Global Saving in 2030

Whether saving is a serious impediment to growth in developing countries has long been an issue of concern. In the late 1960s, developing countries saved only 18 percent of their income, and low-income economies only 13 percent, compared with 21 percent in high-income economies. Given developing countries’ limited ability to attract foreign saving, it was felt that inadequate domestic saving constrained investment, and thus growth, necessitating large transfers from high-saving rich countries. Whether saving was the primary constraint on development can still be debated, but the situation has changed dramatically. Developing countries’ domestic saving averaged 32 percent of their income in 2009, while the rate in developed countries had fallen to 17 percent. This sharp increase in saving rates among developing countries has not laid to rest the concern that inadequate saving may limit their growth prospects, however, because aging populations may put downward pressure on their saving rates in the coming decades.

A conclusion of this chapter is that despite the tendency of population aging to lower saving rates, saving is unlikely to be a binding constraint on global growth. Although this conclusion applies at the global level, there will be clear disparities in saving rates across countries and regions and some of them may face difficulties in the future.

The main messages of the chapter are as follows:

- Changes in saving rates in developing countries over time will be driven by three main factors: aging populations, economic growth rates, and the deepening of financial markets. The aging of populations in much of the developing world will put downward pressure on household saving rates. However, aging will also make (young) labor scarcer with respect to capital, raising real wages relative to the return to capital. This shift in relative factor prices will entail a redistribution of income from asset holders, who tend to be older and thus have lower saving rates, to workers who tend to be younger and thus have higher saving rates, contributing to mitigate downward pressure.

The higher economic growth rates in developing countries will also encourage saving. Indeed, a scenario of gradual convergence between the developed and developing worlds in terms of income and structural change assumes that, for a large group of developing countries, growth rates will continue to increase up to around 2020, when they will stabilize and then slowly decelerate. For some countries, notably in Sub-Saharan Africa, growth rates are projected to follow an increasing trend through 2030. These accelerations of growth are even stronger in a scenario where the productivity gap between high-income countries and the developing world closes more rapidly. These positive changes in the pace of growth boost saving and partially offset the drag from the increasing share of old people.

Other growth-related mechanisms will also play a role. Longer life expectancy may have the effect of increasing saving to finance additional years of education and retirement. In turn, the increased number of better-educated workers with steeper age-earnings profiles will also tend to increase saving rates. Moreover, higher incomes are associated with fewer children
and greater female labor force participation, increasing the potential for saving during workers’ most productive years.

Financial deepening in developing countries is found to put downward pressure on saving rates. Specifically, financial development can relax liquidity constraints and thus reduce the need for saving by individuals and firms with high-return investments. Financial deepening reflected in the greater availability and use of insurance and pension arrangements can also reduce the need for precautionary saving. But financial deepening is also associated with a more efficient allocation of capital, and thus with higher growth in incomes, which would tend to support saving. This complex interaction among aging, growth, and financial deepening can be expected to result in a slight decline in developing countries’ average saving rate, from a peak of 34 percent in 2014 to 32 percent in 2030.

- **The evolution of saving will differ significantly by region.** In two regions—East Asia as well as Eastern Europe and Central Asia—downward pressure on saving rates due to rapid aging will be at least partially offset by rapid growth, so that saving rates will not fall by as much as in high-income countries. In Indonesia, for example, the old-age dependency ratio will increase at as rapid a pace as in high-income countries between 2010 and 2030, but its saving rate will fall only from 32 percent to 31 percent (under the gradual scenario), in contrast to the expected decline in high-income countries’ saving rate from 18 percent to 16 percent. Some of this difference reflects changes in structural variables such as financial sector depth and the size of social security systems, but mostly it is due to Indonesia’s higher growth rate. At the other end of the demographic spectrum, Sub-Saharan Africa’s relatively young and rapidly growing population, coupled with its increasing growth due to productivity catch-up, will make it the only region where the saving rate does not fall during the time horizon considered here.

- **The rise of developing countries will support global saving rates.** Developing countries will experience rapid growth in output, rapid population growth in regions with relatively young populations, and relatively high saving rates between 2010 and 2030, while high-income economies will experience slower growth and declining saving rates. By 2030, developing countries will contribute 62 of every 100 dollars of total world saving, up from 45 in 2010. The shift in economic weight to relatively high-saving developing economies will counterbalance the contraction of saving in high-income countries. Developing countries’ rapidly growing share of global saving implies also that their share of global wealth will also rise, albeit more slowly.

- **Saving in developing countries appears to be concentrated among high-income households.** Although the concentration of saving (and of wealth) within a small segment of a country’s population has the possibility to support growth by encouraging financial deepening, concentration also has somber implications for economic mobility and thus for the political and social consensus essential for growth. Not only do high-income households tend to save a greater proportion of their incomes than low-income households, but they also account for the bulk of saving in countries at various stages of development and demographic transition. In countries with high economic mobility, the relationship between low saving and low income could reflect efforts to smooth consumption by households experiencing temporary income losses. Unfortunately, a similar correlation is observed across households grouped by educational attainment—a proxy for permanent income and thus a more stable condition than the position in the income distribution at a point in time. Consistently, the least educated groups in a country have low or no saving, suggesting an inability to improve their earning capacity and, for the poorest, to escape a poverty trap. Policy makers in developing countries have a central role to play in boosting private
saving through policies that raise human capital, especially for the poor.

- Changes in household structure will increase the importance of financial markets in providing for income support during old age. As incomes rise, household size tends to fall because workers are more geographically mobile and older individuals are more able to live independently on their accumulated savings. Alongside this reduction in household size tends to come a profound transformation of the old-age support structure—from an informal, multigenerational household system to more formal private pension or public social protection systems. Reliance on privately financed pensions rather than household saving and wealth during old age has the potential to improve welfare if the elderly and their children all prefer to live separately. Another benefit is that using private financial markets to intermediate pension savings can increase financial depth and contribute to development. However, shifting from dependence on the income of family members to dependence on financial institutions also underlines the importance of strong regulation to limit fraud and excessive risk taking by financial intermediaries.

- Demographic change will challenge the sustainability of public finances. In developing countries experiencing a large increase in the share of their populations past working age, budgets will be strained by mounting pension and health-care costs. The shift in the composition of public expenditure toward old-age-related items, though, will be offset only marginally by the reduction in education spending expected in the face of aging populations. Furthermore, the scope for decreases in non-age-related expenditures is limited. Complex policy challenges will arise from efforts to reduce the burden of health care and pensions while limiting the decline in benefits and services. Working through these challenges will be necessary to ensure the sustainability of public finances without imposing severe hardships on the old.

### Saving at the aggregate level: Past, present, and future

#### Saving has increased in developing countries

A large portion of global saving now originates in the developing world. This is quite a recent observation, however. For the two decades from 1980 to 2000, developing countries’ saving amounted to a fairly stable ratio of around 4 percent of world income (figure 2.1). That ratio increased sharply since 2000, however, to more than 9 percent by 2009, while total saving by high-income countries fell from 18 percent to 12.5 percent of global income over the same years. The rapid rise in developing countries’ saving has sustained global saving rates in the face of declines in high-income countries. A notable follow-on effect of the increase in saving in developing countries is that they account for a growing share of global wealth (discussed in box 2.1).

The growth in developing countries’ contribution to the global pool of saving can be decomposed into two parts: (a) the size of their economies relative to the global economy and (b) their saving rates. Looking at changes in developing

![FIGURE 2.1 Developing countries have accounted for a growing share of global saving since around 2000](image-url)

*Source: World Bank calculations using data in the World Bank World Development Indicators database.*

*Note: Shaded area corresponds to the period from 2000 onward, where a regime shift in developing countries’ total saving appears to have occurred (a simple linear regression of developing countries’ saving rates on time in the 1965–99 period is $S = 0.000t − 1.464$, while that for the 2000–09 period is $S = 0.002t − 47.369$, where $S$ and $t$ correspond to developing countries’ total saving and the year, respectively).*
have increased total saving in developing countries by 1.5 percent of global income, while another increase of 1.9 percent was directly due to changes in economic size.

Saving in developing countries has risen sharply from the levels of some 50 years ago. Developing countries as a group saved 18 percent of their income in the 1960s, and low-income countries only 13 percent, compared with 21 percent in high-income countries. These low saving rates were viewed as a major constraint on investment and thus on future growth. Other factors such as uncertain policy environments, poor infrastructure, and undeveloped financial systems also hindered investment and at the same time reduced incentives to save.

But much has changed since the 1960s. The past three decades in particular have seen impressive policy improvements and large increases in growth, saving, and investment. Saving had risen to almost a third of developing countries’ income by 2009, despite some decline during the global financial crisis (figure 2.3). Conversely, aging populations have put significant downward pressure on advanced economies’ saving rates. The ratio of developing-country saving rates to those in high-income countries rose steadily from 0.9 in 1980 to 2.0 in 2009.

As in the case of investment, much of the increase in saving by developing countries is attributable to China, though other large emerging economies, such as India and Indonesia, have made significant contributions as well (figure 2.4). The path of saving rates has differed substantially across major developing economies: India’s saving rate has increased steadily; Brazil showed a slowly increasing trend in saving until the peak in 1989 and a distinct downward trend thereafter; and the Russian Federation’s saving rate has been erratic since the dissolution of the Soviet Union.

**Saving trends in China, in particular, have received considerable attention in both policy circles and academic literature.** China is notable not only because of the large size of its saving pool and its high saving rate but also because the composition of saving is broad: China’s household, corporate, and government saving have all
has been concentrated in high-income countries, but middle-income countries have seen significant deepening since the early 1990s as well (Beck, Demirgüç-Kunt, and Levine 2010).3

Regional saving trends among developing countries indicate that the recent rise in saving has been mainly due to increases among countries in East Asia and the Pacific, the Middle East and North Africa, and South Asia. This rise in saving has been concomitant with significant external surpluses (owing to robust exports of manufactured goods and energy), although, notably, in South Asia the rise has occurred even in the presence of small deficits.

Within regions, too, there is significant diversity in the level and trend in domestic saving. Typically, saving rates tend to be lower in low-income countries (figure 2.5). In East Asia, for example, the region’s relatively high overall saving rate—averaging 24 percent between 1980 and 2010—masks much lower rates of saving among low-income nations, although saving rates among countries in income groups in East Asia have risen over time (figure 2.5, panel a). In times of crisis, such as during the Asian financial crisis of 1997–98 and the global crisis of 2007–09, saving rates actually dropped because incomes fell and debt was incurred to smooth consumption.

Another key factor is the relatively unbalanced pattern of financial market development in China; households and small and medium-size enterprises often face tight credit constraints, so they must save to self-finance, while state-owned enterprises typically have easy access to credit. But perhaps the most important factor behind China’s high level of saving in recent decades has been its high rate of economic growth, which tends to push up saving rates.

Although the forces at work in driving up saving rates in China apply to many developing countries, nowhere is the impact of the forces as acute as it is in China; in fact, in much of the developing world, one or more of the characteristics clearly observable in China is absent. For example, Sub-Saharan Africa is at an earlier point in the demographic transition than other developing regions, and the transition is proceeding more slowly than it did in other regions. Also, financial systems have deepened worldwide; this

---

**FIGURE 2.4** The paths of saving rates have differed substantially across major developing economies


---

seen large increases. The literature points to several factors in the increasing saving rate, including the following:

- Chamon and Prasad (2010) identify the rising private burden of housing, education, and health care expenditures as well as increased precautionary saving as important drivers of a seven percentage point increase in the urban household saving rate between 1995 and 2005.
- Ma and Yi (2010) focus on the rapid increase in the working-age share of the population, the structural shift from agriculture and corresponding urbanization, tough corporate restructuring, a shrinking social safety net, and transition to a partially funded pension system.
- Wei and Zhang (2011) emphasize competitive saving by parents with sons to make them more attractive for marriage given a skewed gender ratio in the population.
- Curtis, Lugauer, and Mark (2011) show that China’s changing age distribution appears to be an important factor when a bequest motive for saving is taken into account.

The literature points to several factors in the increasing saving rate, including the following:

- Chamon and Prasad (2010) identify the rising private burden of housing, education, and health care expenditures as well as increased precautionary saving as important drivers of a seven percentage point increase in the urban household saving rate between 1995 and 2005.
- Ma and Yi (2010) focus on the rapid increase in the working-age share of the population, the structural shift from agriculture and corresponding urbanization, tough corporate restructuring, a shrinking social safety net, and transition to a partially funded pension system.
- Wei and Zhang (2011) emphasize competitive saving by parents with sons to make them more attractive for marriage given a skewed gender ratio in the population.
- Curtis, Lugauer, and Mark (2011) show that China’s changing age distribution appears to be an important factor when a bequest motive for saving is taken into account.

Another key factor is the relatively unbalanced pattern of financial market development in China; households and small and medium-size enterprises often face tight credit constraints, so they must save to self-finance, while state-owned enterprises typically have easy access to credit. But perhaps the most important factor behind China’s high level of saving in recent decades has been its high rate of economic growth, which tends to push up saving rates.

Although the forces at work in driving up saving rates in China apply to many developing countries, nowhere is the impact of the forces as acute as it is in China; in fact, in much of the developing world, one or more of the characteristics clearly observable in China is absent. For example, Sub-Saharan Africa is at an earlier point in the demographic transition than other developing regions, and the transition is proceeding more slowly than it did in other regions. Also, financial systems have deepened worldwide; this
Private saving in several major developing countries (notably China and India) is atypically high and has actually grown relatively faster than household saving in recent years (figure 2.7). Theory suggests that corporate saving is negatively related to cash flow (Riddick and Whited 2009), which in turn suggests that external financing constraints—which could result from financial development not keeping pace with growth—may be responsible for the recent rise in corporate saving in these economies. As the financial sectors in China and India mature, however, this tendency for high corporate (and hence private) saving will likely diminish.

Public saving does not show such an obvious long-term trend. Although it has fluctuated to some extent, the public portion of national saving has remained roughly in the range of 10–20 percent of national saving in developing countries over the 30-year period 1981–2011 (figure 2.8). The notable exception was during the years leading up to the global recession in the late 2000s, when public saving exceeded 25 percent of national saving from 2006 through 2008 before quickly returning to historical levels in 2009.

