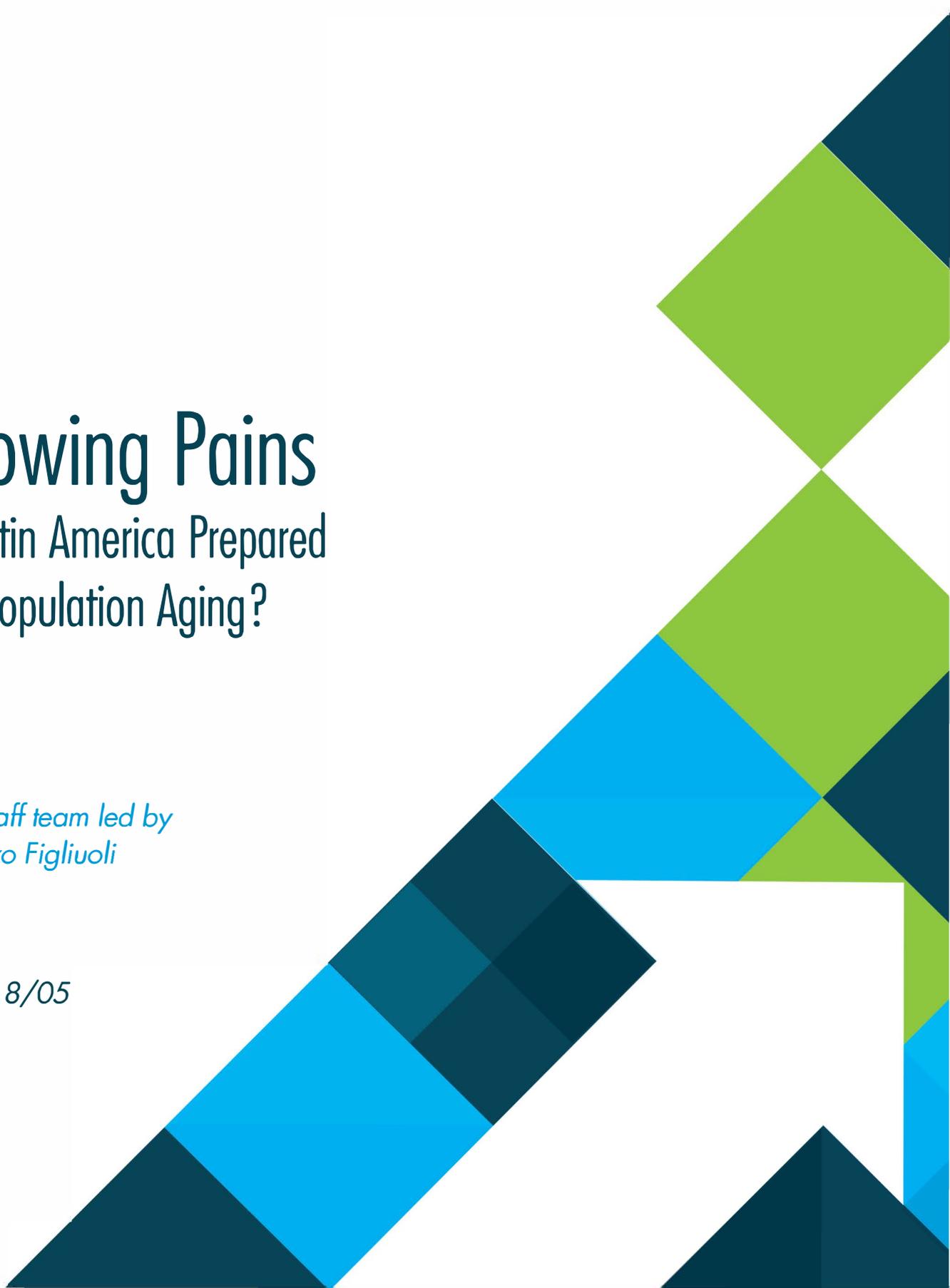


Growing Pains

Is Latin America Prepared for Population Aging?

*IMF staff team led by
Lorenzo Figliuoli*

No. 18/05



Western Hemisphere Department

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Is Latin America Prepared for Population Aging?

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Executive Summary

This paper estimates the fiscal costs of population aging in Latin America and provides policy recommendations on reforms needed to make these costs manageable. Although Latin American societies are still younger than most advanced economies, like other emerging markets the region is already in a process of population aging that is expected to accelerate in the remainder of the century. This will directly affect fiscal sustainability by putting pressure on public pension and health care systems in the region that are already more burdened than, for example, in emerging Asia, a region with a similar demographic structure. A stylized cross-country exercise, drawing on demographic projections from the United Nations and methodologies developed by the IMF to derive public spending projections, is used to quantify long-term fiscal gaps generated by population aging in 18 Latin American countries.¹

Several aspects of current pensions and health care systems in Latin America make the region's long-term fiscal positions particularly vulnerable to population aging.

- Most countries in the region have defined benefit pay-as-you-go pension systems that are relatively generous and typically underfunded. While retirement ages are in line with international averages in many countries, in several cases replacement rates are above, and contributions below, those in high-income countries, making these systems fiscally unsustainable. On the other hand, defined-contribution systems introduced in the 1990s are generating replacement rates that may be below socially acceptable levels and as such may ultimately also not meet their intended objectives of reducing long-term fiscal liabilities.

¹Long-term fiscal gaps are measured as the present discounted value of future spending increases as a share of GDP.

- Health care spending in Latin America is on average relatively high compared with other emerging markets, and it is projected to converge to similar levels as in advanced economies over the long term.
- At the same time, coverage of contributory pension and health care systems are comparatively limited, reflecting both relatively low (female) labor participation and the large incidence of informality in the region. While many countries have achieved higher coverage through minimum noncontributory pensions and health insurance, this might have negative implications for fiscal sustainability down the road. More generally, further extending coverage of underfunded pension and health care systems, in the absence of their reforms, is only likely to increase fiscal liabilities over the long term. This highlights the need to carefully consider trade-offs in all countries between ensuring adequate levels of coverage and containing long-term fiscal costs.

Carefully designed reforms will be needed to ensure financial sustainability while providing socially acceptable levels of coverage and adequacy of pensions and health care.

- Policies to change underlying demographics by promoting fertility and immigration may have limited effectiveness given deep-rooted social and economic trends driving the aging process.²
- Policies aimed at promoting labor participation, particularly by females—given their low participation by international standards, with the significant exception of Brazil—and the elderly—would help delay the impact of aging. Policies to reduce informality from currently high levels by international standards—especially in countries like Bolivia, Guatemala, and Honduras—would also help in this regard.
- Parametric reforms will be needed to ensure long-term sustainability of pension systems. As in the rest of the world, most countries in Latin America would benefit from gradual increases in retirement age in line with increases in life expectancy, particularly for women. This would have to be complemented with a combination of increases in contributions—especially in countries where these are comparatively low, such as Costa Rica, Guatemala, Honduras, and Nicaragua—and reductions in benefits in countries with high replacement rates, such as Venezuela, Ecuador, and Paraguay. Higher contribution rates will also be needed to ensure pension adequacy in countries with defined-contribution systems, especially those with comparatively low current and projected replacement rates, such as Chile and Mexico. In

²Immigration is unlikely to be a permanent solution because ultimately immigrants would be subject to the aging process, thereby adding pressures on pension and health care systems.

all cases, these parametric reforms would have to be carefully balanced with concerns regarding incentives for informality.

- In health care spending, the emphasis should be on budget controls and efficiency-enhancing measures to contain spending while preserving health outcomes and ensuring equitable access to basic health care services.

Introduction

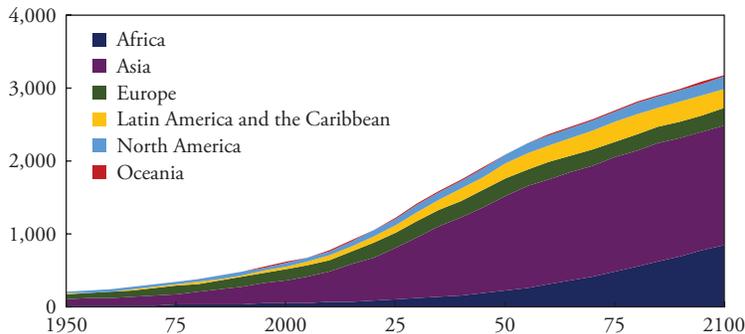
Worldwide Decline in Fertility and Increase in Longevity

The world is experiencing a wide-ranging demographic transformation. The 20th and early 21st centuries were characterized by an unprecedented growth of the global population, from 1.6 billion people in 1900 to 7.3 billion people in 2015. During the 21st century, this trend is expected to level out, leading the global population to peak at 11.2 billion in 2100 (UN 2015). For the first time in more than a century, a significant number of developed countries are already seeing their populations decline. By 2100, the share of countries with shrinking populations is expected to increase from 10 percent to more than 65 percent, including many of today's less developed economies (IMF 2015).

The demographic transformation is driven by higher longevity and lower fertility, two consequences of enormous economic and social progress. The population boom of the 20th century was enabled by dramatic improvements in living standards and medical innovation, which doubled the global average life expectancy from 30–40 years in 1900 to just over 70 years in 2015. The current slowdown, in contrast, is a consequence of a sharp decline in fertility rates from almost five births per woman in 1900 and 1950 to 2.5 births per woman in 2015. The decrease in fertility is due to a variety of factors, including improved education and employment opportunities for women, wider access to modern contraceptives, the introduction of public transfer systems (which reduce the need to have children as a retirement support), the economic transition towards industrialization and urbanization, as well as changes in personal preferences and societal value systems.

Together, the decrease in mortality and fertility are leading to an older population. Between 1950 and 2015, the number of people in the world ages 60 years or older more than quadrupled from 202 to 901 million, and it is pro-

Figure 1. Population Ages 60 and Older
(Millions)



Source: United Nations 2015. *World Population Prospects: The 2015 Revision*.

jected to keep climbing, reaching nearly 2.1 billion in 2050 and 3.2 billion by 2100 (UN 2015; Figure 1). The number of people ages 80 years and older is growing even faster, more than tripling in number by 2050. Accordingly, by the end of the 21st century, the median age of the global population is projected to increase to just under 45 years from under 30 years in 2015.

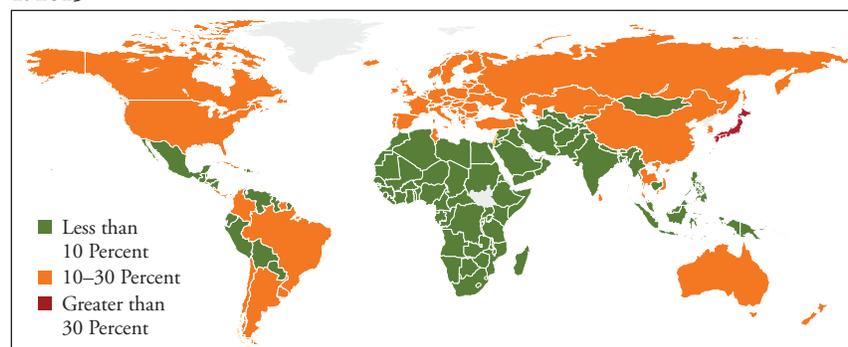
While population aging is a global phenomenon, the aging process is more advanced in some regions than in others. Although the share of older persons in the total population is increasing virtually everywhere, having begun more than a century ago in countries that developed earlier, the aging process is most advanced in high-income countries. With 33 percent of people ages 60 years or older in 2015, Japan has the world’s oldest population, followed by Germany (28 percent), Italy (28 percent), and Finland (27 percent). However, the pace of population aging in developing regions today is substantially faster than it occurred in developed countries in the past. Moreover, while the growth rate of the older population in more developed regions is projected to slow in the coming decades, it is accelerating in developing regions. Consequently, projections indicate that nearly 80 percent of the world’s older population will live in the less developed regions by mid-century and about 90 percent by the end of it (Figure 2).

Economic and Fiscal Implications

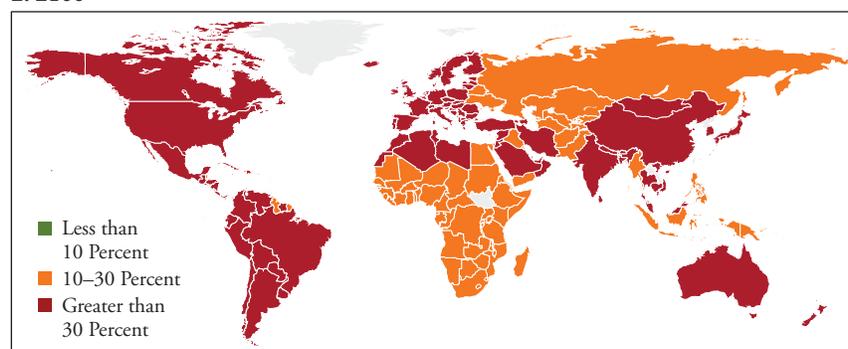
Falling fertility rates create a short-term demographic dividend, followed by a longer-term demographic drag. The decline in fertility rates creates a window of opportunity for economic growth by temporarily increasing the share of the working-age population relative to children and by allowing more women to participate in the labor market. As the parent generation retires, however, this demographic dividend can turn into a demographic

Figure 2. Population Ages 60 and Older in Latin America

1. 2015



2. 2100

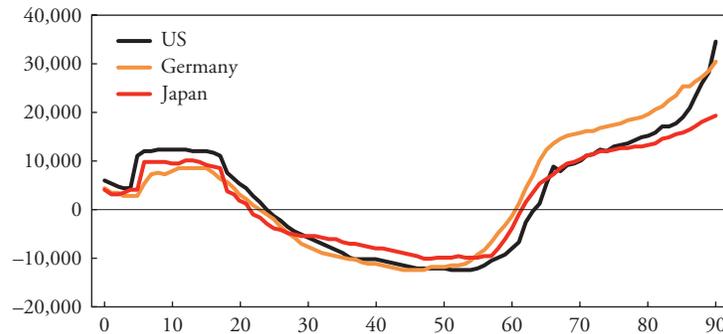


Source: UN 2015.

drag. Although increases in labor market participation and employment can temporarily mitigate the relative shrinkage of the working-age population, the longer-term potential of labor market policies is limited against the backdrop of a far-reaching demographic transformation in which the active population shrinks relative to the inactive one. In such a situation, long-term economic growth can therefore be sustained only by strong growth in overall productivity (MGI 2015).

Population aging also has complex and potentially adverse consequences on productivity growth. Falling fertility rates can initially have positive effects on productivity growth, as smaller families enable parents to invest more into the education and health of each child. Over the longer term, however, an older workforce can have adverse effects on productivity if elderly workers are less innovative or productive than younger ones. Empirical estimates suggest that an increase in the share of older workers by 1 percent has been associated with a reduction in annual productivity growth per worker in the order of 0.2–0.6 percent in Europe and the United States (IMF 2016; Maestas, Mullen and Powell 2016). Other academic studies are more optimistic, suggesting

Figure 3. Net Public Transfers by Age
(\$ PPP)



Source: National Transfer Account, 2003–04.

that individual and firm behaviors may adjust in a way that allows workers to stay productively employed for longer, and that investments to improve human capital can offset some of the quantity effects of a shrinking labor force (Bloom, Canning and Fink 2011; Prettnner, Bloom, and Strulik 2013).

Population aging directly affects fiscal sustainability by putting pressure on public pension and health care systems. The most direct economic effect of aging concerns social security and social assistance programs, which is reflected in the major increase in net government transfers (including both taxes and spending) per person after the age of 65 in major advanced economies for which data are available (Figure 3).

Most public pension and health care systems are financed by contributions from working-age adults while being used disproportionately by elderly people. Aging populations imply that more people rely on public pension and health care services at the same time that the size of the working-age population that can contribute to these systems shrinks. The global old-age support ratio indicates that the number of working-age people (ages 15 to 64) per elderly person (ages 65 and older) has already declined from 11.9 in 1950 to just under 7.9 in 2015, with the fall in Latin America lagging only those in high-income and eastern European countries (see Table 1). This tendency is projected to accelerate over the next decades, dropping by half until 2050 (to 4) to a third of the current level (to 2.7) by the end of the century.

For less developed regions, the economic and fiscal implications of aging may be particularly challenging. Although developing countries may temporarily experience higher productivity growth, they may face greater challenges to afford adequate social protection schemes for the elderly. As a report by the Center for Strategic and International Studies notes, “the United States, Europe, and Japan all became affluent societies before they became aging

Table 1. Global Old-Age Support¹

	1950	2015	2050	2100
World	11.9	7.9	4.0	2.7
High-Income Countries	8.7	4.1	2.3	1.9
Sub-Saharan Africa	17.2	17.5	12.5	4.8
Southern Asia	16.4	12.0	5.0	2.2
Southeastern Asia	15.4	11.4	4.1	2.5
Eastern Europe	11.0	4.7	2.5	2.4
Latin America and the Caribbean	15.9	8.8	3.2	1.7

Source: United Nations Population Division.

¹The support ratio is the ratio of the population aged 15–64 per 100 population aged 65+.

societies, Latin America may grow old before it grows rich” (Jackson, Strauss, and Howe 2009; see also Bloom, Canning, and Fink 2011).

Objective

This paper aims to provide an estimate of the fiscal costs of population aging in Latin American countries.¹ It does so by providing projections for both pension and health spending and the long-term fiscal gaps that emerge from rising expenditures in aging societies. Fiscal gaps are measured by the present discounted value of future increases in pension and health expenditures as a share of GDP.

The existing literature on population aging in Latin America is extensive. The World Bank and the Inter-American Development Bank (IDB), in particular, have published a number of reports on population aging and pensions. In a World Bank volume on Latin America, Saad (2011) discusses demographic trends and Miller, Mason and Holz (2011) make projections for age-related public spending in 10 Latin American countries. The OECD, IDB, and World Bank (2014) and Bosch, Melguizo, and Pagés (2013) focus on the issues of pension coverage and adequacy in the region. Recently, there has also been a focus on the expansion of social security systems, with 14 detailed case studies on noncontributory pension schemes compiled by Rofman, Apella and Vezza (2015).

This report adds to the existing literature by making long-term forecasts of both pension and health spending and providing policy recommendations. Drawing on the demographic projections from the United Nations (UN 2015) and the data on current pension and health care systems from the U.S. Social Security Administration (SSA 2016), this report uses the methodology developed by the IMF (Clements and others 2015) to derive public spending projections up to 2100. It also uses a range of national sources to refine the

¹For the purpose of this report the Latin American region includes 18 countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela.

parametrization and to compare the results to official actuarial projections. Additionally, estimates of pension adequacy of defined-contribution systems are provided. There are concerns that benefit levels in defined-contribution systems will be too low to be deemed socially acceptable. Hence, this report evaluates future expected replacement rates for a sample of 10 countries with defined-contribution systems and provide reform scenarios that assess possible measures to raise pension adequacy.

Methodology

Public pension expenditures are projected based on demographic trends. The benchmark model relies on the pension expenditure identity (Clements and others, 2012):

$$\frac{PE}{GDP} = \frac{\text{population } 65+}{\text{population } 15-64} \cdot \frac{\text{pensioners}}{\text{population } 65+} \cdot \frac{\text{average pension}}{GDP \text{ per worker}} \cdot \frac{\text{population } 15-64}{\text{workers}}$$

Old-age dependency ratio Elderly coverage ratio Benefit ratio Inverse employment ratio

which can also be expressed as:

$$\frac{PE}{GDP} = \frac{\text{population } 65+}{\text{population } 15-64} \cdot \frac{\text{pensioners}}{\text{population } 65+} \cdot \frac{\text{average pension}}{\text{average wage}} \cdot \frac{\text{population } 15-64}{\text{workers}} \cdot \frac{\text{labor income}}{GDP}$$

Old-age dependency ratio Elderly coverage ratio Benefit ratio Inverse employment ratio Labor share of GDP

where PE/GDP denotes the ratio of pension spending to GDP, *population 65+* is the population aged 65 years or older,² and *population 15–64* is the population between ages 15 and 64. The employment ratio (labor force participation) and the labor income share of GDP are typically assumed to be constant over time.³ Hence future pension spending growth is essentially determined by parametric changes in the system (that is, changes in the elderly coverage ratio or the replacement rate) and demographic changes captured by the old-age dependency ratio.⁴ Population aging implies an

²The formula is adjusted as needed for country estimates based on country-specific retirement ages.

