** that the global peak population will be reached this century because fertility rates are **unlikely** to recover to above replacement within the next few decades. This is because most future population growth **depends** on present-day youth, as in the third phase of demographic transition. In other words, a great deal of projected growth is already ‘baked-in’ by the childbearing decisions made by previous generations.

At the national level, net migration and changes in life expectancy will be the **primary contributors** to demographic outcomes apart from this preordained structural constraint. For **62 countries**, immigration will be the leading contributor to population growth through 2100.

**As of 2024**, all the countries in Europe, North America, and most of South America and the Caribbean have undergone fertility transition—the shift to below-replacement birth rates. Above-replacement countries in the Americas (concentrated in Central America and the Caribbean) will undergo fertility transition **by 2054**. As the century progresses, new births will be concentrated in shrinking oases surrounded by a global fertility desert (Fig. 2).

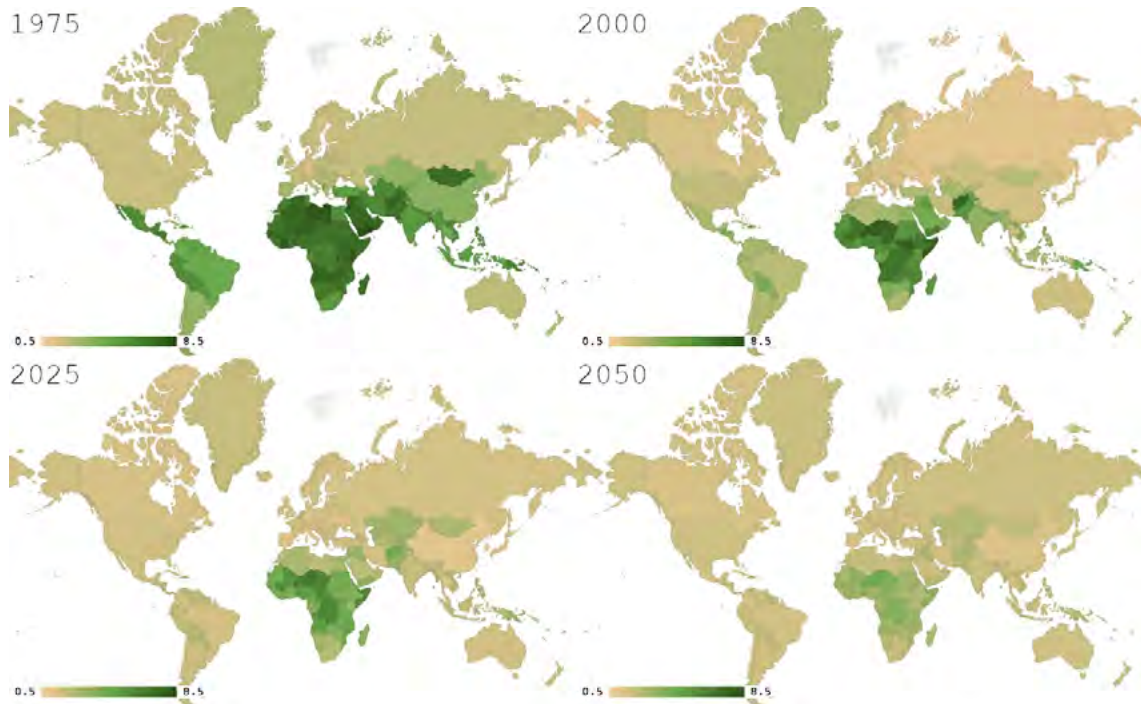


Figure 2: Global Fertility Desertification, 1975–2050

### MACROECONOMIC CONSEQUENCES OF DEMOGRAPHIC DECLINE

The macroeconomic consequences of demographic decline in Europe and the United States are concentrated in fiscal challenges posed by growing pension obligations and labor market shortages in sectors where either supply will shrink (lower-compensated sectors) or demand will expand (those growing with aging populations).

As the number of old-age dependents rises, and if pension outlays remain level, higher claims on working-age income will be necessary to finance benefits. A smaller share of the population will be responsible for a larger volume of transfers. Furthermore, the average hours worked per week will begin to fall because non-working retirees will make up a larger share of the population.