The trend in public saving for the entire world has followed a path roughly the same as that of developing countries over the past three decades,
**FIGURE 2.6** Household saving varies significantly by region

- **a. East Asia and Pacific**
- **b. Latin America and the Caribbean**
- **c. Middle East and North Africa**
- **d. South Asia**
- **e. Sub-Saharan Africa**


Note: Shares are the unweighted average of household saving as a share of national saving across countries in the region, reported only for years in which data are available for enough countries to account for at least 40 percent of the region’s gross domestic product.

**FIGURE 2.7** Corporate saving in China and India has grown faster than household saving in recent years

- **a. China**
  - Government
  - Enterprises (corporations)
  - Households
- **b. India**

Sources: World Bank calculations using data in the ACMR All China Data Center database (China) and CSO National Accounts database (India).

a. For China, 2009 household and enterprise saving are imputed from their respective 2008 shares of 2009 total private saving.
b. For India, 2007 data are provisional and 2008 are estimates, and household saving is defined as the sum of household financial saving and household physical saving.
c. The use of the terms “enterprises” and “corporations” are retained from the original data sources (“enterprises” for China, and “corporations” for India).
although public saving in developing countries typically accounted for a greater share of total saving than in high-income countries until the late 1990s, and public saving fell more sharply for developing countries than for high-income countries during the early-2000s global recession.

It remains an open question whether the global financial crisis interrupted what would have been a sustained upward shift in governments’ role in saving and capital formation (perhaps due to greater infrastructure investment in developing countries) or whether the ramp-up was a short-run phenomenon. Regardless of which description of the precrisis years is more accurate, it is clear that any upward trend in public saving in the coming decades is likely to be offset by significant pressure from aging populations on public health care and pension expenditures.

Although stocks of wealth evolve much more slowly than output, saving, investment, and capital flows, developing countries’ rapidly growing shares of these flows will gradually accumulate into a growing share of global capital and international investment positions (for more details on the recent evolution of the global distribution of wealth, see box 2.1).

**Growth, demography, and financial development will drive changes in the global pattern of savings**

A key objective of this report is to provide a preview of world saving for the next two decades. A definitive theory of saving unambiguously identifying its determinants is not yet available (for a recent survey, see Attanasio and Weber 2010). However, there is broad consensus that economic growth, demographic transition, and certain structural variables such as financial sector development affect saving. Theoretical models as well as reduced-form empirical equations show the relevance of these variables.

For example, the importance of income growth and changes in the age structure due to population growth are central in explaining saving behavior in the life cycle (Modigliani and Brumberg 1954) and permanent income (Friedman 1957) models. These models remain common benchmarks against which saving behavior is evaluated. More recent models consider how the stock of wealth can serve as a precautionary buffer against unexpected shocks (Carroll 1997) and how uncertainty about future income may influence saving at the household (Weil 1993) and firm (Riddick and Whited 2009) levels, especially absent complete markets for risk insurance (Aiyagari 1994). Increased longevity can potentially raise saving rates at all ages (Bloom, Canning, and Graham 2003; Kinugasa and Mason 2007). Thus, if increased growth and improvements in longevity happen together, this effect would reinforce the positive impact of growth on saving.

Structural changes in developing countries can alleviate uncertainty and informational asymmetries and contribute to moving toward more complete markets. For example, financial development can relax liquidity constraints and hence affect saving activity (Deaton 1991; Jappelli and Pagano 1994). At the same time, presence (or absence) of social insurance mechanisms can also condition
how much households in a country choose to save (Hubbard, Skinner, and Zeldes 1995).

The scenarios for the future of world saving are constructed using a global dynamic computable general equilibrium (CGE) model that includes a saving equation whose determinants are per capita income growth, demography (aged dependency), financial development, social protection, and past saving rates. Following standard practice, this equation is calibrated using observed data and

**BOX 2.1  A gradual shift in the global distribution of wealth is under way**

The rise in savings rates in developing countries relative to high-income countries has resulted in an increase in developing countries’ share of global wealth (the accumulation of national saving over time). The growing importance of developing countries is most evident in terms of external wealth holdings: the emerging world saw rapid reductions in negative external positions in the 1990s and early 2000s (Lane and Milesi-Ferretti 2007), which have since become positive and continue to grow. Despite the fact that distributions change at a glacial pace, there was a noticeable shift in the global distribution of national wealth in the 15 years between 1992 and 2007, in both absolute and per capita terms.

Figure B2.1.1 shows, in panel a, the global intercountry distribution of wealth per capita in 1992 and 2007, along with, in panel b, the difference between the two when the 1992 mean is preserved to show the change in the shape of the distribution independent of the shift in the global average. That the distribution shifted to the right means that the world became wealthier in real terms. The bimodal pattern of the distribution in panel a is indicative of the presence of two clubs of countries: the change in the peak on the left, which became slightly higher in 2007, reflects the fact that a number of previously poor countries (such as China, the Dominican Republic, and Namibia) amassed assets and became middle-income countries. The change in the peak on the right, consisting of moderately wealthy high-income countries, fell as rapid growth in per capita wealth (in economies such as Hong Kong SAR, China; Luxembourg; Norway; and Singapore) meant that they moved from the right peak to the right tail of the distribution. There was thus an increasing gap between the wealthiest high-income countries and those around the right peak—for example, Gulf States and southern European countries, respectively.

Most of the world’s stock of wealth remains entrenched in high-income countries. Recent analysis of household wealth by Davies et al. (2011), for example, shows that North America, Europe, and high-income Asia-Pacific countries account for 90 percent of global wealth. Among developing countries, wealth tends to be held in nonfinancial assets, such as housing and land (Shorrocks, Davies, and Lluberas 2010). The continued concentration of wealth in high-income countries, however, has been accompanied by marginal progress toward more equal distribution of national wealth per capita among countries of different income levels over the past 15 years. When countries are weighted by their populations, the Gini coefficient fell from 0.77 in 1992 to 0.74 in 2007. This moderate convergence in national per capita wealth can be expected to continue, albeit gradually, in the future as developing countries account for a growing share of global output, saving, and investment.

---

a. Net international investment positions are available from the International Monetary Fund’s International Financial Statistics (http://www.imf.org/external/data.htm). It should be noted that China’s position constitutes a large part of the developing-country aggregate.

b. Milanovic (2005) discusses three broad concepts for measuring income inequality across countries. In principle, these can also be applied to wealth inequality. Intercountry inequality is based on giving each country’s per capita wealth equal weight in the world distribution. International inequality takes into account the relative sizes of countries, weighting each by its population. Global inequality takes within-country inequality into account, measuring the distribution across individuals regardless of their nationality (see, for example, Bourguignon and Morrisson 2002). The global inequality approach is plagued by data limitations. The international inequality approach gives a good picture of what is happening at the global level, but the results can be dominated by one or two large countries (in the case of developing countries, China and India appear as two spikes that dominate the distribution).

c. The population-weighted Gini measure of international inequality was calculated by assigning each country’s average per capita wealth to each of its residents and taking the Gini coefficient of the resulting global distribution. Over the same period, the unweighted (intercountry) Gini rose from 0.66 to 0.68, indicating that the result on international inequality depends in large part on changes in populous developing countries such as China and India.

(continued)
elasticities obtained from econometric estimations. Measuring global saving, accounting for the general equilibrium effects of growth patterns and policy changes, and predicting the future are all difficult things to do in economics, and they can all be easily criticized. However, the main advantage of a model-based analysis is not in providing precise forecasts but in having a framework that is consistent with economic theory and that can be used to test and explain the other-things-equal effects of changes in key determinants.

The elasticities used in the CGE model are obtained from a formal multivariate econometric analysis, and graphical representations of its main results are offered in figures 2.9 and 2.10.5

As depicted in figure 2.9 (panel a), the conditional6 relationship of saving rate and per capita income growth is found to be positive. For each 10 percent increase in the rate of growth of per capita income, the national saving rate rises 0.5–1.0 percent. This fairly strong relationship goes some way toward explaining why—over the past decade during which developing countries have enjoyed robust per capita income growth—saving rates in many developing countries have also moved upward.

This positive link between saving and growth is moderated by two factors: changes in the aged dependency ratio and changes to the level of financial development, both of which have a negative relationship with the saving rate. As the financial sector develops, there is generally a downward pressure on saving; with credit more readily available in more sophisticated financial...
markets, households are more likely to draw on consumer credit to address their financing needs. Similarly, firms face a weaker incentive to retain earnings when it is easier to access capital markets to meet their working capital needs.

The negative relationship between aged dependency and saving is illustrated in figure 2.10, and it confirms a standard result of the life-cycle theory.

**Forthcoming demographic shifts will have a strong impact on global labor supply and saving**

Momentous demographic change, already under way, will be a key factor in shaping the future of global saving. Three major demographic forces must be taken into consideration: (a) an increase in the size of the population of developing countries relative to the world population, (b) change in the age structure of the world population, and (c) the asynchronicity of changes in age structure.
across regions. Together with high economic growth rates, these forces will mean that global saving will be increasingly determined by occurrences in developing countries.

The world population will grow considerably in future decades, from around 7 billion in 2010 to 9 billion in 2050 (United Nations Population Division 2011). Although the rate of population growth over this period will be far less than during the previous four decades, the addition of more than 2 billion people to the world through 2050 (an addition roughly equivalent to the current population of China, Indonesia, and the United States combined) is not inconsequential. Importantly, this increase in population will be almost exclusively due to growth within developing countries. Already, developing countries represent the main source of growth of the world population, and their contribution has steadily increased. In 1950, 80 out of 100 new people were natives of a developing country; the share increased to almost 95 percent by 2010; and from 2050 onward, developing countries will likely be the only ones contributing to the growth of the world population. As developing countries represent a growing proportion of the world economy, their saving patterns will play a larger role in shaping the overall picture of global saving.

The evolving age structure of both developing- and advanced-country populations will also have profound implications for saving rates. Typically, households go through three broad phases during the life cycle: (a) a first phase, when a household is raising young children and when its income is growing, but so are its expenditures and its investment in the education of the offspring; (b) a second phase, during which the household head and possibly the spouse reach their maximum earning potential and purchasing power; and (c) a final phase, when the main breadwinners cease participating in economically productive activities and rely on accumulated assets and pensions or other transfers to fund consumption. During these three phases, income and consumption—key determinants of the welfare of the household members—are strongly influenced by life-cycle factors such as the age and composition of the household, which may be quite different, on average, in developing versus advanced economies. In a typical household, however, the life cycle leads to a hump-shaped saving profile over time: saving rises from low or negative levels in the first phase, reach a maximum level in the second phase, and begin to decline in the third phase. This third phase thus implies that as the share of elderly people in a country’s population rises, national saving may fall.

Indeed, considerable change is under way in the structure of the world’s population. By 2021, less than a decade into the future, growth in the world’s working-age population will be exclusively determined by developing-country natives (that is, the blue line in figure 2.11 will meet the horizontal line at 100 percent). By 2050, this scenario will be quite different: each 100 working-age individuals added to the global population will be the result of 110 additional working-age people among developing country natives and 10 fewer working-age people in high-income countries. Assuming that working-age people have higher saving rates than elderly people, this growing representation of natives of developing countries in the world’s working-age population implies that developing countries will account for a growing share of global saving.

Large disparities in birth, death, and migration rates between developing and high-income countries help explain both the developing world’s growing population and the change in the world’s age structure. For any given country, the gap between death and birth rates (assuming no net migration) is the rate of population growth, while the sequencing in the reduction of these two rates—the demographic transition—determines a period of rapid population growth.

A recent phase of the demographic transition is depicted in figure 2.12 for the six developing regions. Several aspects of population dynamics in recent decades are emphasized by this figure: First, for all the regions, birth rates are still higher than death rates. Second, death rates are still falling, but they seem to be leveling off at around 10 deaths per 1,000. Finally, the difference between death and birth rates and the speed of its closing are different across developing
regions’ trends (the determinants of which are explored in box 2.2).

A somewhat complex set of mechanisms lies behind the timing of changes in the gap between a country’s birth rate and death rate. When a country experiences an initial fall in child mortality, this generates a cohort of young people that is much larger than that of earlier generations. At a certain point, fertility rates begin to slow down and the increase in the very young population ends. But, as shown in box 2.2, figure B2.2.1, the closing of the gap proceeds at a different pace in different regions. The larger the initial gap and the shorter the time period to close this gap, the bigger will be the “bulge” in the age structure. As time goes by, the “bulge” cohort enters the labor market, increasing the ratio of working-age to nonworking-age population. The opposite effect occurs when the bulge cohort reaches retirement age, with an increase in the ratio of nonworking-age people to working-age people.

A graphical representation of this “bulge” concept can be seen for various regions in figure 2.13. One of the most interesting features highlighted by this figure is that aging is geographically asynchronous—with high-income countries and some parts of the developing world much more advanced in their demographic transition. The asynchronicity is shown by the considerable diversity of the height of the peak of the ratio of working-age to nonworking-age population, the timing of this peak, and the slope of the curve around the peak.

In high-income countries, the ratio of working-age to nonworking-age persons increased slowly from 1950 to 2000, and now is declining.7 As a consequence of the fairly slow demographic transition, this group has experienced mild age structure effects. By contrast, in the East Asia and Pacific region, the reduction in fertility has been rapid (see box 2.2) and the increase in the ratio of working-age population steep. South Asia, the Middle East and North Africa, and Latin America and the Caribbean follow a somewhat similar path: their fertility rates have been decreasing, but their demographic dividend has not yet reached its maximum. Sub-Saharan Africa is once again an exception, showing a glacial pace in its demographic transition. Fertility rates have remained high (as shown in figure
Birth and death rates have shown distinct trends across regions


Note: The crude death rate is the number of deaths among the population of a given geographical area during a given year, per 1,000 midyear total population of the given geographical area during the same year. Crude birth rate indicates the number of live births occurring during the year, per 1,000 population estimated at midyear. Subtracting the crude death rate from the crude birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration.
For any given country, declines in two major demographic measures, mortality rates and fertility rates, contribute to the aging of a population. Consider first the mortality rate. Reductions in infant and child mortality due to the expansion of access to clean water and sanitation as well as to preventive health care (such as vaccination against infectious diseases) are the initial drivers of population growth and explain the increase in life expectancy experienced in the recent past. High-income countries have long had an advantage in terms of having the financial resources to address these concerns, as reflected in their dramatically lower under-5 mortality rates in 1960 than in any developing region (figure B2.2.1). In the five decades since, however, developing countries have made significant progress in reducing child mortality, although from different starting points and at different rates.\(^a\)

As of 2010, under-5 mortality rates in the East Asia and Pacific, Eastern Europe and Central Asia, and Latin America and the Caribbean regions were similar to those in high-income countries in the 1970s. Meanwhile, the rate in the Middle East and North Africa as of 2010 was roughly equivalent to the rate in high-income countries in the 1960s. Under-5 mortality remains comparatively high in South Asia and Sub-Saharan Africa, however, with rates 10 and 19 times those of high-income countries, respectively, as of 2010. For high-income countries, by comparison, recent reductions in the overall mortality rate are attributable to the reductions in old-age mortality, which result from more expensive health treatments and, more generally, higher incomes.