³The wage share was broadly stable as percent of GDP over the very long term, until the last quarter-century, with the debate on whether there will be a trend in the future being inconclusive (see Elsby, Holbijn, and Sahin (2013)). In any case, in line with Solow’s standard growth model, the wage share in output would be constant regardless of the assumed steady state rate of growth of the workforce and its productivity.

⁴This approach implies that, other things equal, the GDP growth rate would not affect the pension/GDP ratio. To additionally explore potential implications of cross-country variation in economic growth if the assumptions underlying the projections in Clements and others (2012) are relaxed, alternative approaches and models based on nominal spending projections have been used for several countries (either based on the authorities’ actuarial models where available or based on a model developed by Acosta-Ormaechea and others (2017) for large Latin American countries).

increase in the population over age 65 relative to the population ages 15 to 64, and hence in the old-age dependency ratio, while immigration would likely play in the opposite direction. In countries with mature systems with a given coverage ratio and replacement rate and an aging population, a rising old-age dependency ratio drives the increases in pension spending-to-GDP. In three cases (El Salvador, Panama, and Uruguay), the projections obtained with this model were completed or replaced by actuarial projections by national authorities or international institutions. In the absence of anticipated reforms, such as a planned increase in contribution rates or a switch from defined-benefit to defined-contribution systems, pension and health system revenues are assumed to represent a stable fraction of GDP.⁵

A different approach is used to assess the adequacy and possible fiscal implications of defined-contribution systems. In contrast to defined-benefit systems, and in the absence of an explicit minimum pension guarantee by the government, defined-contribution systems do not a priori involve public expenditures because pensions are determined solely by accumulated past contributions and returns. However, fiscal costs could still arise if replacement rates turn out to be below socially acceptable levels, giving rise to political pressures to top up pensions with public funds. This risk is particularly relevant in countries where workers transition in and out of informal employment or unemployment, thereby limiting their accrual of pension rights. For this reason, the analysis of defined-contribution systems focuses on projecting future theoretical replacement rates (TRR) for careers with various types of contribution. Thereby, TRR is evaluated for an average-wage-earner as well as for low- and high-wage careers. Furthermore, the impact of low contribution densities (for example, due to informality or unemployment spells) on pension adequacy is assessed.

The projection of theoretical replacement rates in defined-contribution systems is done in five steps (see technical annex for more details):

- Projection of the average wage life-cycle profile for each year over the projection horizon. The contribution career starts at age 20 and ends at the country-specific legal retirement age. In the baseline scenario, contributors earn the average wage in the economy over the entire contribution career.
- Computation of pension contributions by age for each year, based on the assumed wage profile, contribution density, and the applicable contribution rate. The baseline projection considers a 75 percent contribution density;

⁵It has been common to assume (partly reflecting the relative stability of the wage share in output) that government revenue would remain unchanged as a share of GDP over the long term absent changes in tax policy and administration (see IMF 2016b). In practice, however, depending on the country-specific circumstances, demographic developments could give rise to revenue-to-GDP elasticities that are different from (1) In both directions, 2)

that is, a worker is assumed to contribute to the defined-contribution system three years out of four (and is unemployed, out of the labor force, or employed in the informal sector the fourth year).

- Computation of the value of individual retirement accounts or sum of accrued contributions and earned interest (after costs) by age for each year.
- Computation of gender-specific pension annuities based on life expectancy at retirement, the expected real rate of return, and the rate of indexation of future pensions. The value of the annuity payment for an individual retiring at age r at time t is given by:

$$P_{tr}^{DC} = V_{t-1, r-1}^{DC} \cdot (1 - c) \cdot \frac{(rr_t - index_t)}{\left(1 - \left(\frac{(1 + index_t)}{(1 + rr_t)}\right)^{le_{t,r}}\right)}$$

- where V_{t-1}^{DC} denotes the value of the individual retirement account at time $t-1$, c is the annuity cost (administrative cost), rr_t is the nominal rate of return (after fees), $index_t$ is the rate of pension indexation/revaluation (inflation in most cases), and $le_{t,r}$ is the life expectancy at age r .
- Finally, two indicators are computed to assess two key dimensions of pension adequacy, namely, the extent to which pension schemes help to smoothen income over the life-cycle and the extent to which they can alleviate old-age poverty risk. The replacement rate, which relates the starting pension of a new retiree to his/her last earnings before retirement, provides information about the income smoothing function of the pension system. The adequacy ratio, which compares the starting pension of a new retiree directly to the average earnings of the working population, relates to the risk of future old-age poverty if the ratio is low.⁶ In case of mixed systems (for example, Uruguay), the pension received at the time of retirement may include both a defined-benefit component and the pension annuity computed for the defined-contribution system. If individuals can choose between defined-benefits and defined-contribution systems (for example, in Colombia and Peru), the pension received is assumed to be the higher one of the two systems (Colombia) or the one chosen by the majority of participants (Peru). The cushioning effect of minimum pension guarantees and other top-ups is considered wherever applicable. Noncontributory (zero pillar) and voluntary pension schemes are neglected in the calculations because these are included in the defined-benefit estimates.

⁶Pension analysts at organizations like the World Bank, the International Labour Organization (ILO), and the European Union have agreed in recent years that an adequate pension system should ensure both poverty risk alleviation and life-cycle consumption smoothing. To measure these two main adequacy dimensions on the basis of one indicator would be challenging. A high replacement rate, of, for instance, 80 percent, does not directly indicate whether new retirees can be expected to fall below a certain risk of poverty line or subsistence level. The Working Group on Ageing Populations of the European Commission, for example, also displays similar replacement rates and benefit ratios as those used in this study.

Ratios of health expenditures to GDP are computed using the following formula:

$$\frac{HE}{GDP} = \frac{\frac{\text{health expenditure (age 40–44)}}{\text{population 40–44}}}{\frac{GDP}{\text{total population}}} \times \sum_{i=0}^{95-100} \left(\frac{\text{population (age } i)}{\text{total population}} \times \frac{\frac{\text{health spending (age } i)}{\text{population (age } i)}}{\frac{\text{health spending (age 40–44)}}{\text{population age (40–44)}}} \right)$$

where HE denotes public health expenditures, defined as the product of health care expenditure per capita of a reference age-group (assumed to be the 40–44 year old group) as a share of GDP per capita and the sum of the health expenditure per capita for each age group i relative to the reference age group, weighted by the share of the population in each age group. The first term is affected by excess cost growth, defined as the difference between the growth of health care spending in real per capita terms over real GDP growth per capita after controlling for demographic changes, for instance due to costly medical innovation.⁷ This is assumed to be constant over time and equal to 1 percent.⁸ Population aging affects the second term of the product as the population in older age groups, for which health spending per capita is higher relatively to the health spending per capita in the reference group, increases compared to the population in younger groups.

⁷The approach to project health expenditures in percent of GDP by normalizing expenditures relative to a reference group and letting demographic changes drive the projections is indifferent to the specific age group chosen as the reference group.

⁸This is based on historical trends in health expenditure in advanced economies which in many cases already had universal coverage (IMF 2012). Other studies such as OECD (2013), estimate a higher excess cost growth of 1.5 percent for OECD countries looking at the period 1995–2009. For further discussion, see also http://ec.europa.eu/economy_finance/publications/european_economy/2015/pdf/ee3_en.pdf, p. 120. However, this analysis uses the IMF's, more conservative, estimates considering that, with the future rise in life expectancy, age-related expenditure profiles are likely to shift to the right because life expectancy gains also imply, to some degree, healthier life years (an assumption applied by the European Commission in its regular ageing report, see link above Page 125, reference scenario, and paragraph 118).

Long-Term Trends in Latin America

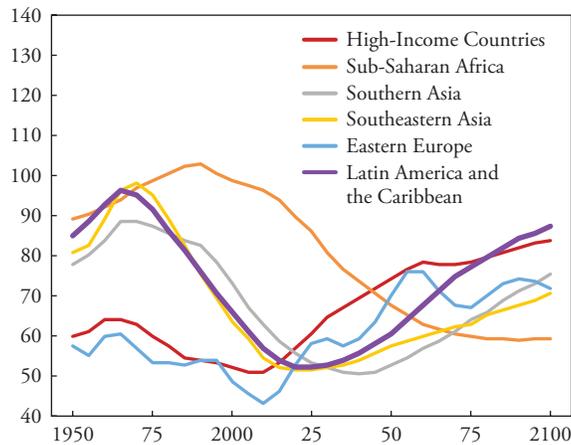
Demographic Challenges in Latin America

Although Latin American countries are still younger than most advanced economies, population aging is expected to accelerate. For the last 65 years, the region has experienced the world's steepest decline in the total dependency ratio (population <15 + population >64/population 15–64).¹ But Latin American countries are at the turning point to a new rapid-aging era as the demographic dividend (defined as the period during which the dependency ratio falls) is coming to an end, and between 2020 and 2100 the increase in the dependent population will be unprecedented (35.5 percent, Figure 4). Given the fall in fertility rates (see below), such an increase will largely consist of a steep increase in the old-age dependency ratio (population >64/population 15–64, Figure 5). As a result, by 2100 Latin America will be the region with the highest share of elderly population (32 percent)—higher than in advanced economies (27 percent, Figure 6).

The demographic dividend, while fading, extends longer than in other regions, with some intra-regional variation. Although it is coming to an end, the demographic dividend is projected to last longer in Latin America than in other regions of the world, except for Africa (Figure 7). Within the region, Paraguay, Bolivia and Guatemala, where the dividend is projected to stretch out to 2045, are home to the youngest populations, while in Chile and Costa Rica the demographic dividend ended in 2015 (Figure 7).

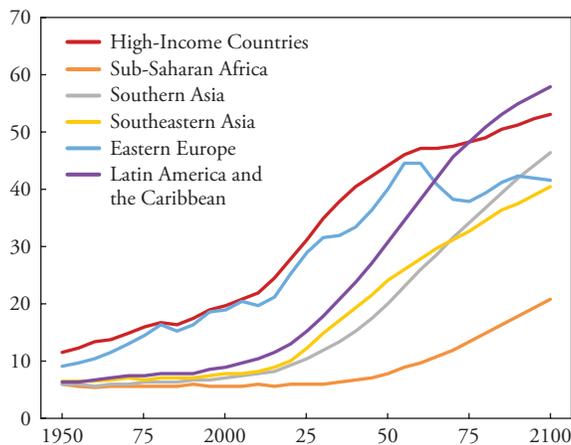
¹Notwithstanding the large decline in the old-age support ratio (population 15–64/ population >64) since 1950 driven by the large increase in the old-age population (paragraph 10), a large decline in the young population explains the decline in the total dependency ratio (population <15 + population >64/population 15–64).

Figure 4. Total Dependency Ratio
(Population <15 and >64/population 15–64; percent)



Source: United Nations 2015. *World Population Prospects: The 2015 Revision*.

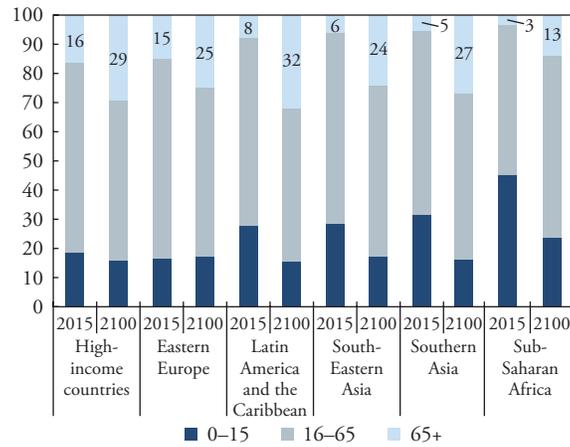
Figure 5. Old-Age Dependency Ratio
(Population <15 and >64/population 15–64; percent)



Source: United Nations 2015. *World Population Prospects: The 2015 Revision*.

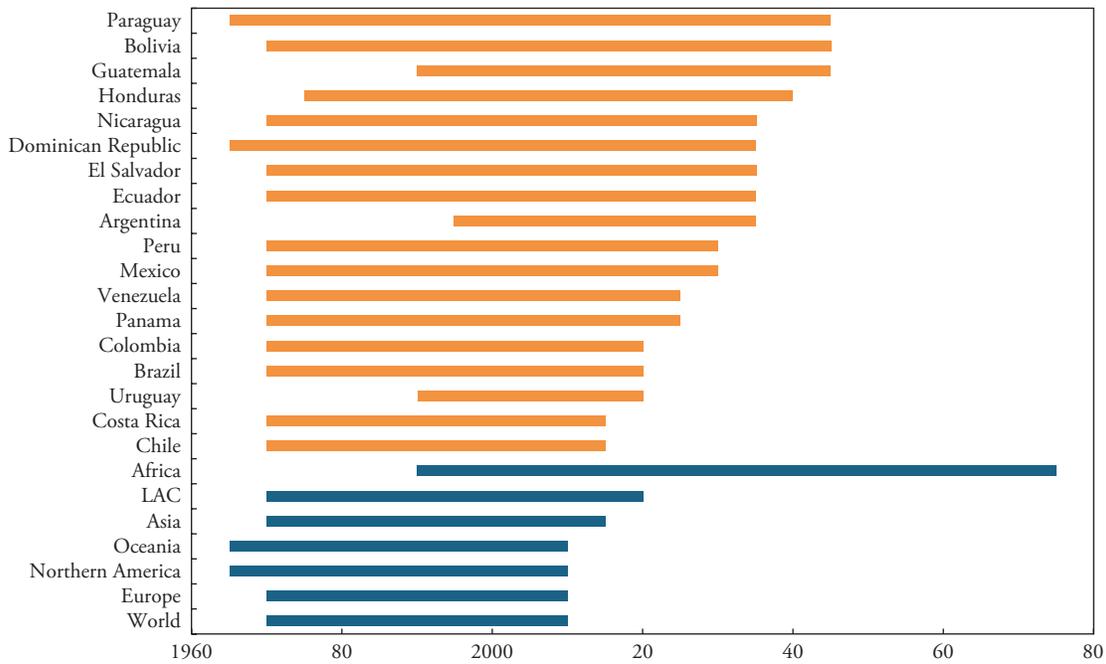
It is important to note that long-term population projections rely on assumptions on the trajectories of fertility, mortality, and migration, thus, they are surrounded by uncertainty. The above projections are based on the UN “medium-variant” scenario, in which global population growth slows by 2050 and peaks in 2100. While the world’s population is projected to reach 11.4 billion in 2100 under the “medium-variant” scenario, it could be as low as 7.3 billion or as high as 16.6 billion under the “low-variant” and “high-variant” scenarios. The main difference in these scenarios concerns

Figure 6. Population Share by Age Group
(Percent)



Source: United Nations 2015. *World Population Prospects: The 2015 Revision*.

Figure 7. Extension of Demographic Dividend



Sources: IDB, 2016 based on United Nations, 2015; and United Nations, 2017.

Note: The bars depict the period in which the total dependency ratio (Population <15 + Population >64/Population 15–64) is falling.

the assumption about the speed at which fertility rates drop to or below the replacement rate.

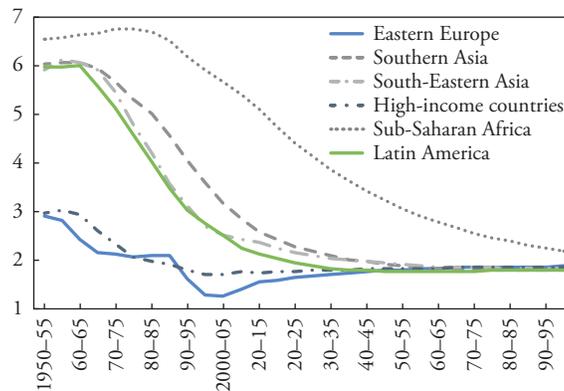
Although the UN population projections are subject to substantial revisions, forecasts for Latin America have in the past been relatively accurate. In 2000, the UN projected the 2050 global population at 8.2 billion; in 2015, it added 1.5 billion additional people—almost 20 percent of the 2000 projection—to the estimate. This revision occurred because the U.N. had overestimated the decline in fertility rates, particularly in the African region. For Latin America and the Caribbean, however, the 2000 UN estimate is considered relatively accurate: the current prediction for 2050 is only 3 percent *lower* than the medium-variant scenario of 2000, as fertility dropped somewhat faster over the last decade than the previous predictions had foreseen. Moreover, at least in the next 20–30 years, the baseline rise in the old-age dependency ratio is confirmed even under alternative fertility/migration and longevity scenarios. Only thereafter, do projections start to deviate significantly for the worse or the better depending on which assumptions are chosen, and because the longer horizon allows more time to produce cumulative effects.

Fertility

The decline in fertility rates in Latin America has been pronounced, widespread, and comparatively fast. In 1950, Latin America's total fertility rate of 6.0 births per woman was equal to that of emerging Asia and twice as high as in emerging Europe and in high-income countries. The decrease by two-thirds, to 2.1 births per woman by 2015, is unprecedented; it is rivaled only by southeast Asia (2.4). While Latin America's fertility rate is still higher than that in emerging Europe (1.6) and the high-income countries (1.7), it implies that the population will start to shrink in 2065 (UN; Figure 8). Across countries, fertility is as low as 1.8 births per woman in Brazil and Chile, 1.9 in Colombia and Costa Rica, and 2.0 in Uruguay and El Salvador. The countries with the highest fertility rates in the region include Guatemala (3.3) and Bolivia (3.0). Even there, however, birth rates have started to drop rapidly.

Fertility rates are projected to dip below the replacement rate until the end of the century. The UN population projections predict that fertility rates in Latin America and emerging Asia will continue to decline, reaching 1.8 births per woman by 2030 and stabilizing at this level thereafter. In emerging Asia, fertility rates of 1.8 will be reached by 2060, after some deceleration in the decline in the last few decades. In contrast to the continued declines in Latin America and emerging Asia, fertility rates in high-income countries and emerging Europe are projected to return to 1.9 before stabilizing at this level. Sub-Saharan Africa, where fertility rates declined much less than elsewhere (from 6.6 in 1950 to 5.1 in 2015), will be the only region with fertility rates above the replacement rate by the end of the century.

Figure 8. Fertility
(Children per Woman)



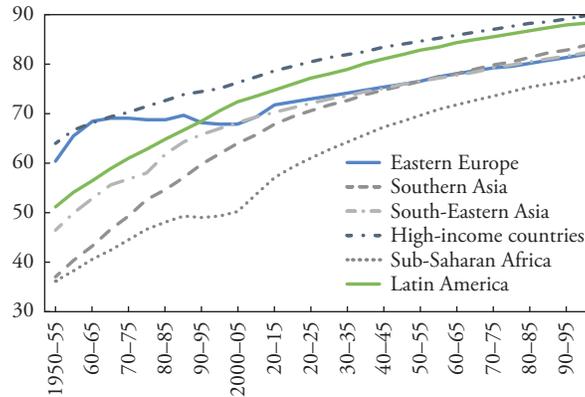
Sources: United Nations, Department of Economic and Social Affairs, Population Division (2015). *World Population Prospects: The 2015 Revision*.

Mortality and Life Expectancy

Life expectancy in Latin America has almost caught up with high-income countries. The global reduction in old-age mortality and increase in life expectancy has been driven by rising living standards and better access to quality health services, and is one of the greatest achievements of the last century. In 1950, Latin America's life expectancy of 51.2 years was closer to southeast Asia (46.5) and south Asia (51.3) than to emerging Europe (60.3) or the high-income countries (64.0). The subsequent increase in life expectancy across the region, however, has allowed Latin America to surpass emerging Europe and reduce its gap to the high-income countries to only four years by 2015 (74.8 years in Latin America and 78.8 years in high-income countries; Figure 9). Chileans (82.7 years) and Costa Ricans (80.10 years), for example, can already expect to live about as long as Canadians (82.6 years) and citizens of the United States (79.6 years). However, the increase in life expectancy was most pronounced in the lower-income countries of Central America, including in Nicaragua (from 42.3 to 74.5) and Honduras (41.8 to 72.8). Table 1 gives an overview of life expectancy by country and gender.