A dwindling labor force will render marginal labor more valuable, allowing high-productivity services to grow at the expense of lower-productivity primary and secondary sectors, which may be unable to offer the remuneration

necessary to attract labor. All else equal, workers unable to transition into these faster-growing sectors will experience relatively slower wage growth, accelerating income inequality. Furthermore, strategic sectors of the economy may be weakened. For example, without concomitant automation, a shrinking agricultural labor force may imperil food security while an inability to extract certain rare earth minerals could have upstream implications for both energy security and defense industrial bases.

Without adjustments—such as changes to immigration policy—output growth is **likely to slow** as a result. Immigrants engage with host economies in a variety of ways (see Policy Brief #2), but a narrow model is sufficient to intuit the relationship between immigrant labor and the macroeconomy of demographic change. Roughly speaking, the contribution of labor alone to economic growth is driven by the following variables:

1. The proportion of the population in the labor force (*labor force participation*)<sup>vi</sup>
2. The average hours worked per worker for each age (*labor intensity*)
3. The number of people in each age group (*age mix*)
4. The average value of output produced for each hour worked (*productivity*)

**Labor force participation** not a primary concern for this brief—even in countries that currently have low youth labor force participation, demographic decline presages a scenario where native labor is nearly fully employed and nevertheless insufficient to arrest macroeconomic deficits. **Labor intensity** is critical because it falls with age, even prior to retirement. As a result, when a population's **age mix shifts** toward the elderly, its labor intensity experiences a secular decline. **Productivity growth**, however, can compensate for declining labor intensity caused by a shift in the age mix and has been the **chief contributor** to GDP per capita growth in recent decades.

Therefore, the negative effects of demographic decline can be ameliorated by some combination of the following outcomes:

1. Shift in the age mix toward age groups with the highest labor intensity;
2. Increase in the labor force participation of age groups with the highest labor intensity;
3. Rapid and wide dissemination of productivity enhancements.

## ROLE OF IMMIGRATION

Immigration policies affecting labor force participation and productivity will be mentioned, but this brief centers on **how immigration can shift the age structure to raise population-level labor intensity and the implications for labor market shortages and the fiscal costs of demographic decline.**

Immigration can address the macroeconomic consequences of demographic decline by increasing both the working-age population and the population of childbearing-age women (thereby increasing the working-age population in the future).<sup>vii</sup> In some countries births are **projected** to continue increasing in the coming decades because of the immigration of childbearing-age women—but this is no reason for long-run economic optimism. The circumstances still vary immensely by country, time period, and prospective immigration policy.

In some high-income countries, the quantity of immigration necessary to sustain current levels of economic growth is so large that populations would have to become nearly fifty percent foreign-born in the **next twenty-five years**. That is to say, politically infeasible levels of immigration from high-fertility countries (now largely in sub-Saharan Africa) would have to be ‘matched’ with low-fertility destination countries by some organizing authority. As Giovanni Peri **writes**:

**“There is no clear channel through which aging societies—which become economically stagnant and less innovative and whose citizens are likely to fear international migrants for the change they bring—will attract more immigrants.”**

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Expected future flows to these low-fertility destination countries (absent extraordinary policy changes) will therefore be insufficient to fill the shortfalls in growth (and in pension outlays and labor supply). High-fertility countries will not ‘rescue’ their low-fertility counterparts.

The population transfer necessary to overcome this tendency—putting aside political dilemmas—would also run the risk of robbing developing countries of their **demographic** dividend: the opportune period when productive age categories are overrepresented and surplus resources may be sufficient to redirect toward transformative social and economic ends. To sustain high-income growth rates, a large share of the youthful dividend population would have to immigrate to high-income countries, fueling debates surrounding ‘brain drain’ (see Policy Brief #2). Briefly, if an individual of any country belongs to a productive age category, there are two questions that can be asked:

**1.**

In which labor market is their productivity highest?  
(A descriptive question.)

**2.**

How ought the remuneration for their highest-productivity labor be allocated?  
(A prescriptive question.)

Youthful individuals in developing countries may be more productive in high-income countries (where they also help to arrest demographic decline). However, if none of their remuneration is allocated to their country of origin (through remittances or eventual return migration, bringing human capital home), there arises a global welfare conundrum; this conundrum becomes more acute the larger the share of a dividend population moves out of the country.

Ultimately, this brief is concerned with the way that immigration can address the macroeconomic consequences of demographic decline in Europe and the United States. However, there are bilateral implications of immigration flows. Assuming that macroeconomic challenges can be solved exclusively by immigration is both politically unrealistic and raises world welfare questions that are beyond the scope of this brief.