The aging of populations in recent decades also reflects sharp reductions in fertility rates. In the 1960s, developing regions (excluding Eastern Europe and Central Asia) had fertility rates of around 6.2 births per woman, or more than twice the rate of high-income countries. That gap has now become much smaller (figure B2.2.2). As of 2010, East Asia and the Pacific and Eastern Europe and Central Asia had fertility rates equal to that of high-income countries and approximately equal to the so-called replacement rate of 2

---

**BOX 2.2** The geographically asynchronous demographic transition is driven by cross-country differences in some key factors

---

**FIGURE B2.2.1** Developing countries have made significant progress in reducing child mortality, although from different starting points and at different rates

![Figure B2.2.1: Developing countries have made significant progress in reducing child mortality, although from different starting points and at different rates.](chart.png)


Note: The under-5 mortality rate is the probability per 1,000 that a newborn baby will die before reaching age five if subject to current age-specific mortality rates.
Global Saving in 2030

Glob al Development Horizons

versus wages); and pension, health care, and other old-age support needs. These, in turn, will affect international capital flows (see box 2.3).

World saving patterns are set to shift in the decades ahead

This report’s view of the future evolution of global saving is based on scenarios built with a multi-country dynamic general equilibrium model. The

Box 2.2 (continued)

B2.2.2), and as long as they continue to do so, the average age of the population and its share of working-age individuals will remain low compared with other regions. The high incidence of acquired immune deficiency syndrome (AIDS) among young adults has added to the reduction in the ratio of workers to young and old.

Given this heterogeneity in demographic conditions, regions will differ in terms of their saving dynamics; relative factor returns (capital versus wages); and pension, health care, and other old-age support needs. These, in turn, will affect international capital flows (see box 2.3).

**FIGURE B2.2.2** The gap in fertility rates across regions has narrowed


Note: The total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates.

Infant mortality rates, although lower than the under-5 mortality rates shown in figure B2.2.1, show similar regional dispersion and reduction patterns.
Global Development Horizons

Global Saving in 2030

The model is used to assess the effects on saving of several major forces: the forthcoming changes in demographics, the fact that developing countries will continue to grow faster than high-income countries, and shifts of other structural determinants such as the level and coverage of financial development and social protection. The approach is broadly similar to that taken in the second group of studies described in box 2.3.

Two scenarios are run with the model. The main difference between the two scenarios is the pace of convergence between developing and high-income countries in terms of economic growth and financial development. The gradual convergence scenario assumes a certain degree of economic growth convergence, accompanied by endogenous increases in financial deepening. The rapid convergence scenario imposes faster growth convergence, together with the assumption that developing countries will be able to reduce the gap between their financial development and that of the United States in 2030 by about 25 percent. All of the other exogenous variables (notably, demographic shifts in the age composition and labor supplies) as well as other policy variables (such as tax rates, tariffs, and government expenditures) are held at the same levels in both scenarios. (The assumptions and parameters of the model are detailed in online annex 1.6).

The scenarios’ results reported are for national saving—that is, they represent the combined change in both private and public saving. Given its long-term view, the model makes the simplifying assumption that governments run balanced budgets: any increase in public expenditures is passed on to households via an increase in direct taxation. The impact of demographics on both private and public age-related spending is reflected in a change in private sector consumption and saving and, thus, national saving. The mechanisms by which demographic change affects the public component of national saving are not explicitly modeled in the CGE framework but are nevertheless captured. A later section of the chapter presents a more detailed, but partial equilibrium, analysis of the forthcoming expansion of age-related public expenditures.

Under a gradual convergence scenario, global saving will almost double from its 2010 level

Developing countries will represent a very large share—almost two-thirds—of all global saving by 2030 (figure 2.14, panel b), up from slightly less than half in 2010. China and other Asian economies (both developing and high-income) will continue to be major savers, with China accounting for a larger share of global savings than any other individual country. Together, high-income European countries also will continue to contribute a significant share of global savings.

FIGURE 2.13  The size and timing of the demographic “bulge” differs across regions

A recent wave of studies uses multicountry or multi-region general equilibrium models to account for the impact of cross-country demographic changes on saving—some considering the historical experience, and others the outlook for future decades. It is possible to identify at least two different strands of this literature.

Auerbach and Kotlikoff (1987) provide an early example of an approach that uses large-scale overlapping generations models to analyze the implications of policy reform. A large number of papers follow this approach to study social security reform (for example, Conesa and Krueger 1999) and basic tax reform (for example, Altig et al. 2001; Conesa and Krueger 2006), among other issues. Within this first group of studies, a subset of papers focuses on the economic consequences of population aging in closed economies. A specific question addresses the adjustments required in the social security system because of demographic shifts. Important examples include Huang, Imrohoroglu, and Sargent (1997); De Nardi, Imrohoroglu, and Sargent (1999); and, with respect to asset prices, Abel (2003).

In a closed-economy setting, geographically asynchronous aging does not matter, and the saving effects of the demographic transition—particularly in the latter phases, when the society is aging—are determined by the speed of change in the age structure and size of the bulge cohort. More specifically, in an economy closed to international capital flows, changes in labor supply and aggregate saving affect the relative returns of labor and capital and the growth of the economy. In an aging economy, young labor becomes scarcer with respect to capital, thus the return to labor rises relative to the return to capital.

This change in factors’ relative prices also has intergenerational distribution effects. The people who lose from lower capital returns will tend to be asset holders who are older than the average person, while those who gain from higher wages will tend to be younger than the average.

These effects are intensified by a rapid demographic transition and a quickly closing gap between an initial mortality reduction and subsequent fertility reduction. These two aspects of the demographic transition strengthen the changes in aggregate saving and labor supply, thus exacerbating the changes in relative factor supplies and the divergence in relative factor prices.

For an open economy, geographically asynchronous aging across other countries will affect saving, and thus the relative factor prices, through international capital flows. A country’s current account deficit and its capital inflows are determined by the excess of its investment over its saving (and vice versa for a surplus and capital outflows). Because the supply of saving is related, via the life cycle, to the age structure of its population, the current account balance is affected, all things equal, by demographic change. In a world with free capital movement, capital should flow from fast-aging regions, where capital is relatively abundant, to regions with fast-growing populations, where labor is abundant.

A second strand of studies extends the previous approaches by explicitly considering these open-economy issues. By taking into account international links (trade and capital flows) and using multicountry or multiregion general equilibrium models, this third strand of literature reassesses the impact of cross-country demographic changes on various economic issues. Several studies use demographic projections to quantify, for example, the effects of pension reforms on the viability of social security systems (Aglietta et al. 2007; Attanasio, Kitao, and Violante 2006, 2007; Börsch-Supan, Ludwig, and Winter 2006; Fehr, Jokisch, and Kotlikoff 2003). Krueger and Ludwig (2007) study the impact of demographic forecasts on the distribution of wealth and welfare in Organisation for Economic Co-operation and Development countries. Other studies adopt an ex post approach. For example, using calibrated life-cycle models, Domeij and Flodén (2006), Feroli (2003), and Henriksen (2002) find that changes in demographics explain a large part of historical current accounts.

a. This box draws heavily on Marchiori (2011) and Krueger and Ludwig (2007).

b. The intergenerational distribution effects are further complicated when the funding of pension schemes comes from payroll taxes.

c. International migration will also be affected, and the mechanisms will be similar to those described for international capital flows.
Compared with the start of the 21st century, saving rates will have fallen by 2030, a reflection of increased demographic pressures from aging populations in much of the world and slowing growth rates. In both the developing and developed worlds, saving rates will decline from their respective peaks (figure 2.14, panel a). For developing countries collectively, saving is anticipated to reach a peak of 34 percent of their income in 2014 and steadily creep downward to 32 percent in 2030; for high-income countries, the corresponding reduction will be from 20 percent to 16 percent. The significantly slower decline in the developing world’s saving rate, coupled with the increasing size of developing countries in the global economy, will contribute to a widening difference between the global saving contributions of the two groups.

Another implication of the increased relative size of developing countries is that the global saving rate will not fall in spite of decreases in the saving rates of both groups. The larger economic size of the developing world, alongside the slower rate of decline in its relatively higher saving rate, will offset the decline of saving in high-income countries. In summary, although the global flow of saving will rise dramatically in absolute terms between 2010 and 2030, the global saving rate will remain constant at around 24 percent.

China will continue to be dominant in the global savings picture. The continuous increase in the country’s saving over the scenario horizon will mean that by 2030, its absolute saving will be far and away the largest among all economies worldwide, at around $9 trillion (measured in 2010 dollars) (figure 2.15). This large amount of saving is a function of China’s large population and high propensity to save, as often noted, but those strong upward pressures on saving will to some degree offset by a rising old-age dependency ratio (China’s ratio will surpass 2010 U.S. levels in the latter half of the 2020s) and decreasing economic growth. Thus, although China’s saving will undoubtedly remain large, it will nevertheless be smaller than it would be in the absence of changes in population structure and the slowdown of economic expansion.

The effects of a large population on national saving will also be seen in India, which will overtake both Japan and the United States in terms of its absolute level of national saving sometime in the 2020s. A major factor supporting the relatively rapid rate of growth of saving in India is its favorable demographics: India’s old-age dependency ratio will rise far more slowly than in East

**FIGURE 2.14** Saving rates will decline more slowly in developing countries, and by 2030 those countries will account for two-thirds of global saving

*a. Saving rates, 2005–30*

*b. Shares of global savings, 2030*

evident when comparing the saving rate paths among developing countries (figure 2.16). In economies that will experience a simultaneous sharp reduction in the working-age share of their population and an increase in the old-age share of their population, such as Indonesia and Russia, the saving rate will fall significantly. The more moderate decline in saving rates in Mexico will be due in part to its relatively more positive demographic evolution.

A remarkable exception to these general trends will be Sub-Saharan Africa, where the saving rate will not fall thanks to a stable old-age dependency ratio and healthy rates of economic growth (the region will average about 5 percent annual growth in the gradual convergence scenario). Indeed, Sub-Saharan Africa stands as a remarkable outlier to the global pattern of declining saving rates worldwide, largely because of the favorable combination of productivity growth and little demographic pressure.

Under the rapid convergence scenario, the absolute level of global saving will be slightly larger

Global saving will be $27 trillion under the rapid scenario, whereas under the gradual convergence scenario, it will be $25 trillion. This larger amount of global saving is mainly due to the assumption of a higher growth rate in the global economy. The overall global saving rate under this new scenario will, however, still fall slightly: this is mainly because, even though developing countries save more in absolute terms, the negative impact of higher levels of financial development on saving rates will dominate—households and firms need to set aside less saving in the presence of better financial intermediation—and the net effect will be a reduction in developing countries’ saving rates, to 30 percent, versus 32 percent in the gradual convergence scenario (figure 2.17, panel a).10

In the rapid scenario, faster financial development in developing countries tends to bring down their saving rates. The impact on the global saving rate, however, is offset by the fact that the global weight of developing countries (which still
tend to have higher saving rates than advanced countries) is greater relative to the gradual scenario. Thus, the path of the global saving rate is roughly the same across the two scenarios.

Relative to the first scenario, developing countries will capture a slightly larger share of global saving under the rapid convergence scenario (figure 2.17, panel b). This small change obscures a significant degree of heterogeneity in the paths of different countries, however. This heterogeneity, in turn, results from the difference in impact of financial development on saving in this second scenario: for countries starting at low initial levels of financial development, reducing by one-fourth their distance from the United States means a larger increase of financial development. China, for example, will experience a decline in its saving rate of 7 percentage points (from 52 percent to 45 percent), whereas Indonesia will see a sharp drop in its saving rate of more than 7 percentage points (from 32 percent to 25 percent). Both countries will follow healthy growth paths, but Indonesia, which in 2010 had a level of financial development only a fifth of the high-income-country average (compared with China, with a level close to two-thirds in the same year) will experience a larger change in its financial development and thus a greater negative impact on its saving rates.

The small reduction in global saving implies an increase in the rental rate of capital worldwide, however, because lower global saving reduces the supply of capital, while higher overall growth increases the demand for capital (as discussed more thoroughly in chapter 1). Interest rates turn out to be significantly higher in the rapid convergence scenario than in the gradual scenario. However, stronger price signals, and better financial intermediation in terms of coverage and efficiency, mean that savings will be channeled more effectively to its most productive uses.

A more nuanced view of the future of saving: Distribution, public finance, old-age support, and other impacts

The scenarios presented in the previous section explored the implications for global saving of forecasts for productivity growth, demography, and financial development. The principal conclusions were that higher growth tends to increase saving, a rise in the elderly dependency

---

**FIGURE 2.17** National saving rates (panel a) and share of global saving (panel b), by income groups, gradual versus rapid convergence scenario, 2010–30


Note: The gradual and rapid convergence scenarios refer to numerical simulations based on two sets of assumptions on productivity growth and structural changes (see details in the main text).
ratio tends to reduce saving, and higher financial development may lower saving rates but improves the efficiency of investment allocation and thus increases growth. Overall, average global saving rates would remain roughly constant through 2030, in part because of the rising global gross domestic product (GDP) share of the relatively higher-saving developing countries. This macroeconomic analysis requires a number of simplifying assumptions. For example, the population age structure of a country (or groups of countries) is approximated by a simple old-age dependency ratio, growth is assumed to benefit all households in the same way, and saving is not disaggregated into households, government, and firms.