Life expectancy is projected to increase further, albeit at a slower pace. Improvements in living standards and medical innovation are expected to further increase lifespans around the world. By the end of the 21st century, Latin America's life expectancy is expected to be comparable to high-income countries (88.4 and 89.7 years, respectively) and significantly higher than in all other regions that are currently less developed. Chile's life expectancy (93.5 years in 2100), in particular, will continue to rank

Figure 9. Life Expectancy at Birth
(Years)



Sources: United Nations, Department of Economic and Social Affairs, Population Division (2015). *World Population Prospects: The 2015 Revision*

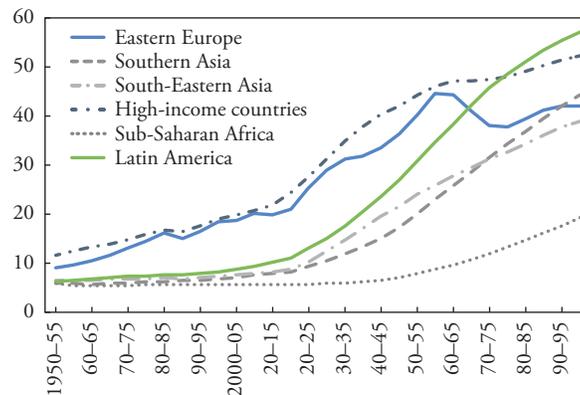
among the highest in the world. Meanwhile, gender gaps in the longevity of the elderly are expected to remain broadly constant in relative terms but increase in absolute terms (from 2.5 to 3.1 years on average in Latin American countries).

Population Aging

The combined effect of lower fertility and higher life expectancy is a fairly rapid aging of the population. Between 1950 and 2015, the median age in Latin America rose from 20 to 29 years; by the end of the century, it is expected to increase to 49 years, which exceeds even the projected levels for high-income countries (46 years). At the same time, the old-age support ratio, which indicates the number of working-age people (ages 15 to 64) per elderly person (ages 65 and older), has declined from 16.0 to 8.9 in between 1950 and 2015, significantly more than in Asia (Figure 10). In Uruguay, there are only 3.9 working-age people per elderly person; in Argentina and Chile the equivalent figures are 5.1 and 5.6. Only Honduras and Nicaragua still have old-age support ratios above 10 (see Table 2), which was the norm when social security systems were first introduced in most Latin American countries. Increasing pressure will be put on pension systems as the cohorts of workers entering the labor market become smaller compared with the cohorts that enter retirement.

Latin America's old-age support ratio will approach that of high-income countries by 2050. While population aging has so far been gradual, the trend is expected to accelerate over the next decades (Figure 11). By 2050,

Figure 10. Old-Age Dependency
(Population 65+/15–64, percent)



Sources: United Nations, Department of Economic and Social Affairs, Population Division (2015). *World Population Prospects: The 2015 Revision*.

Table 2. Key Demographic Trends in Latin America

Country	Total Population (millions)	Percentage 65+	Dependency Ratio ¹	Support Ratio ²	Life Expectancy at Birth (years)		GDP per Capita (PPP, 2015)
					Men	Women	
Argentina	43.0	10.8	56.6	5.1	72.3	79.9	20,364
Bolivia	10.6	6.3	64.6	7.9	65.5	70.4	6,954
Brazil	206.1	7.6	45.1	7.7	70.4	78.0	15,391
Chile	17.8	10.7	45.3	5.6	78.3	84.2	23,367
Colombia	47.8	6.8	45.9	8.6	70.3	77.5	13,829
Costa Rica	4.8	8.6	45.6	6.8	76.8	81.8	15,595
Dominican Republic	10.4	6.5	58.1	8.1	70.3	76.5	14,237
Ecuador	15.9	6.5	55.9	8.2	72.9	78.5	8,620
El Salvador	6.1	8.0	55.3	6.7	68.0	77.2	11,474
Guatemala	16.0	4.8	72.1	9.8	68.0	75.1	7,722
Honduras	8.0	4.7	59.4	10.8	70.5	75.5	5,095
Mexico	125.4	6.3	52.4	8.7	74.2	79.0	16,988
Nicaragua	6.0	5.0	55.0	10.8	71.5	77.6	5,200
Panama	3.9	7.4	53.7	7.4	74.4	80.6	22,237
Paraguay	6.6	5.9	57.3	8.9	70.7	75.0	9,198
Peru	31.0	6.7	53.5	8.3	71.7	77.0	12,529
Uruguay	3.4	14.3	56.1	3.9	73.3	80.5	21,244
Venezuela	30.7	6.1	52.7	9.0	70.0	78.3	15,028 ³

Sources: USA SSA 2015; World Bank World Development Indicators; and United Nations Population Division.

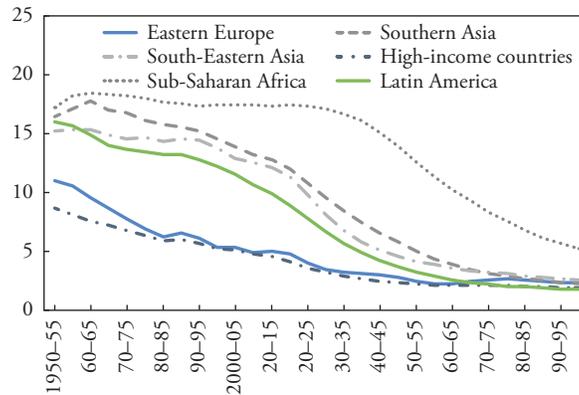
¹The dependency ratio is the ratio of the population aged 0–14 and 65+ per population age 15–64, in percent.

²The support ratio is the ratio of the population ages 15–64 per 100 population ages 65+.

³Data is from 2014.

the average Latin American old-age support ratio is projected to drop to 3.2, the level of emerging Europe and the high-income countries. Owing to marginally higher fertility rates and lower life expectancy, support ratios in emerging Asia will remain about one point higher than in Latin America, although their societies will undergo a parallel trend. Towards the end of the century, support ratios will drop below 2 in all regions except for

Figure 11. Old-Age Support
(Population 15–64/65+, percent)



Sources: United Nations, Department of Economic and Social Affairs, Population Division (2015). *World Population Prospects: The 2015 Revision*.

sub-Saharan Africa, meaning that every elderly person is supported by only two working-age adults.

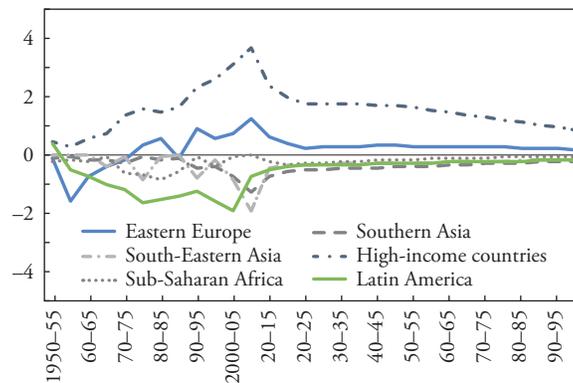
Migration

In contrast to the advanced economies, where immigration mitigates some of the adverse demographic trends, emigration accentuates aging in Latin America. Over the last decades, Latin America has seen very high levels of emigration to the United States, Canada, Spain, and other developed economies, particularly among younger working-age people. Emigration has exceeded immigration by 0.1 percentage points per year since 1950, leading to cumulative losses of 17.3 percent of the population over the last 65 years (Figure 12). Future migration, albeit difficult to predict, will likely play an increasingly important role in demographic dynamics in the region, given the increasing globalization of economies, the increased access to labor markets, and greater opportunities for individual mobility. Although net emigration rates are projected to decrease, Latin America is not expected to benefit from significant inflows of working-age people.

Design of National Pension and Health Care Systems

The majority of Latin American countries have defined benefit pay-as-you-go (PAYG) pension systems in place. Twelve of the 18 countries in the sample use PAYG systems, which are integrated into the social security system and are funded by contributions of the employed population. In most countries,

Figure 12. Migration
(Net migration rate, per 1,000 population)



Sources: United Nations, Department of Economic and Social Affairs, Population Division (2015). *World Population Prospects: The 2015 Revision*.

these systems are relatively generous for retirees. The pensionable age of 60 to 65 years in most countries is in line with international averages, but expected² replacement rates of up to 90 or 100 percent of pre-retirement earnings in Ecuador, Paraguay, or Venezuela exceed those of high-income countries (see Table 3). In most countries, these pensions are financed by contributions in the range of 10–20 percent of the gross payroll, although contributions of up to 28 percent in Brazil already exceeds the contributions in high-income countries in which populations are older (just under 20 percent in the OECD, see OECD 2015).

Several countries use funded defined contribution systems, which are often coupled with a defined-benefit pillar. In the 1990s, several Latin American countries transitioned from unfunded defined benefit systems to funded defined contribution systems. Bolivia, Chile, the Dominican Republic, El Salvador, and Mexico are transitioning to pure defined-contribution systems, although they are at different stages of the transition. For example, in Chile, which was one of the first countries in Latin America to introduce a funded system, the transition is more advanced, while defined-contribution systems

²The replacement rates reported in the table do not reflect current empirical replacement rates, instead they are the outcome of simulations based on a set of assumptions, including a hypothetical contribution career, and the current pension law, without considering transition pension rules. A single set of economic assumptions is applied to all countries, namely: price inflation of 2.5 percent per year, real earnings growth of 2 percent per year, real rate of return after administrative charges on funded defined-contribution pensions of 3.5 percent, and a discount rate for actuarial calculations of 2 percent per year. A full career and complete contribution history are assumed, and individual earnings grow in line with the economy-wide average, implying no changes in the earning distribution. Section 3.D reports estimated replacement rates for defined-contribution systems in selected future years, considering the gradual transformation of national pension schemes.

Table 3. Key Pension System Parameters in Latin America

Country	Type of System ¹	Statutory Pensionable Age ²	Vesting Period (Years)	Contribution Rates, 2015 ³		Gross Replacement Rate ⁴ (Percent)
				Total (Percent)	Employer (Percent)	
Argentina	DB	65 (60)	30	21.2	10.2	71.6 (71.5)
Bolivia	DC	58	10	15.2	3.0	41.0
Brazil	DB	65 (60)	35 (30)	28.0	20.0	69.5 (52.9)
Chile	DC	65 (60)	20	11.2	1.2	32.8 (28.8)
Colombia	DB/DC	62 (57)	25	16.0	12.0	70.8 (64.1)
Costa Rica	DB/DC	65	25	12.2	8.3	79.4
Dominican Republic	DC	60	30	10.0	7.1	22.8
Ecuador	DB	60	30	10.7	1.1	94.2
El Salvador	DC	60 (55)	25	13.5	7.3	46.6
Guatemala	DB	60	20	5.5	3.7	67.8
Honduras	DB	65 (60)	15	6.0	3.5	64.9 (60.9)
Mexico	DC	65	24	8.7	6.9	25.5 (23.6)
Nicaragua	DB	60	15	13.0	9	94.2
Panama	DB/DC	62 (57)	20	13.5	4.3	78.4 (72.8)
Paraguay	DB	60	24	23.0	14.0	104.1
Peru	DB/DC	65	20	13.0	0.0	70.6
Uruguay	DB/DC	60	30	22.5	7.5	52.5
Venezuela	DB	60 (55)	15	13.0	9.0	94.2 (89.5)
OECD Average	N/A	64.7 (63.5)	N/A	19.6	11.2	52.9

Sources: OECD (2013), OECD (2015), OECD, IDB and World Bank (2014), SSA (2016)

¹DC systems may include a DB pillar in the process of being phased out. For countries with fragmented systems, the largest single component is taken as a benchmark.

²In many countries, the actual retirement age is lower than the statutory age because a large fraction of contributors retire several years earlier based on the length of their contributions (for example, Brazil). In Ecuador, the pensionable age varies depending on the years of contributions.

³In percent of reference salary. Includes old-age, disability, and survivors. Values for Argentina are net of location-based tax credits for employers.

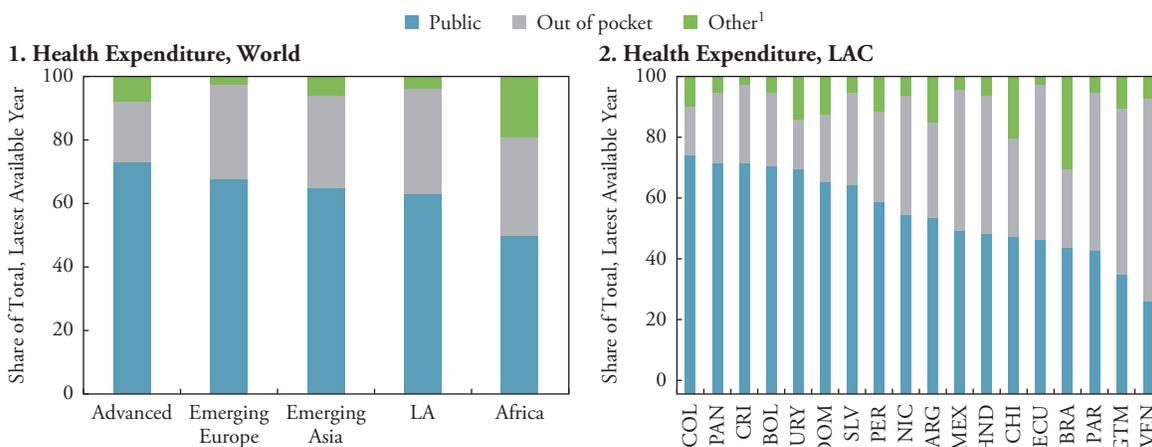
⁴Latest available. Gross pension entitlement in percent of gross pre-retirement earnings. Comparisons are based on a specific set of assumptions. See OECD, IDB and World Bank (2014) for detailed information. Data for Argentina, Brazil, Chile, and Mexico are from OECD (2015).

in Bolivia, the Dominican Republic, El Salvador, and Mexico are younger and phasing out the pre-existing defined-benefit pillars will take more time. On the other hand, Colombia, Costa Rica, Panama, Peru, and Uruguay use different combinations of defined-benefit and defined-contribution systems. In particular, while in Costa Rica and Panama workers generally³ have to contribute to both pillars, in Colombia, Peru and Uruguay the two systems coexist in a parallel way and most contributors can choose which system to join.

Health systems in Latin America are diverse, with varying proportions of total expenditure from the public sector, private plans, and out-of-pocket payments. On average, Latin America, emerging Asia, and emerging Europe have a similar share of about 30 percent of total expenditure covered out of pocket. The share covered by the public sector is slightly lower in Latin America than in Asia and emerging Europe (see Figure 13). Colombia, Panama, Costa Rica, Bolivia, and Uruguay are the countries in the region where the public sector accounts for the largest share of total expenditure on health care. In contrast, out-of-pocket expenditures cover half or more

³In Panama low wage earners only participate in the defined-benefit system.

Figure 13. Health Expenditure

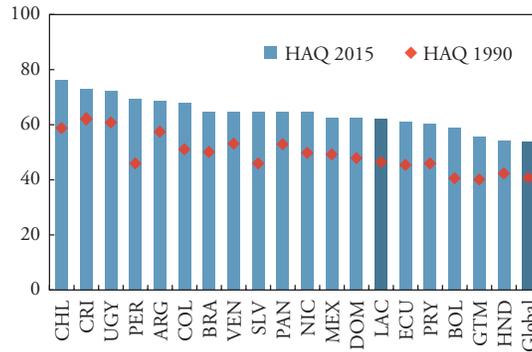


Sources: WHO; and Fund staff estimates and projections.
¹Includes expenditures covered by private plans and the nonprofit sector.

of total health expenditure in Venezuela, Guatemala, and Paraguay. Brazil and Chile are the countries where private plans play a more important role in the region, covering about 30 and 20 percent of total expenditures respectively.

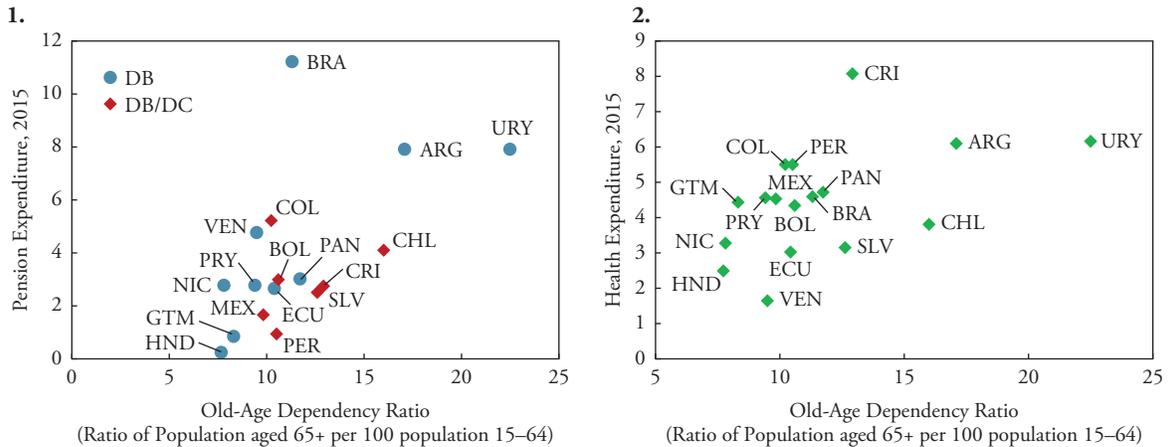
Coverage of public health care systems has been expanded, but levels of success vary by country. Over the last three decades, many countries in Latin America have implemented policies and programs aimed at achieving universal health coverage. Several countries have implemented subsidized programs that target specific populations not covered by contributory health insurance systems (Dmytraczenko and Almeida 2015). Uruguay, Chile, Costa Rica and Colombia have systems with high or universal coverage, with insurance financed by employer and employee contributions, and government subsidies for those outside the formal sector. Argentina and Panama also have relatively high coverage of employer/employee-funded social insurance. Brazil has a system of universal public health care that ensures basic coverage for all, funded through the federal, state and local budgets, although many formal sector workers also have supplemental private insurance (Dmytraczenko and Almeida 2015). Mexico and Peru have made significant efforts to increase the insured population through noncontributory insurance schemes, which now cover a large portion of the population without employment-based insurance. By contrast, in countries such as Guatemala, Honduras, Paraguay, and El Salvador, the majority of the population is uninsured and relies on services provided by the Ministry of Health, which may not always be easily accessible and may imply a cost to the user, particularly for medicines. Out-of-pocket spending therefore tends to be higher in these countries as a percentage of total health care spending. A new measure of personal health care access and quality, the Health Access and

Figure 14. Health Access and Quality Index



Source: Barber and others (2017).

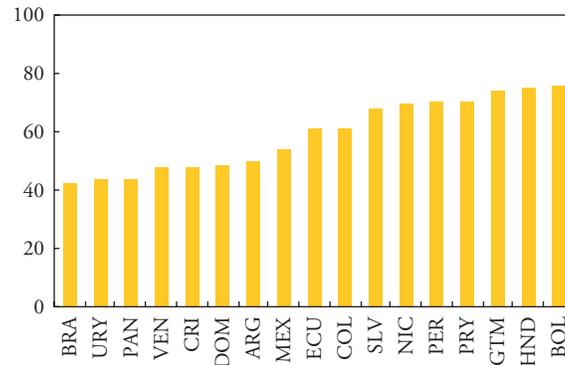
Figure 15. Old-Age Dependency versus Pension and Health Expenditure



Quality Index (Figure 14), shows the improvements made in health care across Latin American countries since 1990, with all countries in the sample above the global average in 2015 (Barber and others 2017).

Differences in country-specific pension and health care spending reflect the demographic juncture as well as system design. High old-age spending in Uruguay, Brazil, and Costa Rica stem from relatively older populations. Argentina’s high pension and health care spending reflects its generous replacement rates and nearly universal coverage. Honduras, Guatemala and Nicaragua have low spending due to a relatively young population and narrow coverage. In Venezuela, the low health expenditure reflects the narrow share of total health spending covered by the public sector, compared with a higher contributory coverage of the public pension system (see Figure 15). In general, countries that shifted to defined contribution or mixed schemes,

Figure 16. Informal Employment
(Percent of nonagricultural employment, latest year available)



Source: ILO.

display comparatively lower public pension spending than countries with defined benefits systems.

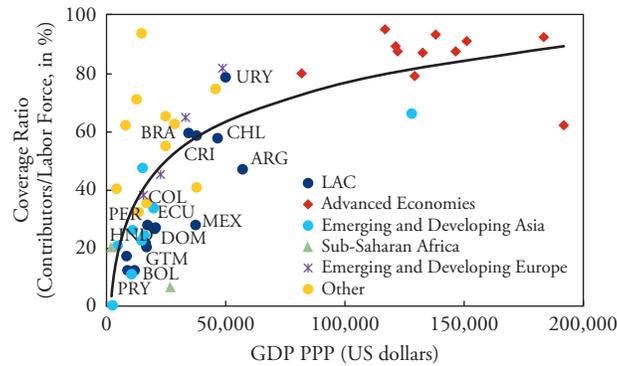
Coverage, Adequacy and Formality

Overall, Latin America's pension systems face serious challenges in coverage and adequacy. Across Latin America, only 45 percent of active workers contribute to a pension system, and only about a third of the elderly population (over 65 years) is currently entitled to pensions from a contributory scheme (Da Costa and others 2011). Although some countries have made significant progress in expanding the coverage through noncontributory pensions and special regimes, the coverage rates remain well below those of other regions. And even in countries where a larger share of the population is covered by public pension systems, these systems are often unable to provide adequate incomes for the retired population, particularly in defined-contribution systems in which replacement rates have fallen short of expectations.