# LABOR MARKETS

As explained above, an aging society results in a shift in the age mix toward older ages with lower labor intensities (fewer hours worked). As a result, there are fewer hours worked in the economy overall, making the marginal hour worked more valuable. Marginal hours will accrue to the sectors that can offer higher wages—those with higher productivity (output per hour worked) like softwa-

re. Lower-productivity sectors (like agriculture) will either experience a shortage of hours, raise productivity and remuneration, or compress margins and raise remuneration.

We can see these dynamics at work in the United States. For decades before the 2008 Financial Crisis, the U.S. received large numbers of low-skill im-

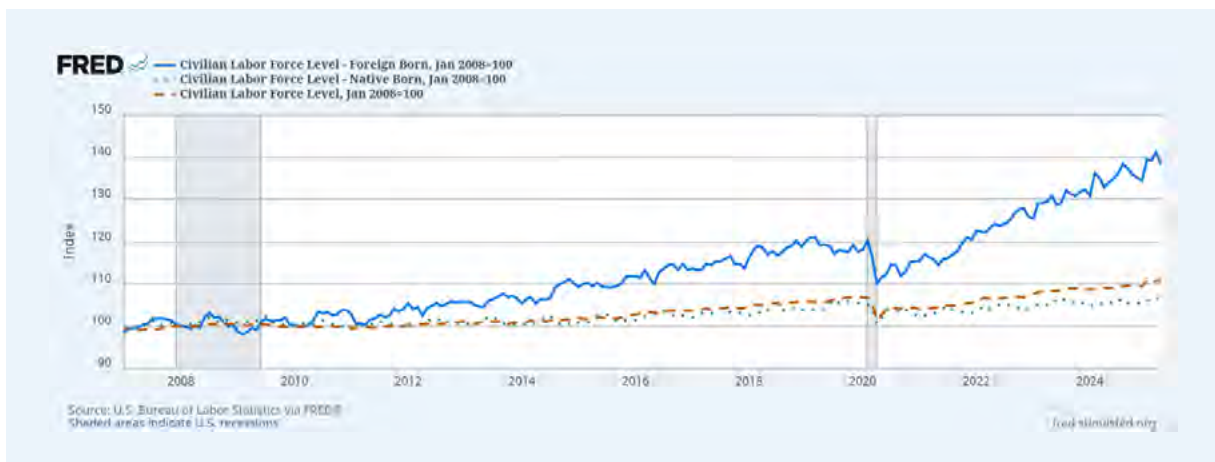


Figure 3:  
Contribution to Growth in U.S.  
Civilian Labor Force (---) by Native Born (···)  
and Foreign Born (—)  
Workers, 2007–2025<sup>viii</sup>

migrants from Mexico. As macroeconomic conditions in the United States changed and underwent fertility transition, these flows began to diminish, measurably **compressing** the wage premium to high-skill labor. Thanks to significant increases in the flow of low-skill immigration from other countries in the last decade (especially Central America and Venezuela), low-skill-intensive sectors (like agriculture or construction) have avoided shortfalls that would have forced U.S. firms to “alter their production techniques in a manner that replaces low-skilled labor with other factors of production.” At the same time, the decline in the native born working-age population has been **concentrated** among the least educated Americans. Absent alternative sources of low-skill immigration, technology will have to compensate by raising productivity or sectoral output will fall.

As shown in Figure 3, net growth in the U.S. labor force since 2008 has been driven almost entirely by growth in foreign born workers, reflecting growth across all skill levels driven by undocumented

and visa-managed flows alike. [insert data for EU or OECD]. Thus, high- and middle-income countries already (or will) find themselves in a situation where labor force growth is immigration-driven.

Status quo flows are nevertheless insufficient to resolve looming (and extant) sectoral shortages. While there are numerous policy levers available to address this problem, migration policy responses can be summarized as follows: raise the quantity of the most labor-intensive (young) workers and/or raise the labor intensity of each age category's workers.