Other approaches to studying the future of global saving are to consider how demography and growth will affect saving at the household level, and how aging will affect public finances. Examining saving from a microeconomic perspective can provide a more realistic and nuanced view of the likely evolution of saving, although at the price of considering a limited set of countries given the data availability. Although the household-level analysis confirms the broad conclusions of the macroeconomic analysis, the micro-level data also expose the complexities of the interaction among aging, saving, and growth. The analysis finds that (a) aging tends to reduce saving; (b) the size and composition of households simultaneously affect saving, labor supply, and other key economic decisions; and (c) all three of these factors have feedback effects on demography. It also finds that saving tends to be highly concentrated, which may initially help boost development of financial systems but also has potentially negative implications for economic mobility and inclusion.11

These findings have significant public policy implications, not least of which is that the decline in the extended family support system in many developing countries will require greater reliance on formal financial institutions, which in turn will affect both financial markets and government finances. Many countries will find it challenging to provide health care and retirement benefits for their aging populations while ensuring financial sustainability and encouraging healthy rates of economic growth.

This second part of the chapter complements the general equilibrium-generated scenarios of global saving discussed above. The more disaggregated analyses of the household and government saving in this part are based on different tools and datasets, and therefore some of the mechanisms operating in these settings—for example, the impact of education on the life-cycle saving behavior and the effects of demographic changes on government expenditure—were not integrated in the CGE modeling.

**Saving at the household level: Who actually saves?**

The evolution of household saving and economic development are strongly interrelated. A glance back at figure 2.6, for instance, shows that household saving represents a large share of national saving of an economy and, therefore, its capacity to finance investment using domestic resources. Indeed, fundamental economic decisions concerning saving are made at the household level: how time is allocated between leisure and work; how income is earned and shared; how much of income is consumed (and for which goods and services) versus saved; and what proportion of resources is devoted to investment in the education of the young.12 Analysis at the micro level can thus provide substantial insights, also because it considers distributional aspects ignored by representative-agent approaches.

The microeconomic analysis undertaken here considers the household-level data of a group of developing economies in which saving behavior is driven by distinct characteristics: a middle-income economy with modest economic growth rates (Mexico), a middle-income country with robust growth (Thailand), a transition economy with an aging population (Russia), and a country with a large demographic dividend (Ghana). The analytical approach adopted here is a cohort (or pseudo-panel) approach that uses a series of repeated cross-sectional data on both income and consumption. This approach allows not only the measurement of saving rates of individuals at different ages, but also determines whether these individuals belong to different cohorts (that is, if they were born in different years). In other words,
Following cohorts over time is appealing because it helps shed light on how the two key drivers of saving—demography and growth—operate at a more disaggregated level. Cohort analysis can help determine whether saving has been rising because the share of the population at high-saving ages has increased or because younger

**BOX 2.4 Micro analysis is a useful tool for determining likely trends in future savings**

Separating the age, cohort, and time effects in the estimation of the age-saving profile is not straightforward and requires several identification restrictions. The micro analysis presented in this report follows an approach that was pioneered by Heckman and Robb (1987) and subsequently used by Deaton and Paxson (1994); MaCurdy and Mroz (1995); Gokhale, Kotlikoff, and Sabelhaus (1996); Paxson (1996); Attanasio (1998); and more recently, Chamon and Prasad (2010). The saving data, consisting of data points for each cohort and each year, are the dependent variables; these are regressed on dummies for age, cohort, and time (where time is the year of the survey). The restrictions are equivalent to assuming that “all deterministic trends in the savings rate data originate from a combination of cohort and age effects” (Attanasio and Szekely 2003, 15). a

For the four countries examined here, household saving is estimated from high-quality household surveys. These surveys are all nationally representative and were conducted using a broadly comparable methodology over a fairly long period covering the mid-1980s to the late 2000s. The saving variable estimated from the surveys is obtained as simply the difference between total household disposable income (which includes imputed amounts—for example, imputed rents from owning a house, income in kind, and consumption of automobiles) and total expenditures. b, c

Most of the findings that follow from this analysis are illustrated by graphing variables of interest along the life cycle. Thus, it is useful to describe how these graphs are constructed. In each country and for each household survey, approximately 14 five-year birth cohorts are constructed. Cohort 1 is the youngest cohort; for example, in Mexico, cohort 1 is represented by all household heads born 1985–89, so that, in the most recent surveys of 2009–10, they are 20 to 25 years old. Cohort 2 represents household heads who were born 1980–84 and were repeatedly observed in the surveys of 2004 at the “average” age of 22, in the survey of 2005 at the age of 23, and so on, until the most recent survey of 2010 at the age of 28. The oldest cohort, cohort 14, represents household heads who were born 1920–24; in the first Mexican survey of 1984, these heads were 60–64 years old. The graphs plot the cohort’s average for the variable of interest against the age of the head, and so the age profile of the cohort is obtained by connecting the different points in time when the cohort is observed. Given that the surveys cover a period of about 20 years, cohorts can be followed over a large portion of their life cycles. Furthermore, this construction allows different cohorts to be observed at the same age. Figures 2.23, 2.27, 2.28, and 2.29 are presented in this manner.

a. For more details on the estimation procedure and its relationship with the life-cycle theory, see online annex 2.1.
b. Other definitions of saving have been used, but the main results do not vary significantly. Additional definitions include (a) excluding investment components—such as purchases of durable goods and spending on education and health—from the total expenditures; and (b) netting transfers, such as pensions, from the income aggregate. Note that for the case of Russia, the estimation of consumption is not reliable, but the questionnaire included a specific question on saving. Therefore, for the case of Russia, we used this self-reported saving variable.
c. These micro-based estimations of household saving are not strictly comparable with domestic saving in the national accounts (NA): for these countries, NA’s domestic saving includes corporate saving, and the definitions of income and consumption are not consistent across the NA and the household surveys.
cohorts have been saving more, possibly because of stronger economic growth. Discerning the difference between these two cases is important because it may suggest whether the expansion of aggregate saving is temporary (because a large cohort is currently in the working-age stage of its life cycle) or more permanent. The estimated age and cohort profiles of saving can also be used to make exploratory inferences about how saving will evolve in the future.

Before considering the results of the analysis in detail, it is useful to examine some descriptive statistics on saving. Figure 2.18 shows that the levels and movements of national saving rates of Thailand, Russia, Mexico, and Ghana are similar to those of their regions, thus supporting the notion that the findings of specific country analyses can be used to make qualified generalizations regarding broader groups of countries.

As is the case for national saving rates, trends in household saving rates in the four countries of interest have varied greatly in recent decades (table 2.1). In Ghana and Thailand, there has been an upward trend in household saving rates since the late 1980s. Thailand’s household saving rate was also much higher than in the other three countries over the same period. Mexico’s household saving rate shows some sign of increasing toward the mid-late 2000s, but it is reduced again if 2010 is included, presumably an effect of the global financial crisis. The household data for Russia show not only a much lower saving rate relative to the other three countries but also little variation over time. The low rate of household saving in Russia is attributable to the fact that the Russian Federation is a large country with regions that have experienced very different economic growth trajectories. The estimated age and cohort profiles of saving can also be used to make exploratory inferences about how saving will evolve in the future.

**FIGURE 2.18 National saving rates of Thailand, the Russian Federation, Mexico, and Ghana are similar to those of their regions**

![Figure 2.18](image-url)


Note: Series represent three-year moving averages (MA).
saving in Russia is perhaps not surprising because household saving in the Eastern Europe and Central Asia region is lower than in other developing regions.

These micro data confirm one of the main findings from the macro trends described earlier in the chapter: apart from Russia, developing countries have increased their saving rates, and micro data show that some of this increase is attributable to increases in households’ saving rates.

How do demographic differences drive differences in savings? Ghana versus Russia

Together with the assumptions of the life-cycle hypothesis, the age-saving profiles identified with the pseudo panel approach can be used to make some simple inferences on the outlook for household saving. Theory suggests that the bulk of an individual’s lifetime saving occurs during the middle of his or her life cycle—that is, during the individual’s working years. Thus, an increase in the share of a population of working age should increase aggregate savings. This inference rests on strong assumptions, however: it assumes no behavioral change and no price, wage, rental rate, or other general equilibrium effects. In fact, it is mainly an accounting projection, and as such it should be taken with a good bit of caution. However, studying the relationship between the age structure and saving is still relevant and interesting in that it can give an indication of how differences in countries’ progression along the demographic transition will affect their saving profiles in the coming decades. The case of Ghana versus Russia is considered first.

The projected saving rate (as shown in figure 2.19) is estimated using the following equation:

\[
\tilde{S}_{tot,t} = \sum_{c,t} \tilde{S}_{c,t} \frac{\hat{Y}_{c,t}N_{c,t}}{\sum \hat{Y}_{c,t}N_{c,t}}
\]

(2.1)

where \(\tilde{S}_{tot,t}\) is the projected aggregate saving rate for year \(t\), \(\tilde{S}_{c,t}\) is the saving rate of cohort \(c\) for year \(t\) (using the age and cohort profiles identified by the regressions described in online annex 1.5), and the fraction is the income weight of cohort \(c\) for the year \(t\). These weights are also predicted for time \(t\) using the age and cohort effects for the income levels (\(\hat{Y}_{c,t}\)) and the future population levels (\(N_{c,t}\)).

The results of this exercise are shown in figure 2.20, which depicts an upward trend in projected aggregate household saving rates in Ghana and a downward trend in Russia.

These opposite trends in household saving are due to the different shapes of the age effects for saving (as reported in figure 2.19) and to the different patterns of demographic transition in Ghana and Russia. Figure 2.20 (panel a) shows that the ratio of working-age population to nonworking-age population will rise from about 1.4 to 1.8 in Ghana (and, in fact, for the entire

### Table 2.1 Trends in saving rates differ widely across countries

<table>
<thead>
<tr>
<th>Year</th>
<th>Mexico</th>
<th>Russian Federation</th>
<th>Thailand</th>
<th>Ghana</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>7.2</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>1987</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>4.9</td>
</tr>
<tr>
<td>1988</td>
<td>—</td>
<td>8.6</td>
<td>—</td>
<td>6.4</td>
</tr>
<tr>
<td>1989</td>
<td>11.1</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>1990</td>
<td>—</td>
<td>—</td>
<td>17.1</td>
<td>—</td>
</tr>
<tr>
<td>1991</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>14.2</td>
</tr>
<tr>
<td>1992</td>
<td>12.0</td>
<td>—</td>
<td>20.9</td>
<td>—</td>
</tr>
<tr>
<td>1994</td>
<td>14.2</td>
<td>—</td>
<td>21.2</td>
<td>—</td>
</tr>
<tr>
<td>1996</td>
<td>9.5</td>
<td>—</td>
<td>27.8</td>
<td>—</td>
</tr>
<tr>
<td>1997</td>
<td>—</td>
<td>4.7</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>1998</td>
<td>13.0</td>
<td>3.8</td>
<td>31.6</td>
<td>13.2</td>
</tr>
<tr>
<td>1999</td>
<td>—</td>
<td>3.4</td>
<td>33.5</td>
<td>—</td>
</tr>
<tr>
<td>2000</td>
<td>11.0</td>
<td>5.2</td>
<td>31.2</td>
<td>—</td>
</tr>
<tr>
<td>2001</td>
<td>—</td>
<td>5.5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>2002</td>
<td>11.0</td>
<td>5.4</td>
<td>29.9</td>
<td>—</td>
</tr>
<tr>
<td>2003</td>
<td>—</td>
<td>4.6</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>2004</td>
<td>10.3</td>
<td>3.3</td>
<td>27.6</td>
<td>—</td>
</tr>
<tr>
<td>2005</td>
<td>14.2</td>
<td>4.4</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>2006</td>
<td>10.8</td>
<td>5.9</td>
<td>20.6</td>
<td>11.3</td>
</tr>
<tr>
<td>2007</td>
<td>—</td>
<td>5.3</td>
<td>22.8</td>
<td>—</td>
</tr>
<tr>
<td>2008</td>
<td>20.3</td>
<td>4.0</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>2009</td>
<td>—</td>
<td>—</td>
<td>24.1</td>
<td>—</td>
</tr>
<tr>
<td>2010</td>
<td>11.1</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Source: World Bank calculations using household surveys.

Note: For all countries except Russia, household saving rates are estimated as the ratio of the difference between the household income and household consumption over household income. For Russia, the household saving rate is self-reported by survey participants.

— = not available.
Global Saving in 2030

How do demography and growth interact to affect saving? Thailand versus Russia

In Thailand, the saving rate is forecast to rise between 2010 and 2050 despite the expected decline in the share of the working-age population over the projection period. This result can be explained by considering more closely how the forecast is generated. First, note that the saving rate among people of retirement age in Thailand will fall only slightly (figure 2.21, panel a). Second, the cohort effect will play an important role in Thailand (figure 2.21, panel b). In the forecast, the future (still-unborn) cohorts are assigned the cohort effect of the most recent cohort (that is, those near the vertical axis)—which, in the case of Thailand, reflects a fairly high saving rate (as younger cohorts’ rapid growth in incomes results in higher saving rates than for older cohorts). Thus the aggregate saving

Sub-Saharan region, as shown previously in figure 2.13) between 2010 and 2050. In Russia, however, the ratio will fall considerably over the same decades, from about 2.3 to less than 1.4.

FIGURE 2.19 Projection of age effects on household saving rates in Ghana and the Russian Federation

Source: World Bank calculations using household survey data.

FIGURE 2.20 Demographic change will drive large changes in saving rates in the decades ahead

Source: World Bank calculations using household survey data.
rate rises over time as younger (higher-saving) cohorts replace older (lower-saving) cohorts. This effect is reinforced because these younger cohorts are larger in size and move along an income-age profile that is above that of older cohorts, so their weight in aggregate saving rises over time.

Another illustration of how higher income growth increases saving can be seen by comparing the baseline forecast for Russia with an alternative case. In the alternative case, higher growth is simulated by increasing the cohort effect on incomes of the new (still-unborn) cohorts. As will be the case for Thailand, these new cohorts will have higher saving rates and higher incomes than older cohorts. By 2030 in the alternative, increased-growth scenario, the share of total income earned by the younger cohorts (considered those born between 1990 and 2009) would reach 37 percent, versus 27 percent in the baseline scenario. The gap between the two scenarios is even larger, with incomes of the younger cohorts (now considered those born between 2010 and 2029) accounting for 51 percent of the total, versus 26 percent in the baseline scenario.