Coverage and Informality

The main reasons for the low coverage of contributory pension schemes is the high level of informal employment. Although measures vary with different concepts of informality, it is estimated that almost half of the labor force in Latin America is employed under informal conditions, with informality rates ranging from 42 percent in Brazil to 76 percent in Bolivia (ILO 2016a, Figure 16). This informal labor force includes not only workers in the informal sector, but also workers in formal enterprises whose employers are not in compliance with the labor law. Informality is particularly

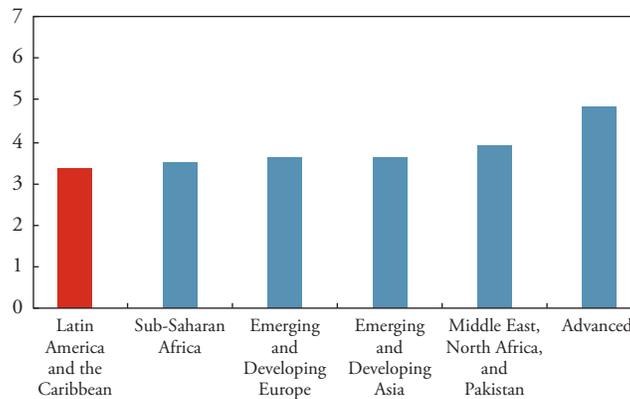
Figure 17. GDP Per Worker and Coverage Ratio, 2014–15



Sources: IMF, WEO, and World Bank.

Figure 18. Global Competitiveness Report: Public Institution Index

[1–7 (best)]



Source: Global Competitiveness Report.

high among domestic workers and self-employed individuals, and it is most common among women and younger workers (ILO 2016a). Overall, the rates of informal employment are at least twice as high as in emerging Europe or in high-income countries, and are particularly concentrated in lower-income occupations.

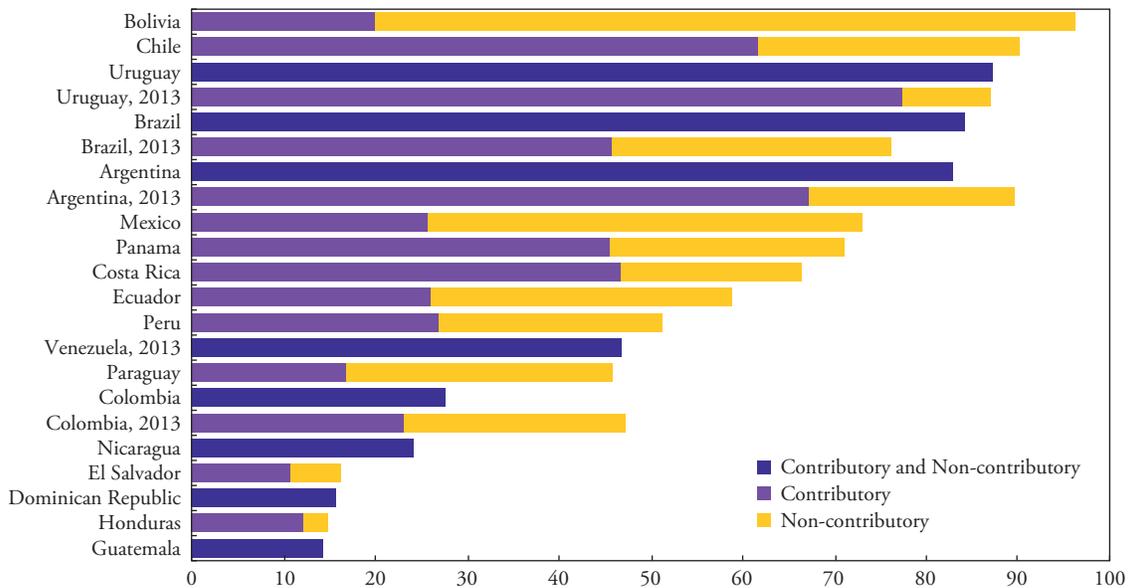
The high level of informality arises from low labor productivity and wages, weak enforcement, and a high share of self-employment. Firms choose to use informal labor if the regulatory and tax burden associated with formal employment is high relative to the average productivity of workers (Loayza, Serven, and Sugawara 2009; Figure 17), and the probability of being caught is low due to weak public institutions and lax enforcement (Figure 18). Workers, on the other hand, take these jobs

out of necessity, while for formal employment (Lewis 1954; Harris and Todaro 1970) or prefer working informally to avoid paying mandated pension contributions given low average wages and personal incomes. International evidence suggests a positive correlation between GDP per worker and pension coverage, and many countries in Latin America lay on the lower end of the distribution (Figure 15). Workers may also prefer informal employment if the future benefits from formal employment are deemed to be low relative to current contributions, for instance because workers expect not to reach the minimum number of contribution years required to qualify for a pension or because they find that their contributions will be used to subsidize others to an extent that they consider unfair or excessive (Pagés, Rigolini, and Robalino 2014; IDB 2016). However, international evidence indicates that the pension system design is less relevant compared with the design of the health care system for the choice between formal and non-formal work. Last, about one third of the labor force—and as much as 70 percent in some countries—in Latin America is self-employed, and for these workers pension contributions are either voluntary or unenforceable (IDB 2016).

As a result of informality, less than half of the population is covered by contributory pension schemes. The effects of informality on pension coverage is exacerbated by the high degree of mobility between the informal and formal sectors in Latin America, which typically results in reduced contribution times and thus reduced or zero pension benefits even for formal workers who have spent a number of years under informal employment conditions (Levy and Schady 2013). Although mandatory social security systems were introduced more than 50 years ago in most Latin American countries, only 45 percent of workers contribute to these systems (OECD, IDB, and World Bank, 2014) and less than 40 percent of the labor force accrues pension rights (Loayza, Serven, and Sugawara 2009; IDB 2016). In lower-income countries such as Guatemala, Honduras, El Salvador, Nicaragua, Bolivia, and Paraguay, the pension coverage rate of contributory systems is close to or below 20 percent (Figure 19). The highest rates of more than 60 percent are found in Chile, Argentina and Uruguay, but even these levels remain below those of high-income countries (Loayza, Serven, and Sugawara 2009; IDB 2016).

Low-income workers and women have particularly low coverage by pension systems, highlighting the importance of policies to reduce informality and increase female labor force participation. Formality and pension coverage are highly correlated with personal incomes, meaning that low-income workers are least likely to be covered by contributory pension schemes (Rofman and others 2008). This correlation is particularly pronounced in Guatemala, where the highest-earning 20 percent of workers are more

Figure 19. Contributory and Non-contributory Passive Coverage in Latin America
(Percent of population aged 65 and older, 2016–15)



Sources: IDB, SIMS; and IDB, 2016.

Note: Where available, earlier data are reported for countries where the latest disaggregation between contributory and non-contributory coverage was not available as of 2016–15. Data for Venezuela was not available as of 2016–15.

than three times as likely to be contributing to the pension system than the middle 40 percent of the income distribution (70 versus 20 percent), while coverage rates for the bottom 20 percent are close to zero (OECD, IDB, and World Bank 2014). Thus, low pension coverage exacerbates income inequality and may result in a regressive re-distribution of resources from low- to high-income individuals if the former did contribute to the social security system but not enough to be eligible for a pension. Women also tend to have lower coverage rates than men, reflecting lower labor force participation rates—with Latin America having the lowest ratio of female to male participation among emerging markets (paragraph 88)—as well as generally fewer years of salaried work (since they interrupt their work lives for child-rearing and caregiving responsibilities), and higher incidence of informal employment (such as domestic work, where almost 80 percent work under informal conditions) and jobs with lower wages. Combined with women’s earlier retirement ages and longer life expectancy, this implies that women tend to spend longer periods with lower pensions, increasing the probability of experiencing old-age poverty (OECD, IDB, and World Bank 2014; ILO 2016a).

In response to the low coverage of contributory systems, many Latin American countries have introduced or expanded noncontributory pension

schemes. Since the 1990s, several Latin American countries have introduced inclusive reforms that aim at increasing coverage of social protection systems beyond formally employed workers⁴ (Rofman, Apella and Vezza 2015). Although all reforms focused on creating or expanding noncontributory (“zero-pillar”) pension schemes, the design and coverage of these programs varies considerably between countries (Figure 17). Some countries, such as Bolivia, have implemented universal pensions for all elderly residents, while other countries, such as Paraguay, have set up means-tested pensions for the very poor. The generosity of the benefits also varies significantly, ranging from less than 10 percent of per capita incomes in Bolivia, Colombia, Mexico, Panama, and Peru to about 30 percent of per capita incomes in Argentina, Brazil, and Paraguay (IDB 2016).

Noncontributory pensions mitigate the adverse social consequences of informality, but may worsen the fiscal pressures from population aging. Most Latin American countries now have some form of social assistance for elderly people who are not covered by social security systems and who live in conditions of poverty (Rofman, Apella, and Vezza 2015; IDB 2016). In fact, noncontributory pensions are the only source of pension income for low-income workers and women—many of whom would not be eligible for any contributory pension benefit—in many Latin American countries, especially low-income ones. In Chile, Ecuador and, Panama, more than half of all elderly people receive noncontributory pensions (Levy and Schady 2013). Although the replacement rates are generally much lower than under contributory systems, noncontributory pensions are costly and they need to be financed from general tax revenues. On average, Latin American countries spent 0.6 percent of GDP on noncontributory pensions, with Bolivia and Brazil spending about twice as much (Levy and Schady 2013). The higher the incidence of informal employment in an economy, the greater the trade-off between pension adequacy and fiscal sustainability becomes. Since social assistance schemes have only recently been introduced or expanded in many Latin American countries, these fiscal pressures may come in addition to any existing unfunded liabilities of long-standing PAYG systems.

Future trends towards formalization may favorably affect the coverage and fiscal sustainability of pension systems, while higher informality could exacerbate gaps. Over the last decade, Latin American countries have made moderate progress to increase formalization (ILO 2014). If these trends continue or are accelerated (as foreseen by some Latin American governments), the future coverage of contributory pension systems will be higher than projected in this model (which assumes a constant coverage ratio). Aside from the usual benefits associated with more formality and greater pension coverage, this

⁴Argentina (1994), Bolivia (1997), Chile (1981), Colombia (1993), Costa Rica (1995), the Dominican Republic (2003), El Salvador (1998), Mexico (1997), Panama (2008), Peru (1993), and Uruguay (1996).

would buy time to address the sustainability of PAYG schemes by increasing contribution revenues in the short and medium term. That said, if no measures are taken to improve the financial viability of such schemes, increased coverage per se could actually worsen their sustainability in the long term. At the same time, since most countries have some form of noncontributory pensions for elderly people who are not covered by social security systems, an increase in coverage ratios may also be favorable for the sustainability of the pension system over the long term, as it reduces the need for noncontributory transfers once the newly formalized workers reach the retirement age. However, this would depend on the exact characterization of the systems and the new entrants.

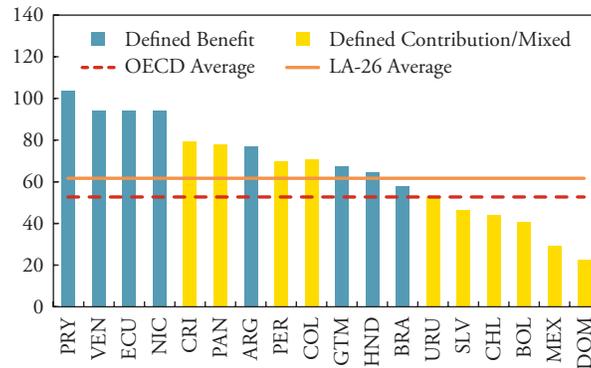
Meanwhile, expansions in the pension system could in themselves hamper the progress towards formalization. In particular, the design of social protection systems may influence the choice between formal and informal employment (Levy; 2008). Since workers weigh up the costs and benefits of formal employment, which would typically include social contributions on the one hand, and a bundle of future benefits on the other, workers may prefer informal employment if current contributions are deemed too high relative to future benefits. These disincentives to formality are compounded when governments provide noncontributory benefits such as old age pensions or health care (Levy and Schady 2013).

Evidence from country studies suggest that this effect does exist in Latin America. For example, Bérigolo and Cruces (2014) showed how an enhancement of health benefits in Uruguay's social security system increases the probability of formal employment. A study of Colombia (Cuesta and Bohórquez 2011) presented evidence from 2008–09 that health coverage was associated with a lower probability of transitioning out of the formal sector, while pension coverage was not. Attanasio, Meghir, and Otero (2011) examined the 2008 Chilean pension reform where the introduction of a basic social pension for workers with insufficient contributions had a negative effect on labor market participation and formal/informal work choices. They found that the probability of contributing to the pension system was reduced by 4.1 percent for workers 40 years and older as a result of the reform. A study by Aterido, Hallward-Driemeier and Pagés (2011) showed that Seguro Popular, a program that provides noncontributory health benefits in Mexico, lowered formality by 0.4–0.7 percentage points.

Adequacy

Assessing pension adequacy is less straightforward than assessing coverage. Since different pension pillars pursue different objectives (replacing previous incomes for the contributory pillar or alleviating poverty for the noncontrib-

Figure 20. Contributory Benefits in Latin America
(Gross Replacement Rates, Men, in Percent)



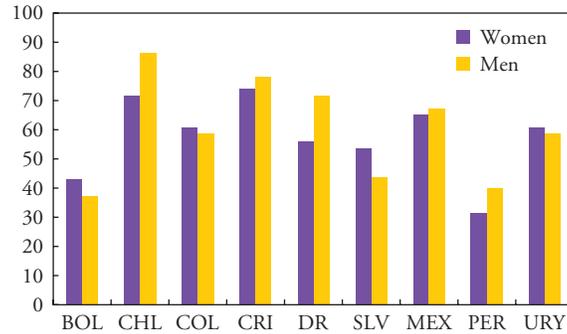
Sources: IDB, 2014; OECD, 2015.
 Note: Data differs from Panel 2 for mixed and transitioning systems because the latter only considers DB pillars. Values for Argentina and Brazil differ from Table 3 and Panel 2 because data in there are sourced from OECD, 2015 as opposed to IDB, 2014 in the above chart.

utory pillar), there is no single conceptual indicator or metric of adequacy. Furthermore, some of the commonly used indicators (such as replacement rates) are hard to compare across countries and within pension systems, as they may differ significantly for individuals with different income levels. The design of the pension system also affects the measures of adequacy: for example, the coexistence of different pillars may affect pension incomes through minimum pension guarantees or the ability to transfer between pillars. Pension adequacy is particularly difficult to assess for defined-contribution and mixed systems, as these have only been phased in recently and entail high uncertainty over the pension levels that they could produce in the future.

While the picture is uneven across countries and systems, pension adequacy is a serious issue in Latin American countries with defined contribution systems. In most countries with defined-benefit systems, prospective net replacement rates are above 70 percent, meaning that pensions replace at least 70 percent of pre-retirement earnings for average workers. These rates differ substantially, however, between normal retirees, early retirees, and certainly, workers who do not reach the required number of contribution years to receive any pension at all. In countries with defined-contribution systems, meanwhile, retirees typically receive only 20–50 percent of their pre-retirement earnings on average (Table 2; Figure 20). Such levels fall short of workers’ expectations and raise the risk for low-income workers to experience old-age poverty.⁵ Moreover, this deficiency is likely to be accentuated going forward (paragraphs 61–66).

⁵See footnote 8.

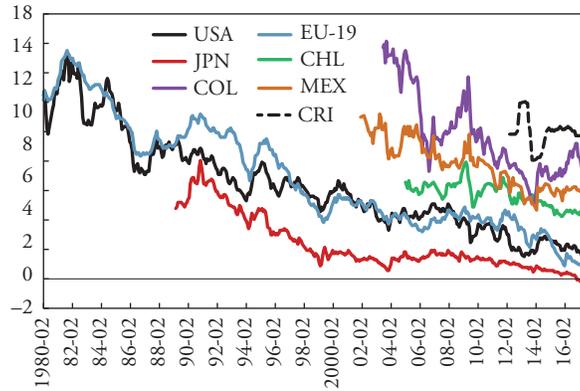
Figure 21. Density of Contribution by Country
(Percent)



Source: Durán and Peña (2011).

Low replacement rates in contributory schemes are due to low contribution densities and low returns on pension fund assets. Replacement rates under defined-contribution systems and, to a lesser extent, defined benefit systems, are linked to the contributions made during the retiree’s work-life. In Latin America, average contribution densities are in the range of only 50–60 percent, meaning that workers contribute to social security systems only during 50–60 percent of their careers (Figure 21). In defined-contribution systems, such gaps in contributions can be particularly costly early in working careers, given the role of compound interest in pension levels. According to some estimates, incomplete contribution histories may result in pension benefits replacing less than 10–15 percent of pre-retirement earnings of low- and middle-income workers in countries like Chile and Mexico (OECD, IDB, and World Bank 2014). In defined-benefit systems, gaps are most important at the end of the working lives, which could result in a failure to reach the minimum contribution period necessary to receive a full pension (OECD, IDB, and World Bank 2014). Alongside low contribution densities, low returns on investment worldwide have also reduced pension adequacy in countries with funded pension systems, although real investment returns in Latin America compare favorably with those in other regions (Figure 22). In particular, declining long-term interest rates since the 1980s, along with historically low levels since the Great Depression, due to expansionary monetary policies in advanced economies, have decreased the returns to pension savings accordingly, and are expected to continue to do so in the future as the world population ages. That said, the downward pressure on real interest rates from larger aggregate savings and lower marginal product of capital (due to higher capital per worker) would, to some extent, be offset by the increase in old-age dependency ratios as retirees dis-save, or save less than workers (Carvalho, Ferrero, and Nechio 2016). Given lower market returns, higher risk adjustments, and prevailing inefficiencies due to restrictive invest-

Figure 22. 10-Year Nominal Interest Rates
(Percent per annum)



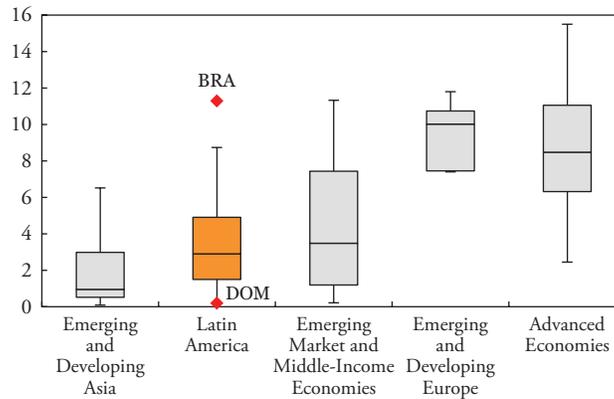
Source: OECD (2017).

ment regulations or captive government financing, replacement rates of defined-contribution systems are projected to remain low or even decline further in the future.

Pension replacement rates for women are typically lower than for men. As is the case with the lower pension coverage of women, the reasons for lower replacement rates include lower labor market participation rates, lower contribution densities due to more frequent interruptions of formal employment, and the lower pensionable age for women in many countries (see Table 3). Differences between genders are particularly substantial in Chile’s defined contribution system, with replacement rates for women about 10–13 percentage points lower than for men across the earnings range. In many countries, however, survivor benefits for widowed women mitigate some of the difference in the pensions received by women and men.

Reforms aimed at increasing coverage through noncontributory pensions have not helped to enhance pension adequacy. Given the low pension coverage across countries, most Latin Americans receive no or only noncontributory pensions. The higher the coverage of the noncontributory pensions, however, the lower the amount that does not compromise fiscal sustainability. For this reason, some of the broadest noncontributory pension systems do not exceed even the poverty line, such as the Bolivian universal pension that provides roughly 10 percent of per capita incomes to all elderly individuals.