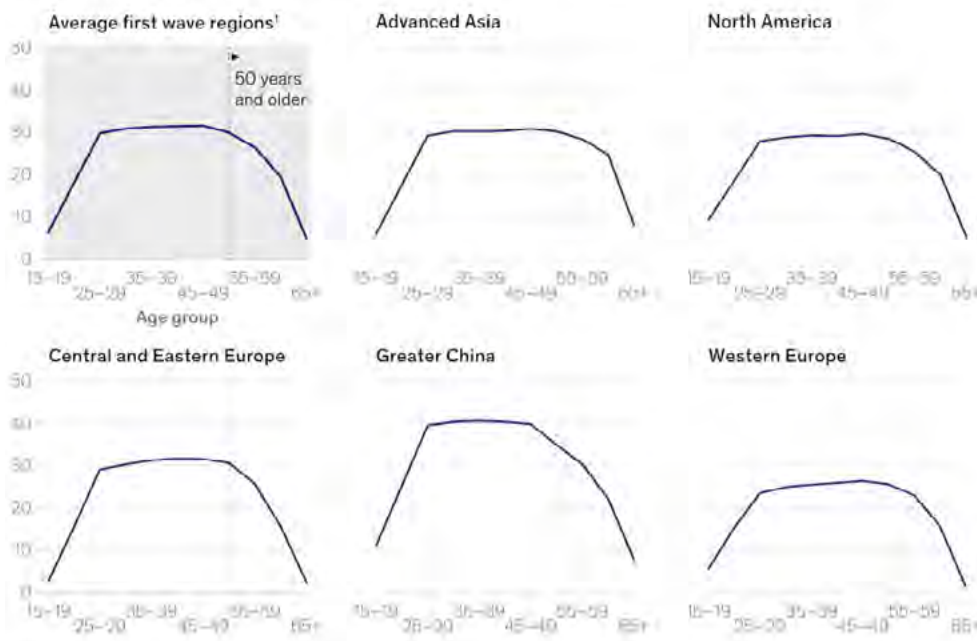
The first solution is straightforward: attract more immigrants from countries with the greatest demographic dividend. These are the countries that will add the largest share of global births relative to their share of global population—which are located primarily in Africa and Asia. By 2100, African countries will make up **38 percent** of the world's population while contributing **half** of global births. As a result, substantial shares of workers in

the most labor-intensive age categories will be African (followed by Asians and especially South Asians); it is these workers who must be attracted in order for immigration to help resolve shortfalls in demographically disadvantaged sectors.

The second solution requires some intuition. As worker ages rise, average hours worked per week fall (Fig. 4). Labor force participation accentuates this trend; for example, **German** workers 65 years and older work 2 hours per week on average because relatively few are in the labor force. The civilian labor intensity at each age (including employed and non-employed) can be raised by increasing the labor intensity of workers and/or shifting non-employed into the labor force. Migration policies – understood broadly to include both origin and destination countries – can contribute by supporting younger populations in high-dividend countries, protecting migrants in transit (see Policy Brief #3), and promoting inclusivity in the labor market (see Policy Brief #4).

### Labor intensity starts declining when workers are in their 50s.

Weekly hours per capita over a life cycle, 2023



<sup>1</sup>Year from post-1980 recession, except for the period 1980-1989, which is 1980-1989.  
<sup>2</sup>Similar to that of the year.  
<sup>3</sup>Source: ILOSTAT, Bureau of Economic Analysis, 2024. Data from ILOSTAT, Bureau of Economic Analysis.

Figure 4: Labor Intensity-Age Curves

With respect to labor intensity, consider the difference between a high-dividend country wracked by epidemics and one with the fiscal and medical resources to contain disease outbreaks and treat serious illness. If a demographic dividend is eroded by disease before the working-age population can ever migrate (or even work domestically), freedom of movement matters little. Disease-burdened populations are also likely to have lower labor intensity at every age. Thus, public health interventions abroad can be understood as part of a migration policy portfolio aimed at counteracting demographic decline.

Similarly, exposure to trauma while migrating can impinge on an immigrant's potential labor intensity at every age. Traveling through dangerous environments, transacting with dangerous firms or individuals, and facing dangerous border control measures can inflict psychological and physical costs on immigrants that reduce labor intensity (see Policy Brief #3). This is a particularly serious concern for children making these journeys. Thus, minimizing the costs imposed by the migratory process helps ensure that immigrants match or exceed an incumbent population's labor intensity as they grow older.

A related concern is **healthy aging**, which permits improved labor intensity and higher labor force participation even at the older end of a population's age mix. Healthy aging of incumbent populations, like status quo immigration, will not resolve the macroeconomic consequences of demographic decline on its own. However, the promise of healthy aging also applies to immigrants: if the peak of maximum labor intensity is extended over higher ages, the global pool of prospective immigrants that could resolve sectoral shortages becomes larger. It therefore becomes essential that immigrants have access to healthcare and other resources that enable a healthy lifestyle.