As the share of total income accounted for by cohorts with higher saving rates rises, so will the aggregate saving rate. Thus, in the case of Russia, the saving rate will be about half a percentage point higher by 2050 in the alternative scenario than in the baseline scenario (figure 2.22). This conclusion—that rising incomes are associated with higher saving rates—reinforces the finding from the previous macro modeling section that...
growth generates the means to sustain itself (it is also consistent with a basic prediction of the standard life-cycle model).\textsuperscript{14}

**Increases in educational attainment will support growth and saving: The case of Mexico**

In Mexico, as in other developing countries, the entry of larger numbers of skilled workers into the labor market in the coming decades will support growth in both incomes and saving rates, even after accounting for some erosion in the wage premium due to the increased supply. This effect can be seen by grouping households according to educational attainment of the household head. As shown in figure 2.23, panel a, household heads of young cohorts are much more likely than those of older cohorts to have a secondary or higher education: only about 10 percent of household heads born in the 1920s have a secondary education, but that figure has steadily risen over time to about 50 percent for household heads born in the mid-1980s. Similar progress can be observed for the share of heads with higher education (figure 2.23, panel b).

The saving profiles of Mexican households differ significantly by education level. The age-saving profiles tend to be quite flat for the least-educated group and higher and steeper for the more-educated groups (see figure 2.24, panel a). There are some mild declines in saving rates for household heads who are above age 65, especially in the case of the group with tertiary education. Higher saving by more-educated heads of households reflect their anticipated rising income levels, while heads with lower education face a much flatter age-earning profile. Because education is typically a good proxy for permanent income,\textsuperscript{15} this analysis helps explain why low-income (and typically not well educated) households tend to save less than high-income (and typically better-educated) households.

Another observation that can be gleaned from figure 2.24 (panel b) is that young cohorts (those closest to the vertical axis) have higher saving rates than old cohorts: saving rates for the youngest cohorts are 10 percentage points higher than for the oldest cohorts, a significant change. This indicates that the long-term trend (at least for the most recent decades observed in these surveys) has been upward-sloped for saving.\textsuperscript{16} The

**FIGURE 2.23 Educational attainment in Mexico has been rising over time**

![Educational attainment in Mexico has been rising over time](image)

*Source: World Bank calculations using household survey data. Note: Box 2.4 provides details of how the cohorts shown in these figures were constructed.*
steepness of the upward trend, however, differs across education groups. The data for Mexico show that the positive cohort effect is strongest for the most-educated group.

To estimate the path of aggregate saving in Mexico over coming decades, we begin with a baseline forecast in which the impact of education on saving rates is not taken into account. The results show that the aggregate saving rate will rise until about 2025 because the share of working-age people in the total population will increase over the same period, thus allowing aggregate saving rates to rise because more of the population will be earning income. The forecast aggregate saving rate levels off in 2025, however, as the share of the nonworking-age population starts to decrease after reaching a peak.

An alternative scenario, which reflects the impact of rising education levels on savings, predicts considerably higher saving rates over the forecast period. To generate projections that take into account the different saving and income profiles, equation (2.1) can be applied separately to three groups of households: those with low or no education, those with secondary education, and those with tertiary education. An average saving rate is then calculated by weighting each of the three groups by its share of total income. These education-augmented demographic projections (figure 2.25, panel a) show that by 2050, the least-educated group will account for the smallest share of nonworking-age people in Mexico. Because the least-educated group’s earnings and saving rates—in terms of both age and cohort effects—can be expected to continue to be lower than those of other groups, the economywide saving rate will be almost 5 percentage points above the baseline scenario by 2050.

**Poor households save little, limiting their ability to escape poverty: Mexico and Thailand**

In most countries, saving tends to be concentrated in households that are relatively high-income compared with the country average. In Mexico and Thailand, saving rates are actually negative up to the 25th percentile of the income distribution. Even if this is partly due to measurement error or temporary fluctuations, the poorest quarter of households seems to accumulate much less saving, while saving rates of households beyond the 75th percentile of the income distribution are high: saving rates among the richest 1

---

**FIGURE 2.24** The saving life cycle differs significantly by educational attainment (panel a), but across all educational levels, young cohorts tend to save more than older cohorts (panel b)

![Diagram](source: World Bank calculations using household survey data. Note: 0 indicates whole population, 1 population with no education or just primary education, 2 secondary education, and 3 tertiary education. Cohorts are defined in terms of five-year age ranges of birth year.)
percent of households are consistently above 60 percent in Mexico and 70 percent in Thailand (table 2.2). Furthermore, this gap between rich and poor households’ saving rates does not appear to have diminished in recent decades.

Admittedly, there are drawbacks to comparing the saving behavior of households across income percentiles to ascertain whether there are permanent vulnerabilities for certain groups. Low or negative saving rates may result from consumption smoothing by households facing a temporary shock. Similarly, the highest-income households are disproportionately in the high-earning years of their life cycles, and their earnings likely include greater than average non-age-related transitory components as well. Total transitory components of income can be large and, because of economic mobility, saving by those households that make up an income percentile at a given point in time may be determined either by long-term saving behavior or by composition effects. That is, low saving among the lowest percentiles may reflect income smoothing by households that are temporarily poor, while high saving among the highest percentiles may reflect smoothing by households that are temporarily flush. Alternatively, low saving may reflect a permanent incapacity of some households to accumulate assets for their retirement or to cope with unexpected drops in income. Grouping the saving data by the level of education of the household head provides a good proxy for permanent income because heads seldom change their educational attainment after forming a household. Therefore, tracking households grouped by education over time minimizes the potential bias introduced by composition effects.

In both Mexico and Thailand, households where the head has low educational attainment tend to also have low saving. According to the most recent household survey data—2010 for Mexico and 2009 for Thailand—the least-educated group accounted for 17 percent and 34 percent of saving, respectively. By contrast, in Mexico about 60 percent of total saving was provided by the most-educated group of heads of household versus 47 percent in Thailand. Moreover, saving tends to be even more concentrated than income: shares of total income accounted for 50 percent and 37 percent for Mexico and Thailand, respectively, according to the most recent survey data. The fact that these income shares are much lower than the saving shares means that more-educated people not only save more in absolute terms but also save, on average, a higher proportion of their incomes.

This concentration of saving among household heads with greater education, and thus greater

---

**FIGURE 2.25 Increased earning power will be the greatest driver of saving by Mexican households**

*a. Ratio of working- to nonworking-age population, by education level of household head*

*b. Household saving rate, with and without education effect*

Source: World Bank calculations using household survey data.
Global Saving in 2030

Mexico, reductions in the skill premium may have moderated the increase in the share of the highly educated in total saving. However, for Mexico, reductions in the skill premium may have moderated the increase in the share of the highly educated in total saving.19

Low saving among the poorly educated likely reflects a long-term incapacity to save because they face much flatter age-earning profiles. Negative saving may reflect these households’ long-term incapacity to accumulate resources because they face unemployment or other barriers to income generation, while consumption exceeds income because of either public or private transfers. Lack of saving makes it difficult for these households to achieve sustainable increases in income by investing in the education of their members or to cope with adverse shocks. The

### Table 2.2: Household Saving Rates Differ Significantly Along the Income Distribution

<table>
<thead>
<tr>
<th>Year</th>
<th>1st</th>
<th>5th</th>
<th>10th</th>
<th>25th</th>
<th>75th</th>
<th>90th</th>
<th>95th</th>
<th>99th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>−177.4</td>
<td>−69.7</td>
<td>−38.2</td>
<td>−12.9</td>
<td>22.7</td>
<td>39.2</td>
<td>48.0</td>
<td>64.1</td>
</tr>
<tr>
<td>1989</td>
<td>−215.9</td>
<td>−79.1</td>
<td>−49.1</td>
<td>−14.9</td>
<td>25.6</td>
<td>41.9</td>
<td>52.5</td>
<td>70.5</td>
</tr>
<tr>
<td>1992</td>
<td>−140.0</td>
<td>−60.6</td>
<td>−40.3</td>
<td>−13.0</td>
<td>21.7</td>
<td>36.4</td>
<td>46.1</td>
<td>65.4</td>
</tr>
<tr>
<td>1994</td>
<td>−120.4</td>
<td>−47.5</td>
<td>−29.5</td>
<td>−8.6</td>
<td>22.8</td>
<td>38.4</td>
<td>47.4</td>
<td>64.6</td>
</tr>
<tr>
<td>1996</td>
<td>−135.9</td>
<td>−55.2</td>
<td>−34.2</td>
<td>−12.7</td>
<td>17.2</td>
<td>32.0</td>
<td>41.8</td>
<td>60.4</td>
</tr>
<tr>
<td>1998</td>
<td>−178.9</td>
<td>−66.8</td>
<td>−39.7</td>
<td>−13.4</td>
<td>21.9</td>
<td>38.8</td>
<td>47.1</td>
<td>64.9</td>
</tr>
<tr>
<td>2000</td>
<td>−142.8</td>
<td>−54.9</td>
<td>−33.5</td>
<td>−10.3</td>
<td>22.2</td>
<td>36.8</td>
<td>45.4</td>
<td>62.2</td>
</tr>
<tr>
<td>2002</td>
<td>−131.5</td>
<td>−53.3</td>
<td>−32.3</td>
<td>−8.7</td>
<td>23.6</td>
<td>39.0</td>
<td>47.6</td>
<td>61.7</td>
</tr>
<tr>
<td>2004</td>
<td>−158.2</td>
<td>−72.9</td>
<td>−45.2</td>
<td>−14.7</td>
<td>24.6</td>
<td>40.2</td>
<td>49.0</td>
<td>62.7</td>
</tr>
<tr>
<td>2005</td>
<td>−178.8</td>
<td>−66.8</td>
<td>−39.2</td>
<td>−11.2</td>
<td>27.9</td>
<td>43.2</td>
<td>51.5</td>
<td>67.5</td>
</tr>
<tr>
<td>2006</td>
<td>−154.5</td>
<td>−66.7</td>
<td>−41.7</td>
<td>−12.4</td>
<td>24.2</td>
<td>39.1</td>
<td>47.7</td>
<td>63.8</td>
</tr>
<tr>
<td>2008</td>
<td>−151.6</td>
<td>−76.9</td>
<td>−49.7</td>
<td>−16.8</td>
<td>31.5</td>
<td>49.0</td>
<td>58.5</td>
<td>73.8</td>
</tr>
<tr>
<td>2010</td>
<td>−237.2</td>
<td>−91.8</td>
<td>−55.0</td>
<td>−17.5</td>
<td>26.8</td>
<td>42.9</td>
<td>52.1</td>
<td>68.0</td>
</tr>
</tbody>
</table>

| Thailand |
| 1990 | −387.2 | −141.6 | −81.8 | −28.4 | 26.7 | 45.2 | 55.3 | 71.6 |
| 1992 | −302.2 | −127.2 | −76.3 | −23.1 | 28.0 | 46.3 | 55.8 | 73.8 |
| 1994 | −332.7 | −130.5 | −80.0 | −26.3 | 31.8 | 49.6 | 58.9 | 74.6 |
| 1996 | −193.7 | −108.3 | −64.1 | −14.5 | 36.9 | 54.6 | 63.1 | 76.5 |
| 1998 | −254.5 | −97.9 | −55.8 | −11.7 | 37.2 | 54.3 | 63.0 | 78.3 |
| 1999 | −264.3 | −95.4 | −51.5 | −9.3 | 36.2 | 52.9 | 62.3 | 75.6 |
| 2000 | −226.2 | −88.5 | −47.7 | −8.1 | 37.5 | 54.6 | 63.5 | 77.7 |
| 2002 | −239.9 | −85.0 | −46.5 | −8.0 | 37.9 | 53.8 | 62.0 | 76.1 |
| 2004 | −231.3 | −83.3 | −46.4 | −8.7 | 37.3 | 53.7 | 62.5 | 76.7 |
| 2006 | −278.6 | −98.2 | −54.9 | −16.1 | 24.9 | 43.3 | 53.9 | 72.7 |
| 2007 | −214.4 | −79.6 | −44.5 | −10.6 | 26.3 | 44.8 | 55.0 | 72.9 |
| 2009 | −166.9 | −60.3 | −32.2 | −6.9 | 26.2 | 43.5 | 54.3 | 73.4 |

Source: World Bank calculations using household survey data.

permanent earning capacity, has increased over the most recent two decades for Thailand but not for Mexico. In Thailand, the share of total saving by households with secondary education has basically been stable, while there has been an increase among the group with higher education, counterbalanced by a reduction for the group with no or very little education. This trend toward increased concentration of savings partially reflects the increased weight of educated individuals in the total population. The share of households with a highly educated head has increased quite significantly as well, not just for the two countries considered here but also in the developing world more generally.18
concentration of saving thus exacerbates the difficulties involved in reducing poverty, raising the prospect of a permanent underclass with little potential for upward mobility.

The concentration of saving among high earners also has important implications for financial inclusion in developing countries. On one hand, concentration of financial services, in terms of either geography or income levels, can make it less costly for financial institutions to enter and operate in developing-country markets. On the other hand, the resulting concentration of financial institutions among the high-income segment of a population, and in the areas where they live and work, has the potential to perpetuate lack of access to financial services for the poor. Analysis of recent survey data on saving vehicles in developing countries (Demirgüç-Kunt and Klapper 2012) shows that the bottom 40 percent of income earners in developing regions are not only less likely to save than the top 60 percent but are also less likely to save using formal financial institutions (figure 2.26). This suggests that the concentration of saving associated with income inequality may be exacerbated by a spillover effect in which poor households’ limited participation in formal financial markets further limits the financial inclusion of other poor households, potentially contributing to poverty traps.

**Saving behavior depends on household formation and composition over the life cycle**

There are several reasons why household data for developing countries may not reveal the expected inverted-U shape for the relationship between aging and saving (saving rises during a person’s working years, then levels off and declines during retirement):

- Because consumption is measured at the household level, it is often difficult to precisely attribute consumption amounts to individual members of the household. As pointed out by Deaton and Paxson (2000), many individuals may live in multigenerational households, such as a 45-year-old household head living with his 20-year-old son and 70-year-old father. At the household level, the positive saving of the 45-year-old may be cancelled out by the negative saving of the young and old members of his household. Thus, the age profile of household saving may be biased and quite different from the age profile of individual saving.

- Elderly individuals who are relatively poor may be more likely to live with their children than richer ones, thus creating a selection bias.

- Different mortality rates may affect the composition of the cohorts because longevity and wealth may be positively correlated, as Attanasio and Hoynes (2000) point out. As a cohort ages, richer individuals survive longer and become the larger subgroup within the cohort. If they continue saving to leave bequests, the inverted-U age-saving profile may disappear mainly because of changes in the composition of the cohorts.