Figure 23. Pension Spending, 2015
(Percent of GDP, 2015)



Sources: Country authorities and IMF staff calculations.
 Note: The upper end of the box represents the 75th percentile of regional spending, the middle line is the median, and the bottom end of the box the 25th percentile of spending. The ends of the whiskers represent the 5th and 95th percentiles, respectively, of regional pension spending in 2015.

Long-Term Gaps

Fiscal Gaps in Defined-Benefits and Noncontributory Pension Systems

Public pension spending in Latin America is relatively low compared with that in high-income countries and emerging Europe. In 2015, spending on public pensions amounted to 3.7 percent of GDP on average in Latin America, compared with 8.7 percent in high-income countries and 9.5 percent in emerging Europe (Figure 23; Table 4). The lower average spending ratio is a result of less comprehensive pension systems, as well as of the more favorable prevailing old-age support ratios. Nevertheless, Latin American countries spend almost twice as much on pensions than emerging Asia does, even though their demographic structure is more similar.

Regional averages conceal great variation across countries. Behind the average pension-to-GDP ratio of 3.7 percent in Latin America are vastly different numbers for public pension spending between countries, ranging from only 0.1 percent in the Dominican Republic to 11.2 percent in Brazil (Table 4). The large differences between countries reflect not only differences in the current age structure, but also differences in the type, coverage, and generosity of public pension systems. Countries with defined-contribution systems, like Bolivia and Chile tend to spend less than countries with defined-benefit systems, such as Argentina or Brazil. Similarly, countries with very low coverage rates, like Honduras and Guatemala, have much lower expenditure levels

Table 4. Public Pension Expenditure in Latin America
(Percent of GDP)

	Pension Expenditure				Spending Change			PDV Spending Change		
	2015	2030	2065	2100	2030	2065	2100	2015–2030	2015–2065	2015–2100
Argentina	7.8	8.3	13.8	18.9	0.4	6.0	11.1	0.5	74.4	228.0
Bolivia	3.0	1.9	2.4	3.3	21.1	20.7	0.3	210.5	240.3	243.4
Brazil	11.2	17.1	29.5	34.4	5.9	18.3	23.2	52.5	364.0	749.1
Chile	4.1	3.0	4.8	5.6	21.1	0.7	1.5	210.2	220.9	0.8
Colombia	5.1	4.1	3.0	3.5	21.0	22.1	21.6	213.3	258.7	292.5
Costa Rica	2.8	5.0	13.5	15.8	2.2	10.7	13.0	17.9	171.9	391.1
Dominican Republic	0.1	0.6	1.1	1.7	0.5	1.0	1.6	5.6	23.8	47.4
Ecuador	2.7	3.5	6.4	8.7	0.9	3.8	6.1	7.3	64.6	154.2
El Salvador	2.6	2.3	0.7	0.2	20.2	21.9	22.4	4.2	230.0	269.3
Guatemala	1.0	1.1	2.1	3.2	0.1	1.2	2.2	0.4	14.3	44.9
Honduras	1.4	1.7	2.0	2.4	0.3	0.6	0.9	3.1	13.9	28.2
Mexico	1.7	2.3	1.8	0.6	0.6	0.1	21.0	3.7	23.0	13.1
Nicaragua	2.7	3.8	9.7	13.0	1.1	7.0	10.3	7.4	104.4	265.6
Panama	3.0	3.3	2.2	1.3	0.3	20.8	21.8	0.6	9.5	217.5
Paraguay	2.8	3.5	6.9	9.4	0.7	4.1	6.6	5.9	58.1	153.8
Peru	1.0	1.3	2.9	4.0	0.4	1.9	3.0	3.1	31.0	75.4
Uruguay	7.9	7.5	10.3	12.9	20.5	2.4	5.0	24.7	12.3	80.1
Venezuela	4.8	6.7	11.5	15.2	1.9	6.7	10.4	15.4	121.2	276.8
LA Average	3.7	4.3	6.9	8.6	0.6	3.3	4.9	4.9	52.0	127.0
Advanced Average	8.7	9.3	9.7	10.7	0.6	1.1	2.0	3.3	27.1	53.0
Emerging Average	4.5	5.4	8.1	9.6	1.0	3.6	5.2	7.3	66.4	145.8
Emerging Asia Average	2.0	3.2	5.9	7.3	1.2	3.9	5.3	7.5	73.4	156.5
Emerging Europe Average	9.5	8.4	8.7	9.3	21.1	20.8	20.2	29.8	240.7	251.5

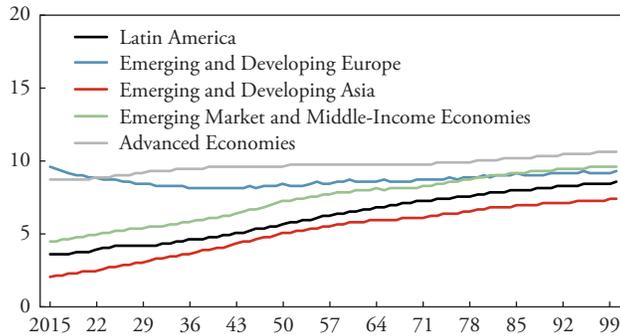
Source: IMF staff estimates and projections.

than countries like Argentina and Uruguay, in which pension systems are more comprehensive.

As populations age, Latin America's pension spending is expected to catch up with other emerging and advanced economies. Average pension spending in Latin America is projected to rise moderately in the next decade, increasing from 3.7 to 4.3 percent of GDP by 2030. However, expenditure is projected to almost double to 6.9 percent of GDP by 2065.⁶ Expenditure would reach 8.5 percent of GDP by the end of the projection period in 2100 (Figure 24; Table 4), substantially narrowing the gap with the advanced world (10.7 percent of GDP) and other emerging economies (9.6 percent of GDP on average and 9.3 percent of GDP in Europe) except Asia (7.3 percent of GDP). Revenues from pension contributions, in contrast, are projected to grow in line with GDP, while investment revenues will dwindle as reserves are depleted. As a result, pension deficits are projected to increase on average by about 3 and 5 percentage points of GDP by 2065 and 2100, respectively.

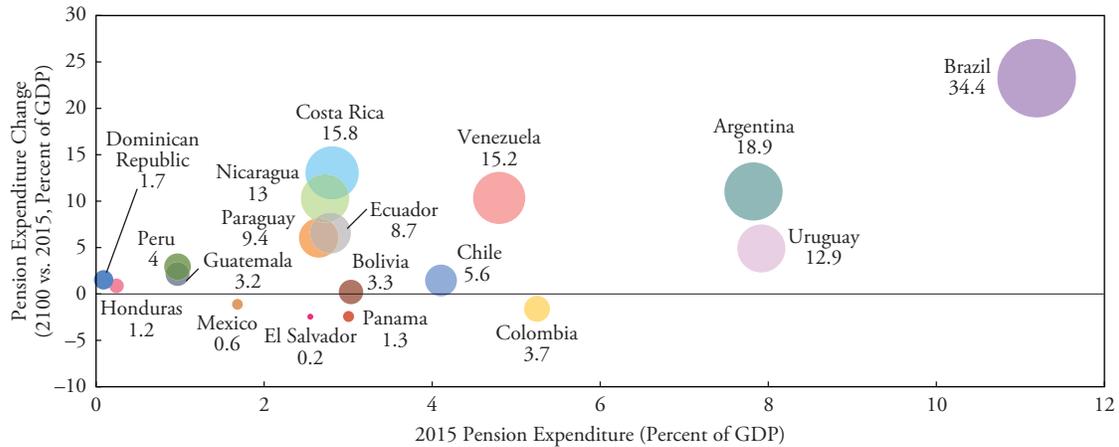
⁶The rationale behind the choice of years 2030 and 2065 as intermediate points for the analysis throughout the paper is to focus on: 1) a relatively early period (2030) when currently unforeseen changes in demographic trends resulting from potential new policies could not yet have an impact on pension expenditure projections; and 2) a sufficiently long period of time when new workers joining the work force under less generous pension system conditions would start having an impact on pension expenditure projections as they retire (2065).

Figure 24. Pension Expenditure Projections, 2015–2100
(Percent of GDP)



Sources: Country authorities and Fund staff calculations.

Figure 25. Pension Expenditure



Sources: IMF staff estimates and projections.

Note: Bubble size corresponds to pension expenditure as a percent of GDP in 2100.

A large proportion of the projected regional spending is concentrated in countries with large, unfunded pension systems. Almost 80 percent of Latin America’s aggregate spending in 2100 comes from only seven countries. For example, without any reforms Brazil is expected to spend over 34 percent of its GDP on pensions in 2100—about 4 times the regional average. Other countries with above-average projected pension spending are Argentina, Costa Rica, Venezuela, Nicaragua, Uruguay and Paraguay (Figure 25).

Countries with a funded component will experience a lesser increase in pension spending, but there is a trade-off between fiscal sustainability and social sustainability. Typically, countries that introduced a funded component in their pension systems are projected to see smaller increases in spending

than countries with unfunded systems. In Colombia, El Salvador, Mexico, and Panama, for example, spending is projected to decrease rather than increase over the forecasting period, as the transition costs from the previous defined-benefit systems gradually decline (Figure 23; Table 4). However, this fiscal sustainability often comes at the cost of inadequate benefits, as average replacement rates tend to be lower in countries that have transitioned to a defined contribution system (see Figure 18). In light of higher old-age poverty, many countries have introduced costly non-contributive or semi-contributive elements to compensate for lower pensions, thus highlighting the trade-off between fiscal sustainability and social sustainability in the design of different pension systems. Figure 23 includes projected public spending on the noncontributory component of these schemes.

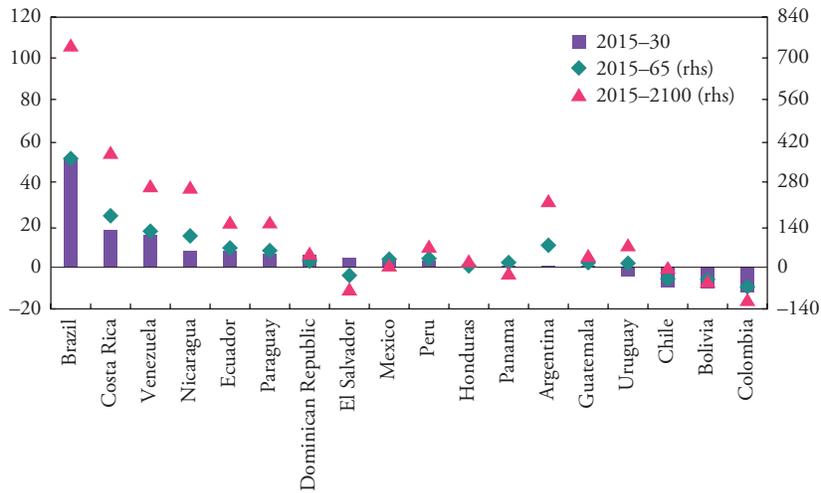
The resulting long-term fiscal gaps that arise from defined-benefits and noncontributory pension systems under current policies are not sustainable. Long-term fiscal gaps are measured by the present discounted value (PDV) of projected government pension spending increases, assuming constant revenue ratio to GDP.⁷ The PDV provides a sense of how much future government pension liabilities could add to public debt burdens, assuming no offsetting changes occur in fiscal policy or reforms.⁸ For the whole region, the PDV of the increase in pension spending between 2015 and 2100 would be on average about 126 percent of GDP (Table 4). In Brazil, it would be 750 percent of GDP, followed by Costa Rica, Venezuela, Nicaragua, Argentina, Paraguay, and Ecuador, with fiscal gaps ranging from 390 to 150 percent of GDP. On the other hand, countries such as Colombia, El Salvador, Bolivia, Panama, and Chile, will have negative fiscal gaps over the same period of up to negative 100 percent of GDP. Last, Mexico, Honduras, Dominican Republic, Guatemala, Peru, and Uruguay, will experience fiscal gaps of less than 100 percent of GDP (Figure 26).

A generous combination of high replacement rates and low contributions played a significant role in weakening the long-term financial stability of defined-benefit pillars. Although other crucial parameters—including retirement ages, indexation rules, and other qualifying conditions—typically contribute to determining the financial viability of defined-benefit pension schemes, international comparison shows that such parameters in Latin American countries are not far from international standards. On the other hand, contribution rates in most defined-benefit pillars in the region (including previous schemes in the process of being discontinued) are below OECD averages, while replacement rates tend to be higher (Figure 27). For example,

⁷In country cases where increases in contribution rates have already been approved, these future increases are incorporated in the projections, partially offsetting the impact of projected expenditure increases on future deficits and the long-term fiscal gap.

⁸Depletion of pension system reserves, where known, is also taken into account in the projections.

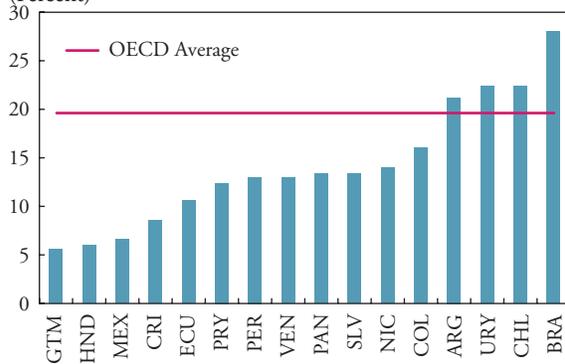
Figure 26. PDV of Public Pension Expenditure Growth
(Percent of GDP)



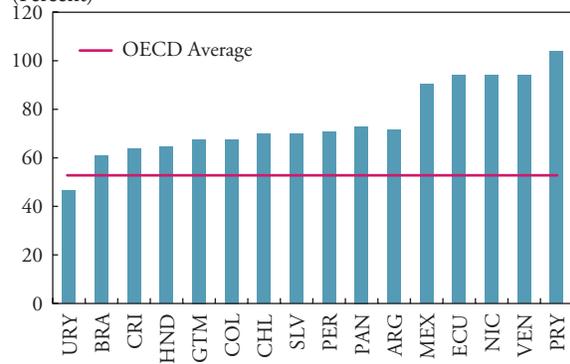
Sources: Fund staff estimates and projections.

Figure 27. Contribution and Replacement Rates of DB Pillars

1. Contribution Rates: DB Pillars
(Percent)



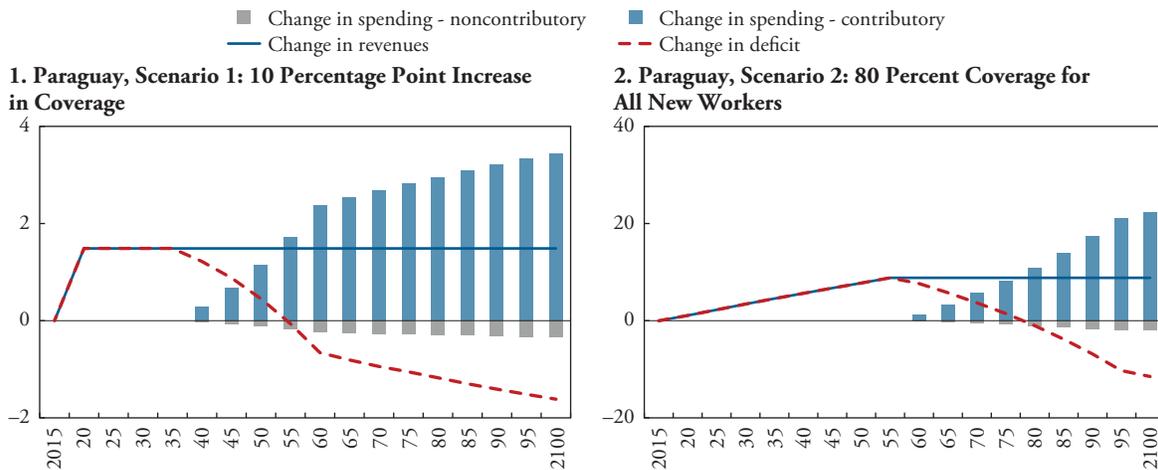
2. Gross Replacement Rates: DB Pillars
(Percent)



Sources: OECD Pension database, OECD, *Pensions at a Glance: Latin America and the Caribbean* (2014), and Fund staff estimates.

average gross replacement rates in Venezuela and Paraguay are about double the OECD average of 53 percent of average earnings, and only in Uruguay is the defined-benefit pillar replacement rate lower than in the non-Latin American OECD countries. On the other hand, Brazil and Argentina (and the pre-existing Chilean defined-benefit pillar currently being discontinued) are the only countries with contribution rates in line with or above the OECD average; all other countries are significantly below such a benchmark. In Honduras, Guatemala, and Costa Rica, contribution rates are less than one-third the level in OECD countries.

Figure 28. Scenario Analysis: Increase in Formalization - Paraguay



Source: Fund staff estimates and projections.

Effect of Labor Formality and Productivity Changes on Projected Fiscal Gaps

Increases in labor formality and pension coverage would reduce fiscal gaps in the short term, but could exacerbate unsustainable pension systems in the longer term. An increase in the share of formal employment conditions would proportionally increase active pension coverage rates, thus increasing revenues relative to expenditures as long as newly formalized workers remain in the labor force. As the new contributors retire, however, passive coverage increases proportionately, and the additional pension benefits increases offset previous contributions. To what extent this affects long-term fiscal gaps depends on the sustainability and generosity of the contributory system, as well as on the availability and generosity of noncontributory pensions that the elderly would have received instead.

Simulation results indicate that the effect of formalization on fiscal gaps could be significant. In the case of Paraguay, for instance, where less than 20 percent of the labor force contributes to the social security pension system for private sector employees, an immediate increase in the coverage rate by 10 percentage points would permanently increase revenues by about 1 percentage point of GDP, but would gradually increase expenditures by more than 3 percentage points of GDP. The net effect on the pension system balance would switch from positive to negative around 2050, when about half of the newly formalized workers enter retirement. If, instead of a one-off increase, coverage rates for new workers were to increase towards levels of higher-income countries (about 80 percent), the effect would be even more pronounced (see Figure 28). Since noncontributory benefits are much lower,

the decrease in the number of elderly people in need of old-age support would not offset much of the increase in fiscal gaps. In a country like Argentina, where coverage rates are already much higher and noncontributory benefits are comparatively more generous than in Paraguay, the effect of an increase in formality would be less pronounced.

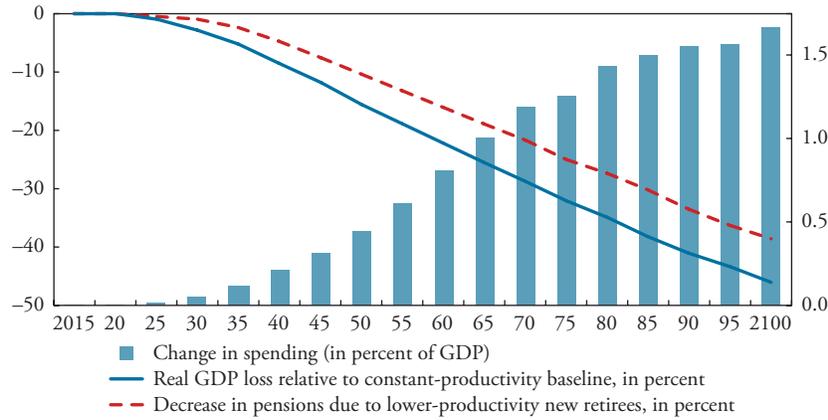
If productivity growth were to slow due to aging, fiscal gaps could increase further. An age-related productivity slowdown could have adverse effects on unfunded pension systems if current contributors have lower wages (and therefore make lower contributions) than they would have in a higher-productivity environment, while current retirees receive benefits based on higher previous lifetime incomes.⁹ Since productivity also determines stock market returns, a productivity slowdown would also affect funded pension systems, although through a different channel. Although there is no decisive evidence on the impact of aging on productivity, a recent empirical study suggests that a 10 percent increase in the 60+ population share may lower productivity growth per worker by 3.7 percent (Maestas, Mullen, and Powell 2016) in the absence of adjustments that allow workers to stay productively employed for longer.