In each age category, labor force participation may be suppressed not only by disability, sickness, or caretaking, but also because of labor market discrimination. Civil rights that guarantee protection against employment discrimination on the basis of identity increase the global pool of workers available to avoid shortages. Furthermore,

changes in labor market expectations in high-dividend countries (for example, ending sex-based exclusion from the labor market) effectively increase the size of a dividend by creating more individuals with a demand for work. Broad demographic inclusivity at home and abroad raises labor force participation across the age mix, making available more workers with youthful labor intensities that can help respond to labor shortages in demographically disadvantaged sectors.

A complementary approach, which may reduce (but not eliminate) the demand for low-skill labor in Europe and the United States, is to increase productivity by lowering barriers to entry for immigrants qualified to fill higher skilled jobs, which are likely to occupy a growing share of the **future occupational structure** in Europe and elsewhere. For example, immigrant-receiving countries could develop better processes to validate immigrant credentials so that high-demand labor markets can take full advantage of the human capital actually available to them. Rather than trapping trained and educated immigrants in underemployment, credential evaluation should be improved in order to grow the pool required of a higher-skill occupational structure.

Furthermore, even if productivity growth resolves shortages and sectoral outputs remain steady, there may be reasons to expand output in what would still be relatively low-productivity sectors. For example, in countries with chronic housing shortages, low-skill immigration could help build the houses necessary to end the shortfall. Productivity growth and low-skill immigration can be complementary, and policymakers may desire large expansions in low-productivity sector output that cannot be achieved with growth in only one of these variables. Political barriers to large-scale low-skill immigration could be allayed through **circular migration** (see Policy Brief #3), whereby immigrants work temporarily in a destination country (e.g., during a harvesting season) before returning to their country of origin.

# PENSION SYSTEMS

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A country's overall dependency ratio (capturing the volume of young and old dependents) will be high in the second phase of demographic transition due to a youthful surplus (below 15 years old) that will eventually age and shift the ratio down in the third phase. Finally, in the fourth phase of demographic transition, the ratio will rise again—now as a result of a larger old-age population.

The old-age dependency ratio (capturing only growth in 65+ year-old population relative to working-age population) rises consistently through demographic transition, while the overall dependency ratio fluctuates (Fig. 5). Old-age dependency illustrates where the need for public saving support is growing, but overall dependency illustrates both this shortage and the countries with demographic dividends that could supplement declining working-age populations abroad.

As a country undergoes fertility transition, **working-age saving rises** due to reduced childcare spending. At the same time, the age mix shifts toward age categories that consume working-age public and private savings. Pensions fall under the category of public savings.

Most pension systems are defined benefits, meaning that transfers “depend on the number of years of contributions and the individual’s earning history,” and a majority of defined benefits systems are pay-as-you-go, meaning transfers to the current old-age population are financed by taxes on the current working-age population. Without raising taxes, conditioning or reducing outlays, or altering the age mix, the fourth phase of demographic transition model requires that pension outlays to the future old-age population mechanically decline relative to the current old-age population as the old-age dependency ratio rises and benefits are financed by a smaller share of working-age individuals. For instance, G-20 pension outlays will grow by **7 percentage points** between 2019 and 2050.