The potential biases introduced by these observations help explain why the hump-shaped relationship between aging and saving predicted by theory is not always observed in the cases examined here.
Figure 2.27 shows, for Mexico, Thailand, and Russia, the average age of the household head against the age of the individuals who live with that head. Four panels are displayed for each country: one for the whole population, and three for the different education levels. The 45-degree line indicates the cohort profile that would be observed if all individuals were heads or were living with heads of their same age. However, as shown in the figure, there are clear deviations from this case, especially at the beginning and end of the life cycle.

At the beginning of the life cycle, household heads tend to be older (above the 45-degree line) than other members of their households. This is because there are fewer heads at fairly young ages, and some young individuals still live with their parents. The opposite effect occurs toward the end of the life cycle, when the elderly cease being household heads when they return to live with their children, thus making household heads younger (below the 45-degree line) than other members of their households.

The deviations from the 45-degree line display a common pattern across all countries: the higher the education level, the less likely it is that old people live in a household headed by a person younger than themselves. This suggests that more-educated individuals may have better means by which to support themselves (accumulated saving) during old age. Conversely, families play an important role of smoothing consumption for old people with lower education and with lower earning and saving capacity.

Apart from this commonality, the three countries differ significantly in the relevance of this intergenerational (or extended) household setup. Specifically, this phenomenon seems less prevalent in Mexico than in Russia or Thailand. This finding can also be observed at the regional level, where a larger proportion of old people maintain head-of-household status in Latin America than in East Asia or in Eastern Europe and Central Asia, as shown in table 2.3. The table also illustrates that the proportion of elderly people who are not household heads, and for whom the support of extended families is important, decreases as income levels increase: the share declines from about 30 percent in low-income countries to 10 percent in high-income countries. The reduction is even more striking for females.

Notice that figure 2.27 also provides a visual corroboration of the potential bias due to the

**FIGURE 2.27** The age composition of households varies by age of the household head; more highly educated individuals are less likely to live in a household headed by someone younger

Source: World Bank calculations using household survey data.
Note: In each set of four panels, 0 indicates whole population, 1 population with no education or just primary, 2 secondary education, and 3 tertiary education. Box 2.4 provides details of how the cohorts shown in the panels were constructed. The 45-degree line indicates the cohort profile that would be observed if all individuals were heads or were living with heads of their same age.
Global Saving in 2030

Evolution of systems of old-age income support

In most developing countries, extended families have traditionally cared for the elderly who can no longer work. However, this is changing for the educated population in the four countries analyzed here: the higher the level of education, and thus the higher the level of accumulated saving, the less likely it is that elderly persons join younger households. Thus, rising incomes in developing countries can be thought of as shifting the support system for the elderly from informal provision by relatives to formal provision through pension systems. The shift from informal to formal provision of support for the elderly, which is likely to accelerate as incomes rise in the developing world, changes the nature of the risks the elderly face in sustaining their levels of consumption after retirement. It will also require changes in the regulation of developing countries’ financial systems.

The existence of large pools of saving, and the need to maintain the real value of this change in household composition discussed above. Even if the group of household heads born in the same year is followed through time, the age composition of their households is changing, and this may affect saving decisions beyond the pure (individual head’s) age effect.

Changes in household size during the life cycle also affect household behavior. Figure 2.28 plots household size against the age of the household head for the four countries across different cohorts and education levels. As postulated by Becker (1993) in his economic theory of family formation, there is a trade-off between quantity and quality of offspring. Households with low levels of income tend to opt for more children because they are unable to invest in their human capital. This is clearly visible across all the four countries, where household size is larger for lower education groups.

Additional observations that can be gathered from figure 2.28 are that younger cohorts tend to have smaller family sizes than older ones, and that family sizes differ quite a lot across different countries.20 Once again, these findings can be validated by a broader regional analysis, as shown in figure 2.29 (additional background information on how this figure was generated is discussed in box 2.5).

In the regional breakdown, it is also possible to see that household size declines quite slowly in Eastern Europe and Central Asia, South Asia, and Sub-Saharan Africa after reaching a peak, indicating once again that multigenerational households are common in these regions of the world.

### Table 2.3

The prevalence of intergenerational households varies by country income level and by region

<table>
<thead>
<tr>
<th>Population above 70</th>
<th>Population above 65</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
</tr>
<tr>
<td>Low-income economies</td>
<td>23</td>
</tr>
<tr>
<td>Lower-middle-income economies</td>
<td>30</td>
</tr>
<tr>
<td>Upper-middle-income economies</td>
<td>47</td>
</tr>
<tr>
<td>High-income OECD members</td>
<td>56</td>
</tr>
<tr>
<td>East Asia and Pacific</td>
<td>32</td>
</tr>
<tr>
<td>Eastern Europe and Central Asia</td>
<td>50</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>45</td>
</tr>
<tr>
<td>Middle East and North Africa</td>
<td>5</td>
</tr>
<tr>
<td>South Asia</td>
<td>14</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>42</td>
</tr>
</tbody>
</table>


Note: OECD = Organisation for Economic Co-operation and Development.
saving over several decades, will encourage the growth of financial intermediaries such as pension funds, investment firms, and life insurance companies. The growth of such intermediaries has the potential to improve the efficiency of investment by increasing the involvement by professionals who specialize in evaluating the profitability and soundness of different investment vehicles. On the other hand, the growth of formal pension systems can also present the elderly with new risks, including a reduction in their expected standard of living if their private pension plans incur substantial investment losses or are inadequately regulated. Poorly designed public pension systems present similar investment risks for the elderly in addition to the potential loss of benefits that may accompany a redefinition of benefits or age-related eligibility levels. Changes in the taxation of pensions, or the presence of high inflation that reduces the real value of fixed-income annuities, can negatively affect both private and public pensions. Of course, informal support systems also present significant risks for the elderly, principally in the

**FIGURE 2.28** Household size varies by age of the household head, and this relationship varies somewhat by educational level

*a. Mexico*  
*b. Thailand*  
*c. Russian Federation*  
*d. Ghana*

*Source: World Bank calculations using household survey data.*  
*Note: In each set of four panels, 0 indicates whole population, 1 population with no education or just primary, 2 secondary education, and 3 tertiary education. Box 2.4 provides details of how the cohorts shown in the panels were constructed.*
Global Saving in 2030

Aging will challenge the sustainability of fiscal policy in both developing and advanced countries

Two of the largest components of government expenditures in many countries are health care and pensions. Both of these components require more resources as the average age of the population rises. At the same time, as incomes increase, the share of these expenditures in income tends to rise. Thus, as populations age and incomes continue to increase in developing countries, health care and pension expenditures are likely to grow even more rapidly than incomes. Moreover, tax revenue is heavily dependent on the size of the working-age population, which will shrink in some developing regions in the years ahead. The rising burden of expenditures on the elderly will not be offset by the declines in expenditures on education that one might expect to result from a decreasing share of young people because rising incomes will also lead to increased demand for education per child. Thus, aging and growth can be expected to increase the fiscal burden of age-related expenditures.

This strain on public finances has important implications for national saving. The public component of national saving could contract because of fiscal deficits or reduced public investment. In

FIGURE 2.29 Younger cohorts tend to have smaller family sizes, but this relationship varies significantly across regions

Note: Values in each panel are simple averages. See box 2.5.
addition, various policy changes to counteract demographic pressures—such as tax increases, reduction in coverage or generosity of age-related benefits, or cuts to non-age-related spending—may affect household saving behavior. These important saving dynamics are not explicitly accounted for in the general equilibrium model-generated scenarios; therefore, this section complements the previous analysis, although in a partial equilibrium setting.

Already, pensions are a significant component of the government budget in many developing countries. Pension systems are also potentially highly sensitive to demographic change, so projections of public pension costs are critical for thinking about the magnitude and timing of demographic pressures on overall public finances. Most projections suggest that the increased public spending on health care will be as important as pensions, accounting for roughly half of the increase in age-related liabilities over the next few decades.

The data available on age-related public expenditures by age of recipient (from the National

**BOX 2.5** A global dataset of household censuses provides a nuanced view of saving at the micro level

The data behind figure 2.29 come from censuses that have been carried out in 43 developing countries since the 1960s. These censuses are collected and standardized by the Integrated Public Use Microdata Series, International (IPUMSI, http://international.ipums.org). Table B2.5.1 shows the number of countries by region with available census data.

Using these data, we calculated the year of birth for each household head in the censuses and thus identified all household heads between 15 and 90 years old. Their birth years range from 1870 to 1994. Five-year cohorts were then constructed according to the birth year of the heads. For example, household heads born between 1870 and 1874 belong to cohort 1, while those who were born between 1875 and 1879, to cohort 2, and so on. These cohorts are then followed through time for all the dates for which the censuses were repeated. For most countries, there are at least four or five repeated censuses. The data for the various countries were then averaged to obtain information at the regional level. The averages were calculated as simple averages or as weighted averages where the weights are the population sizes of the countries.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>East Asia and Pacific</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern Europe and Central Asia</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>7</td>
<td>2</td>
<td>9</td>
<td>3</td>
<td>10</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Middle East and North Africa</td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Asia</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>9</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>11</td>
<td>7</td>
<td>21</td>
<td>9</td>
<td>32</td>
<td>9</td>
<td>4</td>
</tr>
</tbody>
</table>


(continued)
Global Saving in 2030

Global Development Horizons

Finally, education expenditures tend to be a larger share of GDP in high-income countries than in developing countries. This implies that even as aging reduces the share of developing countries’ school-age populations, higher enrollment rates and more rapid growth in per-student expenditures than in incomes will limit any decline in total education expenditures relative to GDP.

Although the burden of age-related expenditures will be significant in many countries in the years ahead, age-related expenditures will be highly sensitive to the generosity and coverage of pension and health care systems (the model generating these scenarios is described in box 2.7). Absent changes in benefits and coverage, four of

**BOX 2.5 (continued)**

Family size represented in figure 2.29 is a variable directly coded in the IPUMSI censuses. Smoothed lines connecting the cohort data were plotted by adopting a polynomial approximation. Figure B2.5.1 shows how this polynomial method fits two set of points relating family size and household heads’ age for two separate cohorts (the youngest and the oldest) in an example for República Bolivariana de Venezuela.

**FIGURE B2.5.1** Family size for the first and latest cohort, points and fitted values, República Bolivariana de Venezuela

Transfer Accounts [NTA] project, discussed in box 2.6) show wide variation across countries in the extent to which public transfers rise with age (figure 2.30). Health care transfers to the elderly tend to be much greater in advanced countries, not only relative to GDP per capita but also relative to health care spending at other ages (in per capita terms). This is consistent with findings that, at the micro level, health care at very advanced ages is a luxury good (see, for example, De Nardi, French, and Jones 2010). In the case of public pensions, transfers tend to begin at substantially younger ages in developing countries than in advanced countries; thus, there may be significant room for reforming developing countries’ public pension systems by raising retirement ages. Finally, education expenditures tend to be a larger share of GDP in high-income countries than in developing countries. This implies that even as aging reduces the share of developing countries’ school-age populations, higher enrollment rates and more rapid growth in per-student expenditures than in incomes will limit any decline in total education expenditures relative to GDP.

Source: World Bank calculations using República Bolivariana de Venezuela census data.
the six developing countries considered in table 2.4—Brazil, Chile, China, and Costa Rica—will experience a substantial increase in the fiscal burden of their old-age expenditures as their populations age in future decades. But this calculation may underestimate the potential burden on public expenditures because rising incomes could result in demands for higher benefits and more widespread coverage in countries where the public sector currently provides only limited pension and health-care services.

Some further insight can be gained by comparing (a) projections of public age-related expenditures in individual countries assuming an unchanged policy scenario, with (b) projections assuming convergence with the 2003 benefits and coverage levels offered by a European country with a deep benefit system (Sweden) and (c) convergence with the somewhat lower benefits provided in the United States, which has a more modest public pension program even than most developing countries but high public health care expenditures on the elderly. A path of convergence with Swedish levels of benefits and coverage would be untenable for most developing countries; the resulting increase in the ratio of public transfers to GDP from 2010 to 2050 in the six developing countries ranges from 14 percentage points in India to 47 percentage points in China. Even adopting U.S. coverage and benefits levels would increase the public transfers-to-GDP ratio significantly from current levels, ranging from 9 percentage points in Brazil to 19 percentage points in China.

These scenarios include projections of public health care expenditures. It should be born in mind that speculating on the future of public health care expenditures is subject to more error than predicting pension expenditures because the costs of public health care depend to a large extent on factors beyond the control of policy makers. Prices of medical services and medicines, for instance, are determined at least in part by market conditions—international as well as domestic—and technological innovations not only affect prices but also make altogether new treatments available. Thus, any projections on health care spending have a high degree of uncertainty, even assuming an unchanged policy environment. The changing nature of demand for

**Box 2.6**  
The National Transfer Accounts project is a valuable source of data on age-related public transfers

Data on age-related public expenditures are typically not disaggregated by age group. However, the National Transfer Accounts (NTA) Project\(^a\) aims to measure public transfer inflows and outflows by one-year age cohort, and data for at least some series have been prepared for 21 countries so far. Most of these countries have series on public education, health care, and pension transfer inflows by age, and among these are six developing countries with data on all three: Brazil, Chile, China, Costa Rica, India, and Mexico. The project is still under way; more countries will be added, and some existing data may yet be revised. Data are currently available for only one year for each country, and the year varies by country.

Some countries have undergone significant reforms since the year for which its accounts are available—for example, Brazil, in the case of public pension reform—which have undoubtedly altered age-related expenditures since then, both in terms of magnitude and age distribution. Bearing these caveats in mind, the NTA data are nonetheless useful estimates of age-related public transfers disaggregated by age. The NTA methodology is harmonized so that age distributions of transfers are directly comparable across countries.

\(^a\) The NTA Project is a collaborative effort to measure, analyze, and interpret macroeconomic aspects of age and population aging around the world ([http://www.ntaccounts.org/web/nta/show/](http://www.ntaccounts.org/web/nta/show/)). Funded by an array of public and private sources, the lead institutions for the project are the Center for the Economics and Demography of Aging at the University of California, Berkeley, and the Population and Health Studies Program of the East-West Center in Honolulu. For details on the project, see Lee and Mason (2011) and [http://www.ntaccounts.org](http://www.ntaccounts.org).
FIGURE 2.30 There is wide variation across countries in the extent to which public transfers tend to rise with age

- **a. Brazil, 1996**
- **b. Sweden, 2003**
- **c. China, 2002**
- **d. Japan, 2004**
- **e. Mexico, 2004**
- **f. United States, 2003**

Source: World Bank calculations using data in the National Transfer Accounts (NTA) project (http://www.ntaccounts.org/web/nta/show/).