Simulation results indicate that the effect of an age-related productivity slowdown could moderately increase the size of long-term fiscal gaps. To estimate the impact of aging on productivity, the elasticity estimated in Maestas, Mullen, and Powell (2016) is used. For example, in the case of Costa Rica where the retirement-age population is expected to increase from less than 10 percent to more than 30 percent of the total population by 2100, this relationship implies that long-term growth could be about 1 percentage point lower than in a baseline scenario, while pension expenditures would be about 1½ percent of GDP higher, resulting in an estimated long-term fiscal gap—PDV of future expenditures—about 7 percent higher than in the baseline scenario (Figure 29).¹⁰

⁹As explained above, the methodology followed in the stylized cross-country exercise presented in this paper assumes a constant replacement rate of pensions as a share of current GDP per capita, with pension expenditure projections driven entirely by demographic trends in the absence of parametric reforms, and given also the additional assumption of constant labor share in GDP. Under this methodology, pension expenditure projections as a share of GDP are not sensitive to the specific GDP and underlying productivity growth assumptions. In reality, the replacement rates (as a share of current GDP per capita) of the stock of past retirees and those of the flow of new retirees are likely to differ if increases in pre-retirement wages reflect both productivity increases and cost of living (inflation) adjustments, while increases in pensions of existing retirees are only adjusted with inflation. Therefore, shocks to productivity growth would have an impact on replacement rates and resulting pension expenditure growth projections.

¹⁰For this exercise, which assumes varying replacement rates for different cohorts of retirees—depending on their pre-retirement wages and post-retirement cost of living adjustments—different GDP growth assumptions have a permanent impact on pension expenditure projections as a share of GDP. In the baseline, GDP growth projections are based on projected trends in working-age population and productivity growth, with the latter assumed to gradually converge to the global average of 1.8 percent observed since the 1960s

Figure 29. Scenario Analysis. Age-Related Productivity Decline, Costa Rica

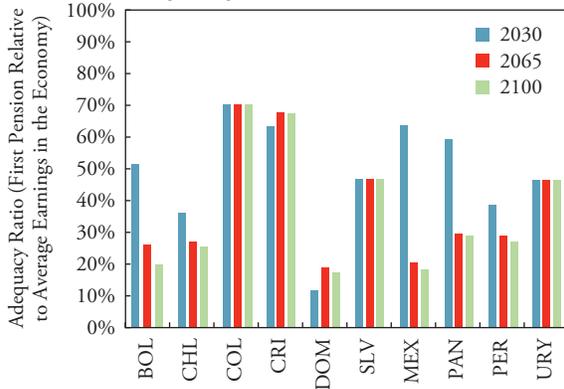


Sources: IMF staff estimates and projections.

Figure 30. Adequacy Ratios

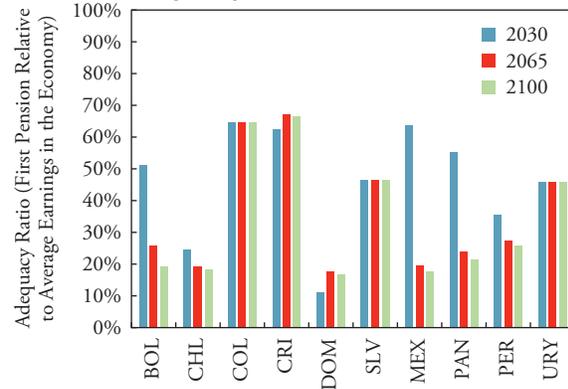
1. Adequacy Ratios for Men

(Percent of Average Wage)



2. Adequacy Ratios for Women

(Percent of Average Wage)



Source: Fund staff estimates and projections.

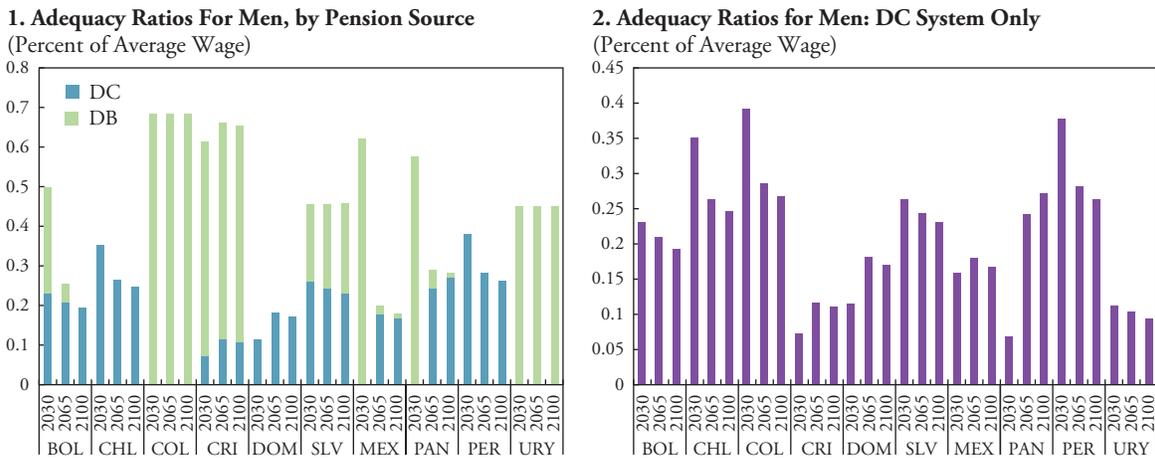
Adequacy Gaps in Defined-Contribution Pension Systems

Adequacy ratios in defined-contribution and mixed systems vary a lot across countries.¹¹ At the 2030 horizon, adequacy ratios for men vary from about 35 percent of average earnings in the economy (Chile) to above 68 percent (Colombia; Figure 30). Adequacy ratios for “pure” defined-contribution

(MGI; 2015), resulting in projected potential GDP growth of 1.3 percent by 2100, down from an estimated 4 percent in 2015.

¹¹Adequacy ratios are computed as the ratio of pensions received by the average wage earner at the time of retirement over the average earnings of the working population (see paragraph 17). The estimates vary over time, reflecting changes in pension systems; depend on actual past rates of return; and assume a contribution density of 75 percent in the baseline scenario. For those reasons, they may differ from the replacement rates computed by the OECD (see paragraph 46).

Figure 31. Adequacy Ratios by Pension Source and DC System Only



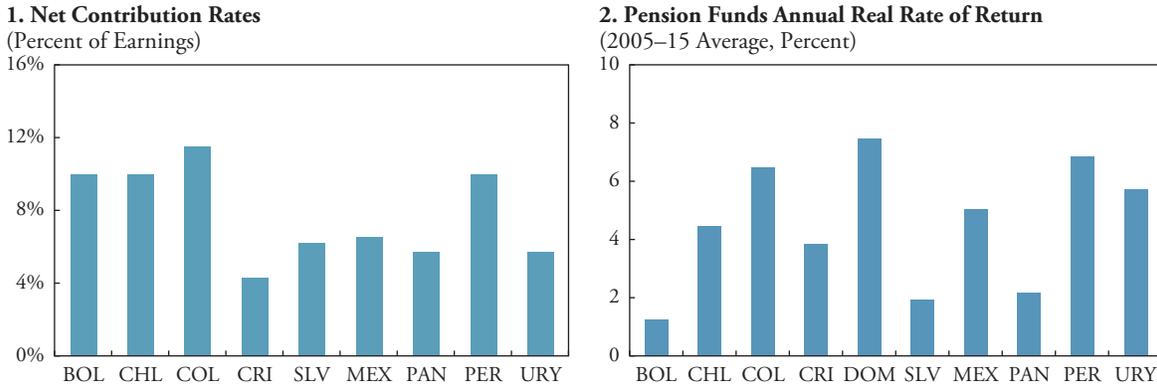
Source: Fund staff estimates and projections.

systems are slightly lower for women because women’s longer life expectancy implies a lower pension annuity for similar levels of accumulated savings and identical returns.

The main sources of cross-country dispersion are differences in the generosity of the defined-benefit pillars (the case of mixed systems), minimum pensions, or old pension systems transitioning to defined-contribution systems. In particular, countries with a mixed system and a generous defined-benefit pillar, such as Colombia, Costa Rica and Uruguay, tend to exhibit higher adequacy ratios (Figures 30 and 31). In Mexico, workers retiring in 2030 still benefit from the old system’s very generous rules as they were “grandfathered” when the system was reformed. In Panama, workers contribute to the defined-contribution system only for the part of their wage that exceeds a certain threshold. Since this threshold is not revalued over time, nearly all earnings progressively serve as a contribution base for the defined-contribution system, whose payoff is much less generous than the old defined-benefit system. This, and the grandfathering of older cohorts, explains the marked decline in adequacy ratios over time.

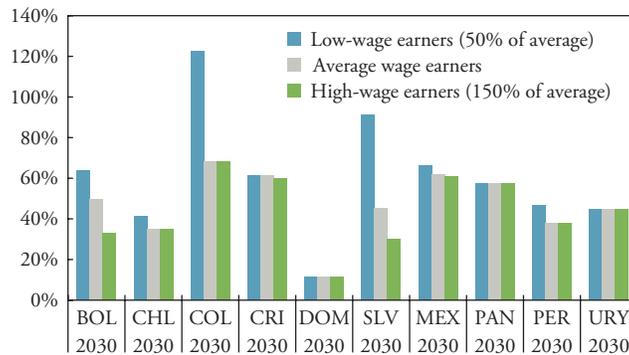
Adequacy ratios for defined-contribution systems decrease with lower contribution rates and past rates of return (see Figure 32). For instance, low contributions account for the low replacement rates computed for Costa Rica and Uruguay, two countries with a mixed system. Differences in past rates of return, relevant for current adequacy ratios and those at short projection horizons (for example, 2030), reflect different investment strategies by pension funds (Figure 30). In some countries, several types of funds exist, with different risk-profiles and, hence, different rates of return. Domestic

Figure 32. Pension Contribution Rates and Real Rate of Return



Sources: International Association of Pension Supervisors, IDB, national sources, OECD, and Fund staff calculations.

Figure 33. Replacement Rates for Men, by Wage Level
(Percent of Last Earnings before Retirement)



Source: IMF staff estimates and projections.

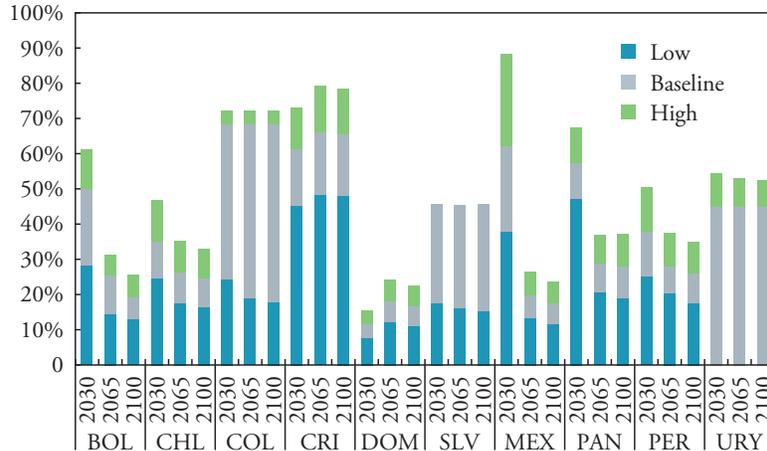
regulations may also impose constraints on the portfolio composition of the various funds.

Within countries, replacement rates (in proportion of the last earnings before retirement) vary with the wage level. This is the case in countries with generous minimum pensions (El Salvador), where low wage earners receive a subsidy or pension complements for participating in the defined-contribution system (Bolivia) or where pensions are capped at a certain level (Figure 33).¹²

Sensitivity scenarios based on different contribution densities show the importance of contribution densities for adequacy. As emphasized earlier, informal work is a prevalent issue in Latin America that affects the number of

¹²Statutory minimum retirement age requirements constrain the incentive to retire that low-wage workers with replacement rates above 100 percent—as a result of some of these system features—would otherwise have.

Figure 34. Adequacy Ratios for Men, by Contribution Density
(Percent of Average Wage)



Source: IMF staff estimates and projections.

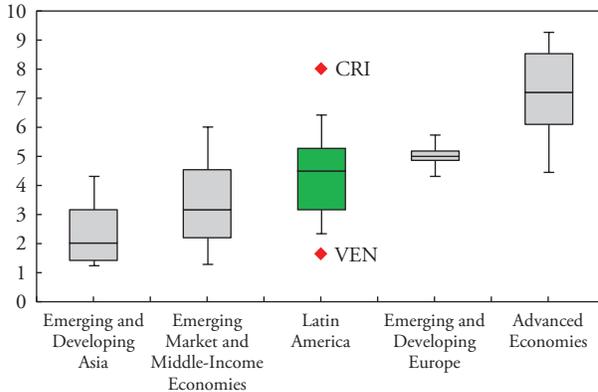
years during which workers contribute to the pension system. Sensitivity scenarios of pension adequacy show that the effect of low contribution densities differs across countries.¹³ Uruguay, for example, does not grant any pension benefit at the legal retirement age of 60 to able individuals who have accrued fewer than 30 years of contributions. On the contrary, the pension accrual schedules of some countries, such as Costa Rica, offer higher accrual rates for the first contribution years which increase the pensions of individuals with low contribution densities (Figure 34).

Replacement rates of defined-contribution systems are likely to continue to raise issues of adequacy in the future; and these issues may indeed be worsening. Paragraph 46 noted that effective current replacement rates in defined-contribution systems in Latin American are well below those of defined-benefit systems and generally well below the OECD average (at least for pure defined-contribution systems). The analysis in this section, which calculates theoretical adequacy ratios and replacement rates in Latin American defined-contribution systems, suggests that this situation is likely to persist and may also result in a further lowering of replacement rates in the long term. Needless to say, improvements in contribution densities and real rates of return would alleviate these concerns.

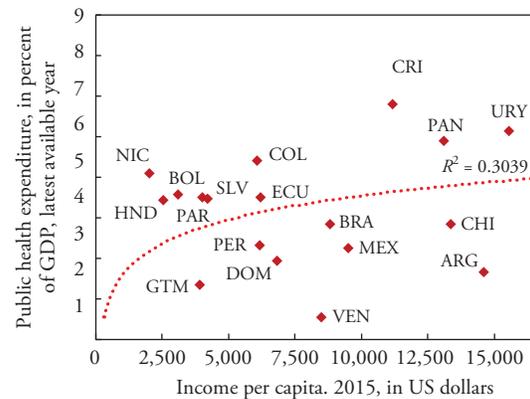
¹³In the baseline scenario, a contribution density of 75 percent is applied; on the contrary, in the low (high) scenario, contribution densities amount to 50 percent (100 percent). For further details, see paragraph 17 and Technical Annex.

Figure 35. Public Health Expenditure in Latin America

1. Health Spending, 2015
(Percent of GDP, 2015)



2. Income Per Capita and Public Health Expenditure



Sources: Country authorities and Fund staff calculations. WHO and IMF staff estimates.
Note: The upper end of the box represents the 75th percentile of regional spending, the middle line is the median, and the bottom end of the box the 25th percentile of spending. The ends of the whiskers represent the 5th and 95th percentiles respectively of regional pension spending in 2015. CRI = Costa Rica; VEN = Venezuela.

Note: Trendline based on worldwide distribution of countries.

Fiscal Gaps in Health Care Public Spending

Public outlays on health care in Latin America exceed pension expenditures, although they remain lower than in high-income countries. In 2015, public health spending in Latin America averaged 4.4 percent of GDP. Similar to pensions, this is lower than in the advanced economies (7.1 percent) and emerging Europe (5 percent), but higher than in emerging Asia (2.3 percent), where public health systems are less comprehensive (see Figure 35). As with pensions, regional averages also conceal great variation across countries within the region. Health care spending in the region ranges from only close to 2 percent of GDP in Venezuela and Guatemala, to about 6 percent of GDP in Argentina, Colombia, Panama, and Uruguay, and 8 percent in Costa Rica, consistent with the high coverage in all the latter countries (Figure 35). As is the case worldwide, countries in the region with higher per capita incomes tend to spend more in total on health care relative to their GDPs, with the main exceptions of Venezuela/Costa Rica where expenditure appears particularly low/high relative to the countries' level of development.

Health outcomes suggest room for improvement in targeting and efficiency of expenditure on health care. Notwithstanding significant gains in health made over the last few decades in Latin America—including higher rates of immunization and the successful eradication of diseases, particularly in the poorer countries of the region—some core health status indicators such

Table 5. Health Outcomes, Income per Capita, and Health Expenditure

	Mortality Rates						GDP Per Capita in 2015 (US dollars)	Public Health Expenditure, in % of GDP
	Maternal ¹	Infant ²	Neonatal ³	Under-five ⁴	Communicable Diseases ⁵	Non-communicable Diseases ⁵		
Africa	473	51	26	74	7	7	2,409	2.9
Emerging Asia	109	23	14	28	2	6	4,581	3.2
LA	43	12	7	13	1	4	9,415	4.4
Emerging Europe	16	8	5	9	0	6	7,942	4.9
Advanced	7	3	2	4	0	4	39,461	6.7
Bolivia	206	30.6	19.6	38.4	2.3	6.4	3,099	4.3
Guatemala	88	24.3	13.4	29.1	2.1	4.1	3,922	2.5
Nicaragua	150	18.8	9.8	22.1	0.8	5.5	2,024	4.7
Paraguay	132	17.5	10.9	20.5	0.8	4.9	4,102	4.5
Honduras	129	17.4	11	20.4	1.2	4.4	2,530	4.5
Dominican Republic	92	25.7	21.7	30.9	0.8	4.0	6,833	2.9
Ecuador	64	18.4	10.8	21.6	1.0	4.1	6,196	3.0
Brazil	44	14.6	8.9	16.4	0.9	5.1	8,811	4.6
El Salvador	54	14.4	8.3	16.8	1.0	4.7	4,219	4.4
Panama	94	14.6	9.6	17	0.9	3.7	13,013	5.5
Venezuela	95	12.9	8.9	14.9	0.6	4.1	8,494	1.6
Peru	68	13.1	8.2	16.9	1.2	3.6	6,179	3.1
Mexico	38	11.3	7	13.2	0.6	4.7	9,512	3.3
Argentina	52	11.1	6.3	12.5	0.7	4.7	14,617	6.1
Colombia	64	13.6	8.5	15.9	0.6	3.8	6,060	5.5
Uruguay	15	8.7	5.1	10.1	0.5	4.5	15,547	6.2
Costa Rica	25	8.5	6.2	9.7	0.3	3.9	11,162	8.0
Chile	22	7	4.9	8.1	0.4	3.7	13,342	3.8

Sources: World Health Organization; World Economic Outlook; and IMF staff calculations. Mortality data is latest year available.

¹Per 100,000 live births.

²Probability of dying between birth and age 1 per 1,000 live births.

³Per 1,000 live births.

⁴Probability of dying by age 5 per 1,000 live births.

⁵Mortality rates by broad case groups, per 1,000 population.

as maternal and other early age mortality rates are, on average, still significantly worse than in advanced economies, and even emerging Europe despite broadly similar income and expenditure levels (PAHO and WHO 2016). By country, although core indicators on outcomes are strongly correlated with income levels, the link with the level of public expenditure on health care is less strong, suggesting significant room for improvement in efficiency and targeting of expenditure in several countries (Table 5). For example, Bolivia and Paraguay have fairly dismal core outcome indicators despite levels of public health spending at or above the regional average. Conversely, Argentina, Colombia, Mexico, and Peru enjoy much more favorable core outcomes with similar or only moderately higher levels of public health spending.