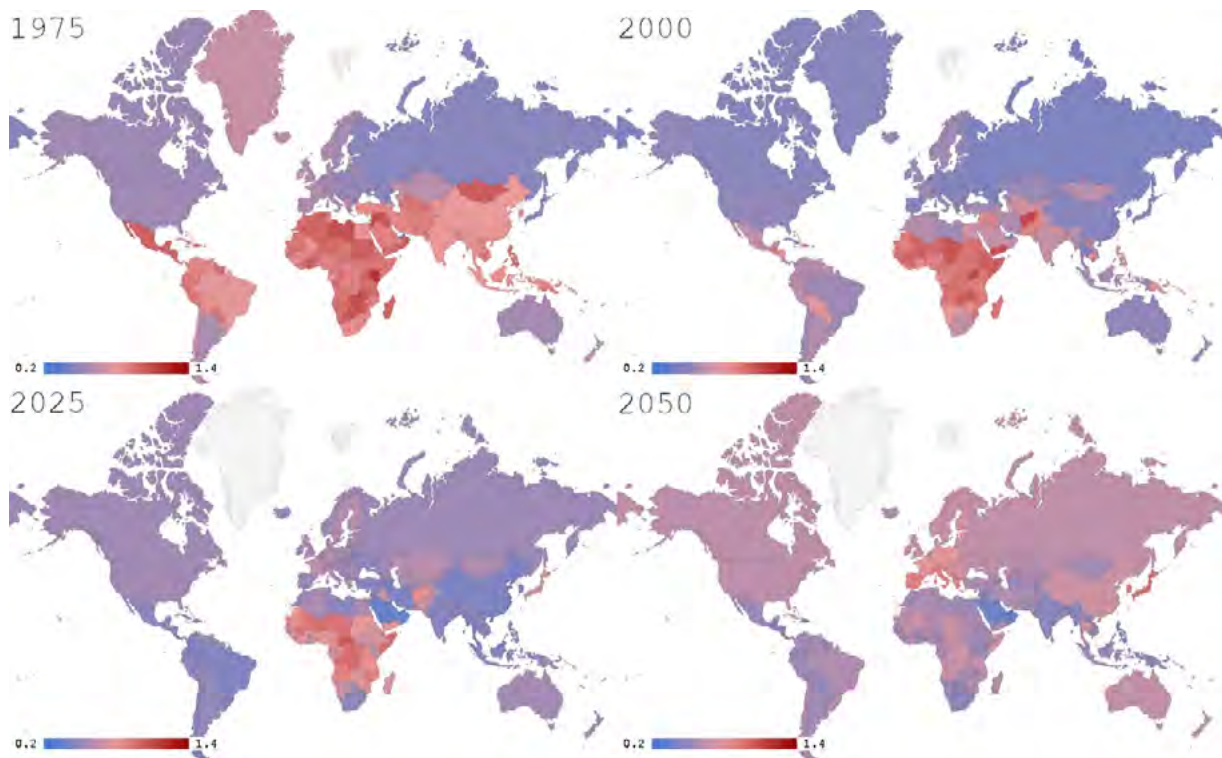


Figure 5: Global Dependency Ratios, 1975–2050

Immigrants at peak-labor intensity ages shift the age mix toward ages that are financing current pension outlays. Nonetheless, sustaining pension outlays with immigration may be difficult. For example, the 2024 Old-Age, Survivors, and Disability Insurance Trustees’ Report calculated the long-run cost rate (ratio of program cost to taxable payroll) for the U.S. social security system under three different average annual net immigration scenarios. Only modest improvements were **identified**: the long-run cost rate under a low-immigration scenario stood at 17.75 percent compared to 16.87 percent under a high-immigration scenario.

In theory, a sufficiently large flow of immigrants could sustain or reduce the cost rate. In practice, the range of politically plausible flows (even under sanguine assumptions) is unlikely to fully resolve the future budgetary shortfalls of most pension plans. However, immigration can still be part of a solutions portfolio—after all, immigrants (including undocumented immigrants) **pay taxes** that finance pension outlays (see Policy Brief #2). New immigrants generally have a positive fiscal impact at the national level (including public pension outlays), but ultimately the fiscal impacts depend **largely** on fiscal policy—when outlays are high enough, no one (native or foreign born) produces a fiscal surplus over their lifetime. Overall, immigration policy of the same sort that might resolve labor market shortages can contribute moderately to pension outlay shortages. However, policymakers must keep in mind the plausibility of different immigration flow scenarios—in order for the United States to sustain the same old-age dependency ratio between 2020 and 2060, annual immigration would have to increase by **37 percent**.

# CONCLUSION

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Demographic projections are characterized by uncertainty. Annual euro area population growth will turn negative by **2035**, but with immigration flows 33 percent higher than baseline estimates, growth would remain positive until **2050**. Annual Canadian immigration of 0.3 percent of population implies a 2046 population of about 40 million, while 1.8 percent of population implies a 2046 population of over 60 million. Likewise, the U.S. Census Bureau assesses a difference in population size of nearly 40 million people between low and high immigration scenarios by 2050. Meanwhile, net migration from Mexico to the United States seemed to have zeroed out in **2012**, and while Mexicans were the largest category of U.S.-bound immigrants in **2022**, the Mexican-born share of the population has fallen in the last decade.