Note: NTA data are at the one-year age cohort level, in terms of average transfers to a person at that age. They are shown here as percentages of the country’s GDP per capita, in five-cohort rolling averages, for the year for which each country has NTA data available. The vertical axes of the China and Mexico graphs are on a different scale than the graphs of the other four countries.
BOX 2.7 The impact of aging on government budgets is clarified by breaking it down into its components

Fiscal balances are affected by changes in the age distribution of a population mainly because public health care and pension expenditures are greater for older people, education expenditures are greater for younger people, and tax revenue comes mainly from people in their working years. A simple decomposition of expenditures (equation B2.7.1) common in the literature (see, for example, Miller, Mason, and Holz 2011), shows aggregate public expenditures $E$, on a particular program or category of programs (for example, public pensions), as a fraction of GDP $Y$, expressed as the sum across ages of expenditures relative to GDP on people of each age. For each age cohort, this is broken down into average expenditures per person $E_{age}/Page$ (where $C_{age}$ is the population of the cohort), relative to output per working-age person $Y/W$ (where $W$ is the working-age population, for example, aged 20–64 years), and the ratio of the population of each age cohort to the working-age population, for example, aged zero-year-old, relative to avg. output per working-age person.

The above identity can be further disaggregated (equation B2.7.2), separating the average expenditures per person of each age into average expenditures per participant in the program $E_{age}/P_{age}$ and the share of the population of the cohort covered by the program $P_{age}/C_{age}$. This highlights that average expenditures per person in the age group can change because of either an increase or a decrease in the generosity of the system, or because of diminished or expanded coverage.

In principle, all of the above components can be expected to change over time. For example, countries that experience a fall in the ratio of the school-age population to the working-age population are often experiencing rising incomes at the same time (which is typically associated with having fewer children but also with rising school enrollment rates) as well as increased education spending per student (Becker and Lewis 1973). Thus, the first two ratios on the right-hand side of the identity rise while the third falls, and the sign of the net change in education expenditures as a fraction of GDP depends on the relative magnitudes of the effects. However, holding expenditures per person constant relative to average income (or relative to income per working-age adult) can be a useful thought experiment, and in any case there is not always an a priori reason to expect program generosity or coverage to change in one direction or another.

\[
E = \left( \frac{E_{age}}{C_{age}} \right) \times \left( \frac{C_{age}}{W} \right) + \left( \frac{E_{age}}{C_{age}} \right) \times \left( \frac{C_{age}}{W} \right) + \ldots + \left( \frac{E_{age}}{C_{age}} \right) \times \left( \frac{C_{age}}{W} \right), \quad (B2.7.1)
\]

Avg. expenditures on each zero-year-old, relative to avg. output per working-age person

Zero-year-old population, relative to working-age population

Generosity: Avg. expenditures on each program participant in age cohort, relative to avg. output per working-age person

Coverage: Share of the cohort participating in the program

Cohort population, relative to working-age population

\[
E = \sum_{age=0}^{\infty} \left( \frac{E_{age}}{P_{age}} \right) \times \left( \frac{P_{age}}{C_{age}} \right) \times \left( \frac{C_{age}}{W} \right), \quad (B2.7.2)
\]
health services must also be taken into account in assembling any estimate of future costs. At present, health care spending for persons near the end of their lives is much higher in advanced countries than in developing countries. If elderly populations in developing countries begin to demand costlier medical services in their final years, the impact of aging on public finances in those countries will be much greater than it would be assuming a static level of services.

Table 2.4 illustrates that if the generosity of public health care programs were to gradually converge with current U.S. levels, for a number of countries the fiscal burden of health care costs would be roughly double what it would be from aging alone. Sweden, with one of the most lavish public health care systems in the world for its elderly, is an outlier. However, the projections in which generosity converges with Swedish levels are useful—first, for illustrating that U.S. levels are not extraordinarily high for an advanced country (and therefore that convergence with those levels is not unthinkable for developing countries over a time horizon of 40 years); and, second, for illustrating just how greatly outcomes may vary if per capita expenditures are driven up by rising health care costs because the fiscal effect of a large increase in costs would be similar to that of a large increase in generosity. Indeed, the greatest task for governments in preparing for the impact of aging on public health care liabilities may not be to tweak coverage and generosity of conventional systems but to make deep institutional reforms to health care systems so that beneficiaries have stronger incentives to seek low-cost health care options, reducing contingent liabilities stemming from unforeseeable shocks to health care costs.

**TABLE 2.4** The path of age-related fiscal pressures will depend strongly on benefit and coverage levels

<table>
<thead>
<tr>
<th>Country</th>
<th>$E_{age} / C_{age}$</th>
<th>Pensions (%) GDP</th>
<th>Health care (%) GDP</th>
<th>Education (%) GDP</th>
<th>Total change (%) GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>constant</td>
<td>2010 2030 2050</td>
<td>2010 2030 2050</td>
<td>2010 2030 2050</td>
<td>2010–50</td>
</tr>
<tr>
<td>Brazil → Sweden</td>
<td>9.1 10.9 12.8</td>
<td>3.0 3.5 4.5</td>
<td>2.6 1.9 1.7</td>
<td>12.4</td>
<td></td>
</tr>
<tr>
<td>Brazil → United States</td>
<td>9.1 14.2 11.0</td>
<td>3.0 4.6 8.8</td>
<td>2.6 3.0 3.6</td>
<td>8.7</td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td>constant</td>
<td>5.5 8.8 11.7</td>
<td>2.2 2.6 2.9</td>
<td>2.2 1.7 1.5</td>
<td>6.3</td>
</tr>
<tr>
<td>Chile → Sweden</td>
<td>5.5 11.1 18.2</td>
<td>2.2 6.3 15.0</td>
<td>2.2 4.8 7.2</td>
<td>30.5</td>
<td></td>
</tr>
<tr>
<td>Chile → United States</td>
<td>5.5 9.5 11.8</td>
<td>2.2 4.7 9.8</td>
<td>2.2 3.0 3.8</td>
<td>15.5</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>constant</td>
<td>3.4 5.9 8.1</td>
<td>1.7 2.2 3.0</td>
<td>2.1 1.6 1.5</td>
<td>5.4</td>
</tr>
<tr>
<td>China → Sweden</td>
<td>3.4 13.6 33.7</td>
<td>1.7 5.4 14.3</td>
<td>2.1 4.0 6.4</td>
<td>47.2</td>
<td></td>
</tr>
<tr>
<td>China → United States</td>
<td>3.4 7.0 12.8</td>
<td>1.7 4.2 9.7</td>
<td>2.1 2.5 3.3</td>
<td>18.6</td>
<td></td>
</tr>
<tr>
<td>Costa Rica</td>
<td>constant</td>
<td>4.3 7.1 11.0</td>
<td>4.7 5.4 6.8</td>
<td>4.2 3.0 2.6</td>
<td>7.2</td>
</tr>
<tr>
<td>Costa Rica → Sweden</td>
<td>4.3 9.8 20.3</td>
<td>4.7 6.8 13.4</td>
<td>4.2 5.4 6.7</td>
<td>27.2</td>
<td></td>
</tr>
<tr>
<td>Costa Rica → United States</td>
<td>4.3 7.3 11.1</td>
<td>4.7 5.6 8.9</td>
<td>4.2 3.6 3.5</td>
<td>10.4</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>constant</td>
<td>1.0 1.2 1.4</td>
<td>2.3 2.4 2.6</td>
<td>1.7 1.3 1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>India → Sweden</td>
<td>1.0 1.6 2.9</td>
<td>2.3 4.4 8.1</td>
<td>1.7 5.7 8.2</td>
<td>14.3</td>
<td></td>
</tr>
<tr>
<td>India → United States</td>
<td>1.0 3.6 6.9</td>
<td>2.3 3.4 5.7</td>
<td>1.7 3.3 4.4</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>constant</td>
<td>1.5 2.3 3.2</td>
<td>2.1 2.2 2.6</td>
<td>3.5 2.5 2.0</td>
<td>0.8</td>
</tr>
<tr>
<td>Mexico → Sweden</td>
<td>1.5 8.0 22.0</td>
<td>2.1 5.0 11.9</td>
<td>3.5 5.9 7.6</td>
<td>34.4</td>
<td></td>
</tr>
<tr>
<td>Mexico → United States</td>
<td>1.5 4.1 9.8</td>
<td>2.1 3.8 8.0</td>
<td>3.5 3.7 4.0</td>
<td>14.8</td>
<td></td>
</tr>
</tbody>
</table>


Note: Figures in the table are estimated using age distribution data on public transfers (from the National Transfer Accounts [NTA]) and projected demographic change. The 2010 pension expenditures are calibrated to public pension expenditure estimates given in IMF (2011). The NTA data are combined with population projections by five-year age cohort from the United Nations. The methodology underlying the projections is given in online annex 2.3. $E_{age} / C_{age}$ denotes average expenditure on each person of a given age, relative to average output per working-age person; additional details are given in box 2.7.
Overall, these simple scenarios suggest not only that the fiscal challenge of rising old-age-related costs in the coming decades will be significant but also that gradual changes in benefits or coverage can have an impact as great as that of demographic change. These scenarios should be viewed as illustrating the potential impact of aging on fiscal balances, not as forecasts of expenditure levels. Additionally, it is important to recognize that the evolution of government saving patterns in the future will depend on other changes that have the potential to moderate the fiscal impact of aging: for example, pension reform, tax reform, labor market reform, changes in labor market participation, and changes in non-age-related public expenditures.

Aging will increase the cost of public pensions

When considering a broader sample of countries than that of the National Transfer Accounts project, it is clear that pension expenditures are set to rise substantially relative to GDP across the developing world (table 2.5). This scenario assumes no change in pension coverage or policies, so that expenditures per person at each age are held constant relative to GDP per working-age person, and changes in expenditures as a share of GDP are driven purely by the changing age distribution of the population. Lacking data on the distribution of expenditures across age cohorts for most of these countries, an approximation is made by assuming that average pension payments are the same for all ages 50 and older, and zero for ages under 50. Under this assumption, pension expenditures as a share of GDP change proportionally to a modified dependency ratio (the methodology is given in online annex 2.3).

Developing countries vary widely in their exposure to rising pension costs. Countries in Latin America, Eastern Europe, and the Middle East and North Africa (to the extent that a generalization can be made based on the Arab Republic of Egypt and Jordan) generally face significant increases in their pension liabilities in the decades ahead. These increases are due mainly to ballooning retirement-age populations and much less to declining working-age population shares, although, from the 2030s on, the latter will be a significant factor in China and also in Brazil given the enormous scale of Brazil’s current public pension system and thus the sensitivity of its fiscal balance to even modest demographic shifts. Some East Asian countries, as well as India, Mexico, Pakistan, and South Africa, do not face enormous pressure because they do not have large public pension systems.

Increases in pension expenditures as a share of GDP can imply significant increases in dollar values. For example, if Turkey’s GDP growth averages 4.2 percent from 2010 through 2030 (in line with a range of projections), then an increase in pension expenditures from 6.3 percent of GDP in 2010 to 9.6 percent in 2030 would imply annual growth of 6.4 percent—more than tripling expenditures in constant dollars. Countries facing the prospect of this kind of sustained growth in pension liabilities will need to consider means of reducing coverage and/or benefits or make large cuts in other areas of expenditures.

The two most dramatic projections in table 2.5 are for Brazil and Ukraine, where pension costs would exceed 20 percent of GDP by 2050. Brazil made significant reforms in 1999 and 2003, but more will be necessary soon because the aged dependency ratio is set to nearly double by 2030. In 2011, Ukraine enacted overdue but politically unpopular reforms to overhaul its already quite fiscally burdensome, Soviet-era public pension system, in part by raising retirement ages (this change is not reflected in the scenario).

For countries with unsustainable pension systems, several avenues of reform are available. It may be necessary to reduce payments per recipient, relative to contributions. Policy makers can generally adjust the generosity and coverage of pension systems, subject to political constraints; in most cases, the promise of future pension payments is implicit—an intergenerational agreement that is not legally binding—and is subject to renegotiation. But significant headway can also be made by the relatively straightforward route of raising retirement ages. This change would have the added benefit of expanding the labor force, thus adding to economic growth and tax revenues. There is considerable scope for later retirement in some countries, and pension systems are...
not always designed well to encourage labor force participation by those in their mid-50s to 60s who are still able to work productively. For example, even after the last round of reforms, the average retirement age of those who retire under Brazil’s Length of Contribution rule is 54 for men and 51 for women (Gragnolati et al. 2011). In China, the statutory retirement age is 60 for men and 55 for women. With adult mortality rates and fertility both falling, the average length of retirement and the ratio of retirees to the labor force is set to rise dramatically in China, and policies aimed at later retirement have been among the main reforms being discussed to address this.

A more fundamental reform is to transition from a pay-as-you-go to a funded system.
number of countries are making the change, particularly in Latin America and Eastern Europe. The transition itself is costly, but the switch to a funded system is a long-term fix, relieving the government of the imbalance between inflows and outflows that results from demographic change. It is also noteworthy that the change can be expected to have a positive impact on total national saving, provided that the funding of the system is financed by taxation rather than public borrowing.  

The fiscal burden of aging will affect the composition and level of national saving

As shown above, public saving has not shown any strong trend historically at the global level, either up or down. It did rise noticeably for a few years leading up to the 2007–09 global financial crisis but quickly returned to its normal historical range of 10–20 percent of global GDP when the crisis hit. Even if public saving does resume an upward trend in the next few years, the scenarios just discussed suggest that, in the medium to long run, most countries will face pressure on public finances—in some cases, quite severe pressure—from the aging of their populations, and this can be expected to constrain public saving. Furthermore, developing countries may face significantly greater demand for infrastructure as economic growth proceeds (see chapter 1); and if public saving levels need to be kept up to support rising infrastructure investment without running sustained fiscal deficits, demographic considerations will be still more pressing.