The Latin America region has the largest projected increase in health care expenditure in the world. Health care expenditure is projected to rise faster than economic growth due to population aging, as the majority of health expenditures occur later in life (paragraph 10). Moreover, technological improvements result in better, but costlier, services for any patient (this

Table 6. Public Health Expenditure in Latin America
(Percent of GDP)

	Health Expenditure				Health Spending Change			NPV Health Spending Change		
	2015	2030	2065	2100	2030	2065	2100	2015–2030	2015–2065	2015–2100
Argentina	6.1	7.4	12.6	16.0	1.3	6.5	9.9	8.8	102.1	252.8
Bolivia	4.3	5.4	9.4	12.6	1.0	5.1	8.3	6.9	78.4	201.4
Brazil	4.6	6.3	12.0	14.4	1.7	7.4	9.8	11.4	123.2	285.2
Chile	3.8	5.2	9.5	11.3	1.4	5.7	7.5	9.2	97.8	221.3
Colombia	5.5	7.6	14.3	17.5	2.1	8.8	12.0	14.0	147.7	342.9
Costa Rica	8.0	11.1	20.9	24.9	3.0	12.9	16.8	20.1	214.7	494.3
Dominican Republic	2.9	3.7	6.8	9.1	0.8	3.9	6.2	5.7	62.7	156.6
Ecuador	3.0	3.9	7.2	9.6	0.9	4.2	6.6	6.1	67.6	167.3
El Salvador	4.4	5.8	11.3	14.8	1.3	6.8	10.4	8.8	102.9	266.3
Guatemala	2.5	3.1	5.6	7.8	0.6	3.1	5.3	3.8	46.1	123.7
Honduras	4.5	5.9	12.0	16.1	1.4	7.5	11.5	9.1	111.1	290.9
Mexico	3.3	4.4	8.7	11.3	1.1	5.4	8.0	7.2	84.5	209.6
Nicaragua	4.7	6.3	13.2	17.5	1.6	8.5	12.7	10.7	128.6	327.7
Panama	5.5	7.2	12.8	16.4	1.7	7.3	10.9	11.3	122.3	290.4
Paraguay	4.5	5.8	10.4	13.6	1.2	5.9	9.0	8.3	90.7	228.2
Peru	3.1	4.1	7.7	10.1	0.9	4.6	7.0	6.3	72.4	179.4
Uruguay	6.2	7.4	12.2	14.9	1.3	6.1	8.8	8.5	97.4	236.1
Venezuela	1.6	2.2	3.9	5.2	0.5	2.3	3.5	3.5	37.6	91.3
LA Average	4.4	5.7	10.6	13.5	1.3	6.2	9.1	8.9	99.3	242.5
Advanced Average	7.1	8.7	12.3	13.8	1.6	5.2	6.7	10.3	99.9	207.8
Emerging Average	3.4	4.4	7.9	9.7	1.0	4.5	6.3	6.8	74.4	174.2
Emerging Asia Average	2.3	3.1	5.6	7.1	0.7	3.3	4.7	4.9	53.9	127.8
Emerging Europe Average	5.0	6.4	10.6	11.9	1.4	5.5	6.9	9.5	96.6	210.9

Source: IMF staff estimates and projections.

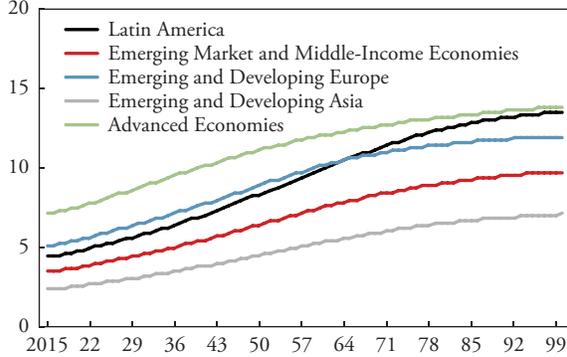
is reflected in the “excess cost growth” factor in this model). In the base-line scenario with 1 percent annual excess cost growth based on historical trends in health expenditure in advanced economies, average health care spending in Latin America would triple to 13.5 percent of GDP by 2100, on par with projected public health expenditures at the time in advanced economies (13.8 percent of GDP) and above all other emerging economies (Table 6, Figure 36).

Long-term fiscal gaps from health care expenditures are larger and more evenly spread than gaps from pensions. The PDV of projected health care spending increases between 2015 and 2100 exceeds 240 percent of GDP, almost double the estimated fiscal gap from pension expenditures (paragraph 54). Fiscal gaps from health care spending are also more evenly spread than those for pensions, with Argentina, Brazil and Mexico constituting more than 70 percent of the total fiscal gap from health care, commensurate with their economic weight. The countries with the largest projected gaps relative to GDP are Costa Rica, Panama, Colombia, Nicaragua, and Honduras, countries with already relatively high health expenditures and rapid projected population aging (Figure 37).

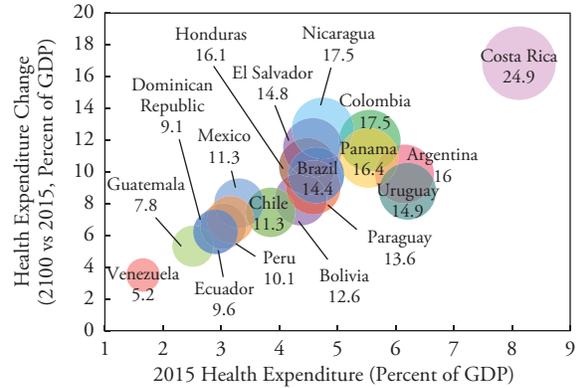
Long-term projections for health care spending are even more uncertain than for pension spending. In addition to the same uncertainties about long-term

Figure 36. Health Expenditure Increases in Latin America

1. Health Expenditure Projections
(Percent of GDP)



2. Health Expenditure



Source: Country authorities and Fund staff calculations.

Figure 37. PDV of Public Health Expenditure Increases
(Percent of GDP)



Sources: Fund staff estimates and projections.

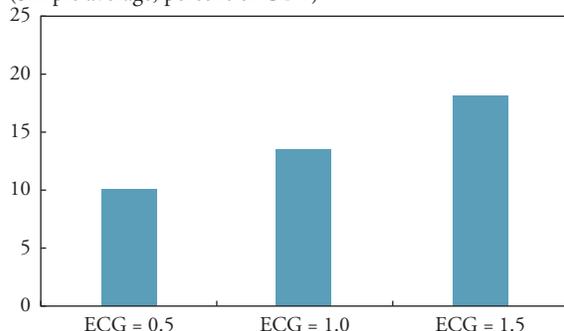
demographic projections, uncertainties about the future evolution of the excess cost growth parameter significantly widen the range of possible outcomes (Figure 38). For example, under alternative scenarios of high and low excess cost growth, at 1.5 percent and 0.5 percent respectively, average health care spending in Latin America by 2100 would be closer to 18 and 10 percent of GDP, respectively.¹⁴

The range of expenditure projections is broadly consistent with the literature on the impact of aging on health care spending. Cohort-based models

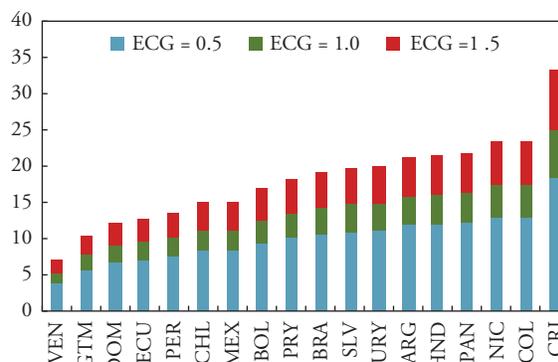
¹⁴In all scenarios, excess cost growth is assumed to start declining gradually in 2050, reaching zero by 2100.

Figure 38. Sensitivity of Health Expenditure Projections to ECG

1. Latin America: Health Expenditure Projections by 2100
(Simple average, percent of GDP)



2. Latin America: Health Expenditure Projections by 2100



Source: IMF staff estimates and projections.
¹ECG is excess cost growth

that analyze health expenditure in terms of services consumed by different age groups have been a typical approach in the literature on the impact of aging.¹⁵ The demographic component of expenditure projections is fairly robust to the specification of expenditures by cohort.¹⁶ While different studies take different approaches to account for the historical residual growth in expenditures not explained by demographics, projections are still broadly comparable to the range presented in the scenarios above. For example, a World Bank study—which focuses on the income elasticity of per capita health expenditure by cohorts to project the expected excess growth in health care expenditures as countries develop—projects expenditure increases that are in most cases similar or slightly below the low excess cost growth scenario presented above (Miller, Mason, and Holz 2011).¹⁷ Another study by the OECD—which adds an extrapolation of a residual health care expenditure growth component (estimated from a historical decomposition of expenditure growth) to the projections based on expected trends in demographics and income elasticity—produces results that are similar, or in some cases, moderately above the high excess cost growth scenario presented above (de la Maisonneuve and Martins 2013).¹⁸ All these models with additional adjustments

¹⁵Other component-based models with additional analysis of expenditures by type of disease and other microsimulation models that focus on the individual as a unit of analysis require additional data that are in both cases less widely available on a consistent basis across countries (Glassman and Zolota 2014).

¹⁶For example, Acosta-Ormaechea, and others (2017) obtain projections of health care expenditure by 2050 in Argentina, Brazil, Chile, Colombia, and Mexico of a broadly similar magnitude to those in this study, using similar assumptions on excess cost growth due to technological improvements, but a different reference age group to compute the age-spending profile.

¹⁷The World Bank study projects public health care expenditure by 2050 in Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Nicaragua, Peru, and Uruguay.

¹⁸In Latin America, the OECD study projects health care public expenditure by 2060 in Brazil, Chile, and Mexico.

to account for non-demographic factors are subject to the criticism that data availability on these factors is limited in emerging markets, requiring the use of assumptions based on trends in advanced economies with very different economic, political, and social environments (Glassman and Zoloa 2014).

Policy Options

Policymakers grappling with the fiscal challenges of aging populations can reform age-related programs directly or attempt to mitigate the decline in the working-age population. The first option involves parametric reforms to the public pension and health care system. The second option includes policies aimed at affecting fertility, migration, and formal labor force participation.

Parametric Reforms

Pension Reforms

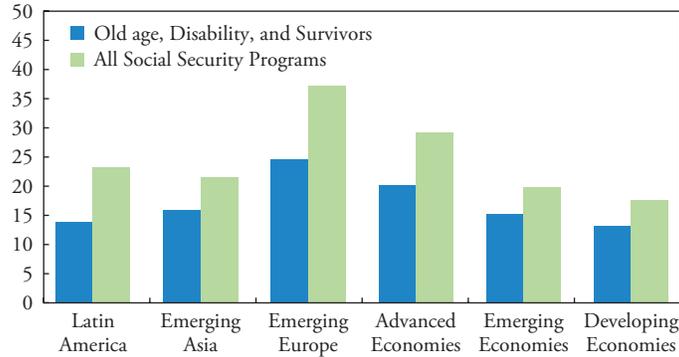
Pension reforms can effectively slow the growth of age-related public spending. Between 2015 and 2100, life expectancy at age 60 is projected to increase by 7.5 years across Latin America (UN 2015). Under the current pension rules, this means that retirees will spend longer and longer periods in retirement. Raising the normal retirement age in line with life expectancy gains is an especially attractive approach to maintaining pension sustainability, as longer work lives have the double effect of reducing the length of benefits—relative to the counterfactual of rising life expectancy without changes in the retirement age—while increasing the contributions to the system. At the same time, the ultimate effect of retirement age increases on the fiscal gap also depends on each pension system's design—in particular low contribution and high accrual rates—could increase the fiscal gap instead of reducing it (just like the increase in coverage analyzed in paragraph 58). This highlights the need for other reforms in countries with imbalanced systems, including lower benefits, progressive taxation of pensions, or higher contributions, with the latter generally being the least preferred option due to its impact on labor demand and possibly economic growth. Ultimately, the effectiveness and recommended prioritization of parametric reforms will depend on current pension system characteristics and demographic trends in each country. As for the pace of reforms, gradual adjustments mitigate their potentially negative social effects, suggesting that pension reforms should be initiated while countries still have the fiscal space needed to afford such gradualism. Individuals also require time to adjust to pension legislation changes (for example, via additional savings), thus necessary reforms should be legislated and communicated well in advance.

The optimal combination of pension reforms depends on the characteristics of the current system, but higher retirement ages are recommended in most countries. Table 6 presents the parametric reforms that would be necessary to keep medium-term pension deficits in line with GDP (stable deficit-to-GDP ratio between 2015 and 2030), and to limit the increase of the long-term deficit to 3 additional percent of GDP (2015–65). Given the double benefit of higher retirement ages for the sustainability of pension systems, as well as the comparatively low current pensionable age in some Latin American countries (particularly for women), this reform option is part of the optimal strategy in the majority of cases. Increases in the retirement age should be accompanied by improved disability systems to protect vulnerable segments of the workforce who might not be able to prolong their careers for health reasons. Linking retirement ages to (rising) life expectancy could be a particularly effective reform that would introduce an automatic stabilizing mechanism while insulating reforms from political pressures that accompany discretionary decisions.

Some countries still have scope for higher contributions or lower benefits, but they need to balance these reforms with concerns about informality. On average, Latin American contribution rates are low compared to higher-income countries, and largely in line with other emerging regions. Regional variation is high, however, with contribution rates ranging from only 5 percent of gross earnings in Guatemala to 28 percent in Brazil (see Table 2). This suggests that some countries have the scope to increase contribution rates to put their pension systems on firmer footing, including most notably Costa Rica, Guatemala, Honduras and Nicaragua. Other countries, including Ecuador, Paraguay, and Venezuela, could instead attempt to reduce replacement rates, as their systems offer comparatively generous pension benefits for retirees that are covered by the defined-benefit pension scheme. A reduction of pension indexation for those countries that offer generous wage indexation of pension benefits, for example by shifting to a mixed indexation of defined benefits based 50 percent on prices and 50 percent on wages, could also significantly stabilize pension finances. A further option could be to increase pension decrements applied as a penalty for early retirements, thus balancing the longer pension payout phase. While the actuarially neutral rate is estimated to be at about 6 percent, some countries do not apply such rates or the values they do apply are too low.¹⁹ Although there is a risk that higher contribution rates or the values they do apply are too low rates could further promote informal employment conditions, there is no strong evidence that the high level

¹⁹Actuarial neutrality is a marginal concept, in that it looks at the effect of working an extra year and is relevant when analyzing retirement incentives. It requires that the present value of the flow of pension benefits for retiring a year later is the same as for retirement today, plus any additional pension accrued during the year. For further information on this topic see Queisser and Whitehouse (2006).

Figure 39. Average Contribution Rates
(Percent of earnings)



Source: Country authorities and IMF staff estimates.

of informality in the region is connected to the institutional features of the pension system (see paragraph 38) (Figure 39).

Broadening the contribution base would temporarily bolster contributory systems while lastingly unburdening noncontributory systems. Given the high rates of informality in the region, broadening the contribution base by promoting formalization would not only improve the financial viability of PAYG systems in the short term, but also reduce the need and cost of anti-poverty programs for the elderly (see paragraphs 39–41). This is particularly important in countries with funded pension systems, where pension adequacy is a greater concern than fiscal sustainability and where noncontributory systems are the only driver of long-term fiscal gaps (paragraph 54). Tables 7 and 8 summarize the parametric reforms applicable in each country to improve the financial and social viability of the respective pension systems. To provide a unifying and comparable framework across countries, Table 6 quantifies parametric reforms needed in defined-benefit systems to limit the increase in pension deficit to zero by 2030 and 3 percent of GDP by 2065.

A gradual increase in retirement age combined with an immediate rise in contribution rates would also increase adequacy ratios in defined-contribution systems. Panel 6 shows adequacy ratios falling under 50 percent over time in all countries, except Colombia, Costa Rica, and Uruguay. Panel 9 illustrates the effect of a reform scenario on adequacy rates in the other seven countries with defined-contribution or mixed systems. The reform involves a gradual increase in retirement ages to 67 for both genders,²⁰ and an immediate rise in the contribution rate to 17 percent, which comes close to the average rate currently observed in advanced economies. This 17-percent contribution rate excludes administrative fees or survivor pension contribu-

²⁰The retirement age is increased to 69 in Chile, which has a higher life expectancy at retirement.

Table 7. Parametric Reforms for Public Pension Systems

Country	Raise Retirement Age	Reduce Benefits Relative to Wages ¹	Increase Contributions
Argentina	x ²	x	
Bolivia	x		
Brazil	x	x	x ³
Chile	x ²		x
Colombia	x	x	
Costa Rica		x	x
Ecuador	x		x
El Salvador	x		
Guatemala	x		x
Honduras	x ²	x	x
Mexico			x
Nicaragua	x	x	
Panama	x	x	
Paraguay	x	x	
Peru			x
Uruguay	x		
Venezuela	x	x	x

Source: IMF staff.

¹Includes reducing pension indexation (Brazil) and increasing pension decrements.

²For women only.

³For public sector only.

tions. A combination of both measures would increase adequacy ratios for average wage earners with a 75-percent contribution density above or very close to the threshold of 50 percent in 2065 (Figure 40). Although higher than in the baseline scenario, adequacy ratios in Chile and the Dominican Republic would still remain far below the 50-percent threshold in 2030.²¹ This suggests that unless rates of return turn out significantly higher than expected, improving the adequacy of defined-contribution pensions would require important reforms, not very different from the ones needed to ensure the fiscal sustainability of defined-benefit systems. Such an adequacy reform scenario is meant to present the extent of reforms required to put defined-contribution schemes on a (socially) sustainable footing and should not be interpreted as an exact policy recommendation. In fact, the analysed immediate rise in defined-contribution contribution rates to 17 percent might not be politically feasible and the implementation of pension reforms remains, to a large extent, a political decision.

Health Care Reforms

Health care reforms can also help reduce the fiscal burden of age related pressures. Health care reforms should aim to manage the growth of spending while preserving health outcomes and ensuring equitable access to basic health care services. Hence, a combination of tight budget controls and

²¹Low adequacy ratios in the Dominican Republic are mainly explained by the late introduction of the defined-contribution system.

Table 8. Parametric Reforms for Public Pension Systems

Country	Zero Deficit Increase by 2030	Deficit Increase under 3 Percent of GDP through 2065
Argentina	Increase female retirement age to 64 by 2025.	Increase female retirement age to 65 by 2025, reduce benefits by 10 percent by 2025, and increase coverage by 15 percent by 2030
Bolivia ¹	N/A	N/A
Brazil	Increase retirement age by three years over the next five years, AND change benefit indexation to CPI inflation, AND reduce benefit by 10 percent (equivalent to a benefit freeze for about 18 months).	Increase retirement age by five years over the next five years, AND change benefit indexation to CPI inflation, AND reduce benefit by 10 percent (equivalent to a benefit freeze for about 18 months).
Chile ¹	N/A	N/A
Colombia ¹	N/A	N/A
Costa Rica	Gradually increase the retirement age to 69 OR gradually increase contribution rates to 14 percent (from current level of 8.5 percent and above planned increases to 10.5 percent) OR cut benefits by 21 percent.	Gradually increase the retirement age to 75 OR gradually increase contribution rates to 32 percent OR cut benefits by 35 percent.
Ecuador	Increase retirement age by three years OR reduce replacement rate by 11 percent OR increase the contribution rate by 2 percent.	Increase retirement age by three years OR reduce replacement rate by 7 percent OR increase the contribution rate by 2 percent.
El Salvador ¹	N/A	N/A
Guatemala	Increase retirement age to 65 by 2025.	N/A
Honduras	Increase the contribution rate for the private sector by 4 percentage points.	N/A
Mexico	As the rise in the deficit reflects the temporary transition costs to a defined contribution system, it would not be advisable to implement reforms that completely undo this increase. Nevertheless, the costs can be reduced by raising contribution rates or reducing benefits.	N/A
Nicaragua	Increase the retirement age to 65 for both men and women in six-month increments, starting in 2017. Eliminate the reduced pension by 2020 and raise retirement age from 60 to 65 by 2030.	Increase retirement age from 65 to 67 by 2065.
Panama	Increase retirement to age 65 for both men and women in six month increments, starting in 2018.	N/A
Paraguay	Increase retirement age from 60 to 65 by 2020 OR reduce benefits by 25 percent (from a replacement rate of 100 percent).	Increase retirement age from 60 to 66 by 2020 OR reduce benefits by 25 percent (from a replacement rate of 100 percent).
Peru	Increase the retirement age by one year to 66 years OR increase the contribution rate from 13 to 14 percent.	N/A
Uruguay ¹	N/A	N/A
Venezuela	Increase the retirement age by five years to 65 for men and 60 for women OR reduce benefits by almost 28 percent OR raise contribution rate to 19 percent (from current level of 14 percent).	Increase retirement age by eight years to 68 for men and 63 for women OR reduce benefits by 32 percent OR increase contribution rates to 24 percent.

Source: IMF staff.

Note: Deficit increases are with respect to 2015.

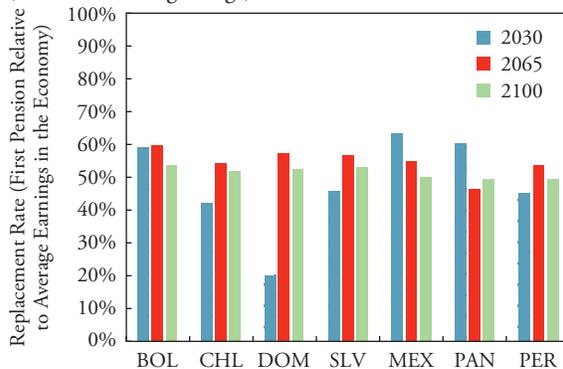
¹Reform measures are not necessary to achieve the targets.

efficiency-enhancing measures should be key to health care reforms in all countries. However, the relative importance and desirability of each of these reforms will vary across countries, depending on their current health care system. Because health care coverage is less extensive in Latin America than in other regions, most Latin American countries are faced with the challenge of expanding basic services to a broader segment of the population.