Populations in high-income countries may stagnate or grow depending on the magnitude of immigration flows, and the origins of those flows are likely to shift depending on policy changes in sending and receiving countries. Latin America, passing through fertility transition, may not send as many immigrants to the United States; intra-European immigration between low-fertility countries may fall; and African and Asian countries may become major origins of immigration flows for high-income counterparts or even, in the future, increasingly low-fertility middle income countries. At the same time, immigration skepticism could truncate flows or even result in mass deportation. Just as this brief has discussed the possibilities of increased immigration to fulfill fiscal and economic shortfalls, removal of the incumbent population would have the precise opposite effect. The model tying together demographic transition, dependency, and labor-driven growth can be reversed to intuit these results.

Under a supranational regime, the surplus savings from countries in fertility transition might be directed to high-dividend countries whose surplus youth might, in turn, be directed to low-fertility countries where their remuneration is high enough to shore up fiscal deficits and send remittances to their countries of origin. In theory, this could accelerate convergence between low- and middle- and high-income countries by the end of the century.

But no such supranational regime exists in a world dominated by sovereign states. Thus, achieving an equitable and sustainable solution to these demographic challenges will require global and regional partnerships among low-fertility and high-dividend countries.

These partnerships will only be effective, however, if they are informed by a data-driven understanding of what is at stake.

- In low-fertility countries, policymakers need to recognize the potential contribution of newly arrived immigrants to labor markets and fiscal obligations at risk from demographic decline while pursuing complementary policies to sustain growth.
- In high-dividend countries, policymakers need to weigh the short-term benefits of migration (e.g., remittances) against the longer-term benefits of investing in opportunities for young people to build successful lives at home – investment that is likely to require support from the wealthier (low fertility) countries.

If managed properly and combined with effective domestic policies, these partnerships could produce the win/win outcome of sustainable growth in the rich countries and rising incomes in the poorer ones as the world makes the global fertility transition.

# ENDNOTES

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<sup>i</sup> **Gallup**; author calculations. Note that Gallup's findings cannot be trivially generalized to the whole OECD because some of the prospective migration reflects intra-OECD movement. This, however, is a minority share.

<sup>ii</sup> **For intuition**: if the average number of live births is  $>2$ , so long as there is no out-migration and a low death rate each pair of parents is replaced by another pair ensuring a long-run stable population. The rate is  $>2$  and not exactly 2 to compensate for unbalanced sex ratios and women's and girls' deaths before childbearing. Slightly higher birth rates of boys than girls require the replacement rate to be  $>2$ —otherwise, the sex ratio would grow so unbalanced that a population would not be able to reproduce itself. 105 men to 100 women can be compensated by a fertility rate of 2.05, but the rate must be significantly higher if the ratio is 500 to 50 because only 50 women would have to give birth to 550 individuals. Similarly, deaths before childbirth require some women to have more than 2 children for their generational cohort to be fully replaced. In societies with high levels of childhood mortality the replacement rate may be significantly higher because fewer girls survive to childbearing age and so would have to give birth to many more children to maintain demographic stability. 2.1 is an estimate that takes into consideration the unbalanced sex ratio, but also assumes a low death rate. None of this is prescriptive, but merely a description of the rates of childbirth required to maintain a stable population under different circumstances.

<sup>iii</sup> **For intuition**: a dependency ratio of 0.5 means that there are 2 working-age people for each dependent within a population; a dependency ratio of 1 means that there is 1 working-age person for each dependent within a population; and a dependency ratio of 2 means that there are 0.5 working-age people for each dependent (or 1 working-age for 2 dependents) within a population. The dependency ratio, as defined by international statistical agencies, is not modified by a country modifying its retirement age, which should condition the interpretation of each country's dependency ratio. Two countries may have the same size population and the same dependency ratio—but if one has a retirement age of 64 and the other a retirement age of 70 the ratio fails to capture the larger number of working people in the latter case and is less informative as a result.

<sup>iv</sup> Author calculation, to replicate at UN source: File Type - "Standard Projections (Estimates and Projection scenarios)"; Major Topic/Special Groupings - "Most Used"; Files - "**Complete (estimates and all projection scenarios) (XLSX)**" [direct link to download]; Coordinates - High Variant (sheet 3), row 94 and Low Variant (sheet 4), row 94.

<sup>v</sup> **World Bank Databank**, *population estimates and projections* (Country: all; Series: "Fertility rate, total (births per woman)"; Time: 1975, 2000, 2025, 2050).





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