Looking forward, gross public saving will likely stay in the range that it has been in for the past several decades, constituting roughly 10–20 percent of gross national saving. This is required for the public sector to play a significant role in any sustained investment in infrastructure. To maintain this level as age-related expenditures increase, policy makers will have a few options. In the short to medium term, they may run fiscal deficits, but this solution is not sustainable and only delays inevitable costly adjustments to long-term demographic shifts; indeed, running deficits will only burden the government with debt, making the fiscal situation still worse in the future. One long-term option is to raise taxes, which may carry with it a political cost but will probably be a component of any balanced policy package to adapt to aging. Second, unnecessary and wasteful spending will have to be cut in non-age-related areas; the areas and scope for cuts vary by country, but most developing countries have space for non-age-related expenditure cuts that can go part of the way toward freeing fiscal space for age-related liabilities. Third, reforming the scale and institutional design of public pension and health care systems will be essential. This process is already under way in a number of countries facing the most imminent pressure from aging, but it will need to be accelerated in many countries.

The path of age-related public expenditures has important implications for household saving as well as public saving. Increased generosity and coverage of public health care and social security programs is associated with significant reductions in household saving, all things equal; not only is there less need to smooth consumption over the life cycle, but precautionary saving is also reduced because public programs play an insurance role, pooling the risk associated with the uncertainty of lifespan and health care needs. The effect can work in reverse as well: China experienced this during the 1990s and 2000s, with urban household saving rates increasing as social safety nets were scaled back.

Over the coming decades, developing countries will experience some of the typical increases in demand for public services that have, historically, accompanied rising incomes. But at the same time, governments’ ability to ramp up pension and health care programs will be constrained by aging to a much greater extent than high-income countries experienced when they were going through a similar stage of economic development. If governments do not follow the path that high-income countries did in the past, and instead reduce the generosity or coverage of age-related programs in the face of a swelling number of beneficiaries, then private saving can be expected to rise because a greater proportion of retirement and health care costs will be paid for out of pocket. Increased generosity and coverage
of education systems should be feasible because the fiscal impact will be offset by the decreasing number of children as a share of the population. Pensions and health care are a different story, and there will likely be an important role here for markets, and private saving, alongside public programs. Higher tax rates will also affect household saving, so even if public saving does not fall, private saving can be expected to fall if tax hikes constitute a large part of the policy response, and, in this case, total national saving will fall.

**Conclusion and policy directions**

The downward pressure on saving rates associated with the aging of the global population through 2030 is unlikely to become a severe constraint on growth overall. However, some crucial policy challenges lie ahead, especially for those countries affected by more rapid aging and with less potential for productivity catch-up. This chapter outlines two of the main challenges: first, the potential pressure of old-age-related public expenditures on government finance, and second, the concentration of saving, in terms of both amounts and rates, within a restricted segment of the population.

Looming policy challenges with respect to government finances include uncertainty about the rate at which old-age-related expenditure will increase and the lack of policy frameworks to deal with this long-term issue. As Heller (2003) clearly put it: “While budgets increasingly encompass a medium-term framework of three to five years, few countries provide long-term scenarios. . . . Most countries’ sustainability analyses focus on their ability to service current debt and anticipated future deficits. . . . Projections of broader fiscal aggregates lack credibility, because they are based on unchanged policy assumptions, current laws, or constant shares of revenues and expenditure in output. Budget processes also lack mechanisms to foster debate on policy commitments or guarantees whose fiscal consequences emerge only over the long term.” (emphasis added)

A fundamental policy choice with respect to the allocation of the burden of demographic change is about its distribution between future retirees and future workers. The menu of policy choices includes lower standards of living for retirees, longer working lives, higher saving during the working life, and larger transfers from workers to retirees.

Most developed countries have opted for (or are considering) a mix of a delayed retirement age, increased private saving for retirement (through favorable tax regimes), and reformed public pension systems—while most have rejected the option of declining living standards for the elderly (see Pensions Commission 2005 for the United Kingdom).

Depending on its position in the demographic transition, a specific developing country will more likely be successful in applying one or a mix of these options. For example, countries at early stages of their demographic transition, such as the Sub-Saharan countries, could probably set up tax incentives to encourage saving. A key issue is assessing whether tax-deferred individual retirement saving crowds out other forms of saving. The literature on the United States finds little evidence that 401(k) contributions substitute for other forms of personal saving (Poterba, Venti, and Wise 1996; Benjamin 2003; Geller 2011).

For other regions, longer working lives and larger transfers may be a better solution. As described in the chapter, there are some strong rationales for transfers to elderly households: (a) redistribution (productivity growth will raise incomes of future cohorts, and public programs are replacing family transfers); and (b) correction of market failures such as limited insurance markets against the risk of long-term care needs.

For developing countries with an increasingly large share of old people, an often overlooked policy challenge consists of recognizing the heterogeneity among the elderly. This is not a homogeneous group, but it varies in terms of financial disparities, health status, capacity to work, and life expectancy. For example, recent research on labor market conditions at older age (Gruber and Wise 2007) has found that higher tax on earnings from ages 55 to 69 is positively correlated with unused labor capacity (workers aged 55 to 65).

Regarding the second issue—the concentration of saving within restricted population segments—this chapter highlighted that the within-countries high concentration of saving
and wealth may create inequality traps that have negative implications for economic mobility and thus for the political and social consensus essential for growth. In fact, the recent literature has emphasized other, more direct channels through which inequality may affect productivity and growth. A main lesson from this body of work (see World Bank 2005) is that in the highly imperfect markets of poor countries, individuals without enough wealth or social status would tend to underinvest or use their resources for some less productive purpose, reducing economy-wide productivity. And the related broad policy advice has been to reduce the unequal access to finance. A simple initial step could include improving financial literacy: many households lack adequate knowledge and decision-making tools when it comes to credit markets. An interesting example is offered by a policy intervention in Mexico consisting of an information campaign on how to use the banking system to channel remittances toward investment rather than immediate consumption.

The chapter has also shown that consistently the least-educated groups have low or no savings, suggesting an inability to improve their earning capacity and, for the poorest, to escape a poverty trap. Leveling the playing field in terms of education opportunities would thus have the added benefit of boosting private saving.

Notes
1. Note that for maximizing country coverage for comparison across time, the figures in this paragraph represent ratios of saving to gross domestic product (GDP). Following standard practice, the rest of the chapter uses ratios of saving to gross national income (GNI).
2. Undoubtedly, the composition of countries is not static over time, and the data reported generally use the maximum available sample coverage. However, these variations in the sample over time do not alter the main qualitative messages in the text.
3. As discussed more extensively in relation to the scenarios of saving in the coming two decades, financial deepening is associated with lower rates of saving, which may also help explain why saving rates have tended to stay low in Latin American countries.
4. There are, however, some empirical findings that are inconsistent with the life-cycle model: for example, preference for default saving plan options, demand for commitment devices that tie one’s hands in making saving decisions, and evidence of habit formation in saving behavior (Arta-nasio and Weber 2010).
5. Detailed results are reported in online annex 1.5, and for a technical description of how the econometric estimates are used in the CGE model, see online annex 1.6; all annexes are available at http://www.worldbank.org/CapitalForTheFuture.
6. “Conditional” in the sense that the relationship between saving rate and per capita income growth takes into account the effects from other determinants—in this specific case: lagged saving, per capita GDP, financial development, aged dependency ratio, social protection (and other controls as shown in specification S4 in online annex 2.5)—whose contributions are held constant.
7. The UN’s high scenario estimates that the world population will reach 36.4 billion by 2300, and the low scenario estimates 2.3 billion.
8. The global demographic transition is assumed to last three to four centuries. It started in Europe around 1700, and it will probably be complete for the whole world in 2100. Figure 2.12 thus depicts only a “snapshot” of about 60 years of this three- or four-century process.
9. Note that the heterogeneity highlighted in figure 2.13 still masks the full heterogeneity because countries within each group differ in their demographic transition. In the case of high-income countries, there are sharp differences between Europe and the United States. In the former, fertility rates are quite below the replacement rate and net migration has been slow.
10. The dominance of the financial development effect can also be verified by separately running the scenario with only the change in productivity or only the change in financial development (not reported, but available on request). Performing such a decomposition makes it clear that the effect of a reduction in the saving rate in developing countries is, indeed, due primarily to more rapid financial development.
11. Economists have been interested in the relationship between economic inequality and saving since the original observation of Kaldor (1957) that the rich should have a higher propensity to save than the poor, and thus higher inequality should have a positive effect on saving. In fact, various post-Keynesian models (Lewis 1954; Pasinetti 1962)
stress the link between the functional distribution of income and saving. These models conclude that redistribution (for example, via differential tax rates) toward profits from wages should increase saving because capitalists tend to have higher propensities to save than workers. More recent research has focused on the personal distribution of income, but empirical analyses have not yet found a significant relationship between income inequality and saving (see Leigh and Posso 2009 for a recent example).

12. These micro decisions can sometimes be aggregated to create a representative household within an economy. In these cases, an aggregate “macro” approach and a “micro” approach provide the same type of results and could be used interchangeably. But this is not always possible, and, for the many cases where there is an “aggregation problem,” these two approaches provide different and complementary insights. This problem exists whenever the aggregate agents’ behavior, such as aggregate private demand, cannot be “treated as if it were the outcome of the decision of a single maximizing consumer” (Deaton and Muellbauer 1980, 148). The conditions for aggregation are quite severe and break down easily in the presence of discontinuities and nonlinearities. Consider, for example, the case of participation in the labor market. Theory says that participation should increase with the wage rate. At the micro level, this can be obtained as increasing hours for an already employed individual or as the entrance in the market of someone who was not working. The effects, in terms of income distribution, may be very different in these two cases. However, at the macro level, it is impossible to model these two alternatives with an aggregate representative worker (even if the number of representative workers is greatly increased). And comparable cases, where aggregation conditions do not hold, arise in almost all markets with imperfection and asymmetric information: goods, credit, education, and others.

13. Note that this simulated growth rate approximates the growth rate of the rapid convergence scenario of the global general equilibrium model described in the macroeconomic projection section.

14. In the simplest version of the life-cycle model, consumption-smoothing individuals save during their working years to purchase assets that they will sell later in life to finance consumption (in other words, they dissave later in life). Without income or population growth, the model predicts that there will be a constant ratio of wealth to earnings in the economy and no economy-wide net savings. However, if the population is expanding, the total amount of saving by the young will be larger than the total amount of dissaving by the elderly. Similarly, even if the population shares of savers and dissavers are constant, growth in income (per capita) implies that the working-age population has a higher lifetime income and that the economy will accumulate more wealth than that held by the elderly. Thus, the saving rate rises as population or income (or both) grow.

15. The fact that the lines representing these education proportions for the various cohorts tend to be quite flat means that as cohorts proceed along their life cycles, their composition in terms of education does not change much.

16. Note that this long-term trend is captured by the cohort effect given the estimation restrictions imposed on the time dummies, as these sum to zero and are orthogonal to a time trend and thus they pick up deviations from a long stable trend.

17. Income is more likely to be underestimated for poor households because of greater informal and in-kind components, thus biasing imputed saving downward for these households. Underestimation could also arise from temporary fluctuations in income; temporary low-income levels in a cross-section would correspond to negative saving rates.

18. For Ghana, Mexico, Russia, and Thailand as a group, the share of households with a head with tertiary education has risen from 6–10 percent of the total in the 1980s or early 1990s to 20–25 percent in the late 2000s.

19. This is consistent with findings in the literature. For example, López-Calva and Lustig (2010) show that a large part of the recent reduction of inequality in Latin America is due to the entry of a greater number of educated people into the labor market and the related reduction of skill premia in wages.

20. The vertical distance between cohorts—in this case, the difference in household sizes for two cohorts at the same age—cannot always be interpreted as a pure cohort effect. Because cohorts are observed at the same age but in different time periods, the vertical distance may be due to a year effect. However, it may be difficult to justify that year effects are important for a variable such as household size (or number of children). Therefore, in this specific case, the vertical distances can be assumed to represent the cohort effect.

21. The general equilibrium model includes government saving; however, consistent with its long-run nature, it assumes that each government’s deficit
(or surplus) remains small and fixed throughout the projection period. Any change in public expenditure is compensated by an immediate counter-balancing change in direct taxes. In other words, households’ disposable incomes are affected directly by changes in public expenditures, and this affects their saving decisions.


24. In the case of pensions, paths of public expenditures can be reasonably approximated without detailed cohort-level data because transfers come almost entirely from one age group and go almost entirely to another. Thus, the projections given in table 2.5 are not limited to countries with NTA data. Details are given in online annex 2.3.

25. For a primer on public pension reform, see Jousten (2007).

26. Under Brazil’s Length of Contribution rule, men are eligible for a pension after making contributions for 35 years (30 for teachers), and women are eligible after making contributions for 30 years (25 for teachers).

27. It is worth noting that an increase in retirement age tends to reduce household saving because lifetime income rises and expected length of retirement falls (Barrell, Hurst, and Kirby 2009). Also, the increased expected future size of the labor force should tend to raise investment demand.

28. Samwick (2000) estimates that a country with a provident fund or fully funded system tends to have an average saving rate that is 3.68 percentage points greater than a country with a pay-as-you-go system, all things equal. Part of the explanation is that intergenerational Ricardian equivalence does not hold; Loayza, Schmidt-Hebbel, and Servén (2000) find that Ricardian equivalence does not hold empirically, even in the long run.

29. Gross public saving is linked with public investment; because gross public saving is defined as current revenues minus current expenditures, and public investment is not included in current expenditures, for a given fiscal balance (total revenues minus total expenditures) gross public saving must rise 1-for-1 with public investment.

30. For an example of methodology for estimating the scope for cutting non-age-related expenditures (applied to European countries), see Heller and Hauner (2006).

31. Baldacci et al. (2010) finds that for OECD countries from 1990 to 2008, an increase in social security spending of 1 percent of GDP reduced household saving by 0.22 to 0.29 percent of GDP, and an increase in public health spending of 1 percent of GDP reduced household saving by 0.70 to 0.78 percent of GDP (evaluated at the respective sample means). Chou, Liu, and Hammit (2006) find a qualitatively similar impact of public health care provision in Taiwan, exploiting the natural experiment of an expansion of public health insurance coverage.

32. Although there are many factors behind high saving in China, Chamon and Prasad (2010) identify the rising private burden of education and health care expenditures, and increased precautionary saving, as important drivers of a 7 percentage point increase in the urban household saving rate between 1995 and 2005.

References


Integrated Public Use Microdata Series (IPUMS) database, University of Minnesota, Minneapolis. https://international.ipums.org/international/.


World Bank Financial Inclusion database, World Bank, Washington, DC.

World Bank Financial Structure and Development database, World Bank, Washington, DC.