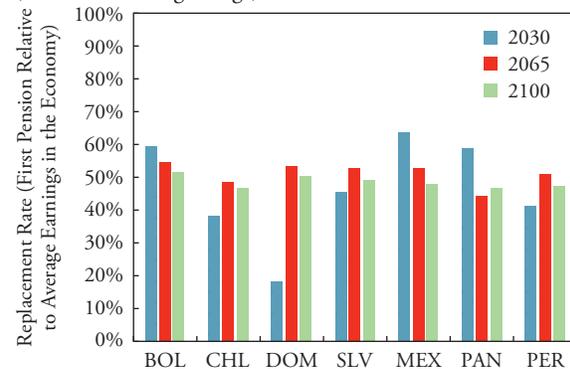
Countries that aim to expand the coverage of public health systems should focus first on providing the most essential health services. Greater emphasis

Figure 40. Adequacy Ratios under Reform Scenario

1. Adequacy Ratios for Men under Reform Scenario
(Percent of Average Wage)



2. Adequacy Ratios for Women under Reform Scenario
(Percent of Average Wage)



Source: IMF staff estimates and projections.

should be placed on preventive and primary care, and governments should allocate a larger share of their health care spending to infectious disease control and better care in poor, rural areas. Social insurance-based systems could be expanded in countries where the informal labor market figures less prominently and revenue administration is of high quality. Chile's experience suggests that health care financing can be sustained by a combination of mandatory contributions in the formal labor market, individual cost-sharing through co-payments, and supplementary government budget financing (especially when subsidies are necessary and in the public interest). However, in countries with a large informal labor market whose workers do not typically make social insurance contributions, tax-financed provision of universal basic health care may be the best starting point if the goal is to expand coverage.

Countries with more extensive health care coverage should put greater emphasis on budget controls. In these countries a mix of instruments to contain costs and improve spending efficiency can help preserve access to high-quality health care while keeping public spending in check (Clements, Coady, and Gupta 2012).

- *Budget caps with central oversight* are a powerful tool for restraining expenditures. Setting budgets for hospitals and other health care institutions based on reasonable and objective expenditure projections, as opposed to simply reimbursing all spending, can help contain spending growth. Such targets are most effective when applied broadly; partial constraints encourage expenditure increases in areas without caps. For example, if only inpatient hospital spending is limited, expenditures on outpatient clinics may increase.

- *Public management and coordination of health care services* help control health care costs by screening out unnecessary services. For example, gate-keeping, through which a primary care physician manages a patient's health care services and coordinates referrals to specialists, is widely considered crucial to constraining the growth of costly and often unnecessary hospital treatment.
- *Local and state government involvement in key health resource decisions* can help tailor services to local conditions, increasing spending efficiency. It can also help control growth in expenditures when coupled with increased responsibility, so that local governments bear the cost of health care inefficiencies or overruns.
- *The use of market mechanisms in the health care system*—increasing patient choice of insurers, allowing greater competition between insurers and providers, and relying on more private services—can help reduce costs by improving the efficiency of the health care system. Moving away from simple reimbursement of provider costs toward more sophisticated management and contracting systems that include built-in incentives for providers to minimize waste and improve services also enhances spending efficiency.
- *Reforms that increase the share of costs borne by patients*, through either higher copayments or expanded private insurance, have also been successful in containing the growth of public health spending. In all countries, cost-sharing policies raise concerns about fairness and must be accompanied by measures to ensure that the poor and chronically ill retain access to basic health services.
- *Restricting the supply of health inputs and outputs*—for example, by rationing high-technology equipment—or imposing direct price controls can, to some extent, reduce the growth of public health spending. However, supplier responses can erode direct price controls on medical inputs or outputs (such as drugs or wages of health care providers): for example, primary care providers may direct patients to more expensive hospital care in response to price or quantity controls. In practice, therefore, price controls have often proved ineffective in containing health care costs. And while giving users more information about the quality and price of particular health care services may increase the quality of medical services, it has not generally helped contain spending.

Policies That Affect Demographics and Labor Markets

Economic and social policy also has some role in addressing the underlying demographic trends. In principle, policy can mitigate population aging by promoting higher fertility or promoting immigration/reducing emigration. However, higher levels of fertility may be undesirable from an ecological perspective, and higher levels of immigration may be politically sensitive

even in a low-immigration region like Latin America. A more effective way to mitigate the fiscal consequences of population aging may be to increase the contribution base in the existing population, by bringing a larger share of the inactive population (particularly women and older people) into the labor force and by including a larger share of informal labor-sector workers into the formal labor sector from which pension contributions can be collected.

Fertility

Fertility rates are the main determinants of demographic developments, but policy measures may have only limited impact. European countries, where in the 1970s fertility rates already declined below the stable rate of 2.1 births per woman, have attempted a number of social policy measures to promote larger families. Some measures provide financial incentives, notably child-related cash transfers or tax breaks. Other measures promote the reconciliation of work and family life, including the expansion of affordable childcare, the promotion of flexible working hours, or the provision of affordable housing. Although there is some evidence that a combination of these policies has showed success in some countries, the individual policies are generally found to have only weak effects on fertility rates.

Some Latin American countries have implemented potentially fertility-promoting social policies, but with little impact. Brazil's *Bolsa Família*, created in 2003, is the world's largest conditional cash transfer program for families. It has been highly effective at reducing poverty and inequality. Mexico had begun a similar program, *Progres*a (later *Oportunidades*) in the late 1990s. Adaptations of the program have also been implemented in other Latin American countries, including Chile. However, there is no evidence that *Bolsa Família* has had a positive effect on fertility rates.²²

Migration

Immigration can temporarily bolster the working-age population, but it is unlikely to offset the long-term demographic trends. International migrants tend to be younger than the population of the recipient countries, so immigration can increase the share of the working-age population. To offset the long-term decline of the fertility rate and keep Latin American old-age support ratios constant at 2015 levels until 2050, however, inflows of more than 23 million people would be necessary every year, adding almost 4 percent of the total population on an annual basis. This is very unlikely, almost impos-

²²See <http://go.worldbank.org/3QI1C7B5U0>; Signorini and Queiroz (2012)

sible (only Lebanon has experienced such a high net migration rate in recent years²³).

Latin America is still a source of emigration rather than a destination for immigrants. Starting in the 1960s, Latin America has experienced increasing out-migration to the advanced economies. Every year about 0.1 percent of the population emigrate from Latin America, the United States, Canada, and Spain are the main destination countries. Over the last decades, there has also been an increase in intra-regional migration, with moderate but growing net immigration into Argentina, Costa Rica, Venezuela, and Chile. Remittances from emigrants play a significant role for the Central American economies in particular, amounting to 18.2 percent of GDP in Honduras, 16.6 percent of GDP in El Salvador, and 10.3 percent of GDP in Guatemala. The adverse consequences of losing these remittance flows may, therefore, outweigh any demographic benefits from limiting out-migration in the working-age population.

Female and Older Labor Force Participation

Latin America's labor force participation is close to the average of regions with similar income levels. In total, 70.8 percent of the Latin American working-age population (ages 15–64) participates in the labor force. This is neither particularly high nor particularly low in a global comparison: the total labor force participation rates range from 58.5 percent in south Asia to 76.4 percent in east Asia, with emerging Europe and the high-income countries being comparable to Latin America (67.0 and 72.2 percent, respectively). One reason for Latin America's middle rank is the difference in the participation rates of men and women: when considering the labor force participation among working-age men only, Latin America's rate of 83.7 percent is exceeded only marginally by east Asia (84.4 percent), while emerging Europe and the high-income countries rank lower.

Female labor force participation is increasing steadily and may attenuate fiscal pressures from aging. Female labor force participation rates have seen a steady rise in Latin America, growing by 15 percentage points between 1990 (43.0 percent) and 2015 (58.4 percent for ages 15–64). This trend is a result of better education, lower fertility, and changing gender norms, and can be expected to continue over the next decades. Nevertheless, the ratio of female-to-male participation rates (68.0 percent) remains below that in east Asia (79.2 percent), the high-income countries (76.6 percent) and emerging

²³Based on 2014 CIA World Factbook via: <http://www.indexmundi.com/g/r.aspx?v=27>. More recent CIA data are available at: <https://www.cia.gov/library/PUBLICATIONS/the-world-factbook/rankorder/2112rank.html>.

Europe (72.4 percent). Female participation rates can, therefore, be expected to continue their increase as fertility rates continue to decline, potentially attenuating some of the fiscal pressures from population aging.

Policy measures can further accelerate the growth in female labor force participation. Fiscal and social policy measures, such as tax credits, parental leave, and subsidized childcare can provide either incentives or disincentives for secondary or low-wage earners (who are often women). If properly designed, such policies can have a big impact on female labor market participation: if the price of childcare is reduced by half, for instance, the labor supply of young mothers has been estimated to increase by up to 10 percent (Kalb 2009; Gong 2010; IMF 2013). Latin American countries currently spend less on families than the advanced economies. Family benefits amount to 0.6 percent of GDP in Argentina and Brazil, 1.0 percent of GDP in Chile and Mexico, and 2.3 percent of GDP in high-income countries (IMF 2013). Nevertheless, Brazil has one of the highest female labor force participation rates among major economies globally; and social policies such as the *Bolsa Familia* cash transfer program were found to have had a positive impact on the growth of women in the workforce (Veras, Perez, and Guerreiro 2007; IMF 2013).

Policy measures will also be needed to increase labor force participation among older people. Longer working lives may ease fiscal pressures from aging by increasing contributions and reducing payouts from pension systems. Hence, policy measures are likely to be needed to enhance labor market participation among older people, focusing not only on postponing the formal retirement age (as proposed in this chapter on pension reform), but also on creating incentives and opportunities to keep older workers with accrued pension rights in employment.²⁴ As in the case of female labor force participation, taxes, pensions, and social security benefits can be designed to provide incentives for older workers. In addition, flexible working arrangements; such as old-age part-time working schemes, can help smooth the transition from full-time employment to retirement, and health care and (re-)training can maintain the productivity and employability of older workers (Murrugarra 2011).

²⁴Current labor participation among men ages 65 and older is already high in Latin America by international comparisons (45.3 percent, compared with 32.8 percent in Asia, 21.5 percent in North America and 9.1 percent in Europe), likely reflecting lower current pensions coverage in the region. Within Latin America, participation rates of older people vary from 14.3 percent in Costa Rica or 15.5 percent in Argentina to 51.1 percent in Peru or 57.8 percent in Bolivia (Murrugarra 2011).

Labor Market Formality

To incentivize firms to formalize employment, policy can address the high costs of formal contracts relative to the low average productivity of labor. Firms may choose to employ informal workers if the regulatory and tax burden associated with formal employment is high relative to the average productivity of workers. The high share of informal jobs in Latin America suggests that the costs of formal employment (such as minimum wages, or inflexible labor laws) may be high compared to the low average labor productivity in the region (paragraph 38). Policy can address this issue by reducing the costs of formal employment or by working towards gradually higher labor productivity, including by improving the comparatively poor educational outcomes (Loayaza, Serven and Sugawara 2009; Levy and Schady 2013).

In some cases, social protection schemes can be redesigned to reduce disincentives to seeking formal employment. Since workers may choose between formal and informal employment opportunities based on the perceived value of future benefits from formal employment relative to current contributions, pension schemes may be designed in a way that increases incentives to participate. Pagés, Rigolini, and Robalino (2014) suggests that contributions could be linked more closely to benefits, and that contributors could be given more choice in selecting their bundle of benefits. Older workers with an informal employment history, for instance, may not want to contribute to pension systems if they cannot expect to accumulate the minimum contributions required to receive a pension. In such cases, the option of receiving reduced proportional benefits for shorter contribution periods (implemented, for example, in Paraguay in 2011) could provide an incentive to participate. Levy (2008) and Pagés, Rigolini, and Robalino (2014) also suggest that a larger share of social security could be financed out of general revenues or consumption taxes to reduce the adverse incentive from high social security contributions.

Structural and demographic change may help increase formalization of the labor markets. A study by Loayaza, Serven and Sugawara (2009) shows that a younger, more rural population is associated with higher informality because such a demographic and structural composition reduces the ability of the government to enforce legislation and increases the strain on educational, training, and other public services. It also suggests that better education and higher levels of development are associated with lower informality, as they increase the average labor productivity relative to any given costs of formal employment. These factors suggest that formalization will progress over the 100-year horizon, as Latin American societies age, urbanize and develop further.

Argentina

Demographics

Argentina has an older population compared with the average of the South American region, and one of the oldest in Latin America, second only to Uruguay. Both the share of people ages 65 and older, and the median population age, are projected to remain above regional averages until 2030, after which they are expected to be lower than the average. (Figure 41). Hence, although the share of the population aged 65+ will increase from 11 to 29 percent of total population between 2015 and 2100, and the old-age dependency ratio will reach 52 percent in 2100, the demographic transition compares favorably to the South American region from 2035 onward.

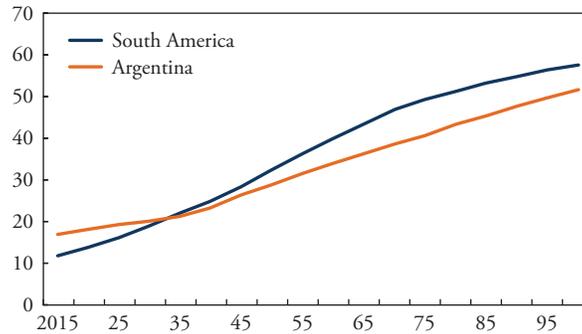
Pension System

Historical Background¹

The Argentinian social security system is one of the oldest in Latin America and the world, making Argentina a pioneer in social security policies. The system was created as a contributory pay-as-you-go system. Successive reforms relaxed its contributory requirements leading to a de facto universalization of the system. Eligibility requirements of the early system, established in 1967, included a minimum age of 55 for men and 50 for women, and 20 years of contributions, with benefits defined based on the three best salaries in the last 10 years of employment. Between 1975 and 1993, several parametric reforms

¹This section draws from Rofman, Apella, and Veza (2015).

Figure 41. Argentina: Old-Age Dependency Ratio
(Population 65+/15–64, percent)



Sources: UN, World Population Prospects, 2015.

were introduced; these mostly affected employer contributions, which were eliminated in 1980 (replaced by an increase in Value Added Tax rates) and reinstated in 1984.

In 1993 a major structural reform introduced a funded scheme and several parametric changes. During the 1980s and early 1990s, the system began to experience financial sustainability issues as its demographic profile naturally matured following the coverage expansion of earlier decades. At the same time, real salaries in the formal labor market showed a declining trend on the back of increasing unemployment and informality. Hence, in 1993, its financial crisis, the system was reformed with the introduction of a funded scheme managed by independent pension fund administrators. Participation in a first pillar was compulsory. This pillar, administered by the National Social Security Administration (ANSES), offered a flat benefit to all retirees. Workers also had to join a second pillar that required them to choose between the PAYG public scheme or the funded scheme, the latter being the default option. On top of workers' and employees' contribution of 11 and 16 percent of salaries respectively, the system as a whole was financed by general tax resources including earmarked tax revenues. Parametric changes included an increase in the legal retirement age to 65 years for men and 60 for women, and an increase in the number of years of service required for retirement from 20 to 30.

Pension coverage during the 1990s decreased steadily because of the reform. The parametric changes introduced in 1993 made access conditions more rigid because they required greater stability in formal employment, at a time when an open approach to international trade and currency appreciation promoted the substitution of labor by capital in the production profile, thus resulting in increasing unemployment and labor informality. Hence, pension coverage during the 1990s decreased steadily until the convert-

ibility was abandoned in 2002, and employment started to rebound with economic growth.

In 2003 the government began to adopt policies specifically aimed at increasing coverage of the elderly and raising benefits. These policies included making the (social assistance) noncontributory pension (PNC) more accessible, and allowing independent workers to pay overdue past contributions under a simplified and very generous scheme introduced in 2004. Known as *Moratoria*, the scheme granted de facto universal access to the social security system with no direct links to poverty reduction criteria. With the expansion of the PNC and the *Moratoria*, the declining trend in coverage levels was reversed and coverage of the elderly rapidly increased to 91 percent in 2011, although only 35 percent of the beneficiaries accessed benefits following the contributory system rules. Starting in 2002, the government also began to increase benefits, with a focus on the minimum pension. Benefits were raised several times during the 2000s, resulting in a significant flattening of the benefit scale.

In 2008 the funded scheme was terminated and a new indexation formula was introduced. The funded scheme underperformed in terms of financial sustainability, and it also created fiscal pressures for the whole system because workers' contributions previously directed to the PAYG scheme were now deposited in individual accounts. Hence, in 2007 the government allowed private pension contributors to switch back to the government benefit program, and in 2008 it terminated the funded scheme and transferred all participants and assets back to the public system. The same year, a new indexation scheme for benefits was established, linking the rate of increase of benefits (d) to the evolution of wages (w), ANSES' tax revenues per disbursed benefit (rb), and ANSES' total revenues per disbursed benefit including social contributions (trb), according to a two-tiered formula:

$$d = \min \left\{ \begin{array}{l} 0.5 * rb + 0.5 * w \\ 1.03 * trb \end{array} \right.$$

Current System

At 7.8 percent of GDP in 2015, pension spending in Argentina was one of the highest among Latin American and Caribbean countries. The Argentine pension system covers more than 90 percent of people of retirement age—the highest coverage in Latin America—with replacement rates higher than 70 percent. As a result, older persons are on average substantially better off than the population as a whole, with a poverty incidence of 4 percent compared with 11 percent for the overall population. Although accumulated reserves were 10 percent of GDP in 2015, the system is no longer self-financed out of workers' and employers' contributions, mainly because

of the high level of informality and coverage of noncontributory pensions after the expansion of the PNC and introduction of the Moratoria. Since the Moratoria only recognizes years contributed before 1994, its use will gradually wind down; thus proportionally decreasing spending: it is estimated that at the end of 2011, about 2½ percent of GDP in pension spending directed at 2.7 million beneficiaries corresponded to the Moratoria. As of 2015, earmarked tax resources and interest returns from assets accounted for 26 and 10 percent of ANSES total revenues respectively. Out of the total pension spending in the same year, 1 percent of GDP was directed to the noncontributory (social assistance) pension, and another 1 percent to the invalidity pension, inclusive of both the social assistance and the social insurance schemes (see Table 9).

Projections

Under current policies, pension expenditures would increase from about 8 percent of GDP in 2015 to almost 19 percent by 2100. Assuming a constant share of GDP for contributions and general taxation revenue, the system deficit will increase accordingly from the current 0.4 percent of GDP to almost 12 percent of GDP in 2100, with a present discounted value of future spending increases up to 2100 of 228 percent of GDP (Table 10).²

Reform Options

Parametric reforms should prioritize raising the retirement ages for females and gradually reducing benefits. Given relatively high contribution rates, parametric reforms to reduce spending and increase revenues should focus on harmonizing the retirement ages between males and females, and gradually reducing benefits. Aside from directly reducing the currently generous replacement rates, a reduction in benefits could be achieved by changing the indexation formula. In particular, indexing benefits (and actualizing past wages) only to realized inflation would still allow retirees to preserve the real value of their benefit, while reducing the increase in pension spending on account of a slower increase in benefits and lower initial benefits. Such reform would also correct other distortions induced by the current formula, including the pro-cyclicality of social security spending and the dependence of benefits on pension coverage (IMF 2016a). Once the system funding has been enhanced, policies to expand the contributory base should also be considered.

²The baseline projections take into account the automatic reduction in the benefit ratio introduced by the current indexation formula as the population ages by linking the benefit ratio to the growth in the pensioner age population. Since such growth is higher at the beginning of the projection horizon and slows down in later years, such effect peaks at around 2040 and gradually declines in the following years.

Table 9. Argentina: Pension System Parameters

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administrative ¹
Social Assistance: Noncontributory old-age pension	Government's general revenues.	Age 70 with income and assets below a subsistence level and not receiving any social security benefits or nutritional support from family members. Naturalized citizens must have at least five years of residence immediately before claiming the pension; foreign residents, at least 40.	70 percent of the minimum monthly old-age pension of 4,299.06 pesos ² (September 2015). Benefits are adjusted when the minimum old-age pension is adjusted.	Needy residents of Argentina.	National Pension Commission (Ministry of Social Development).
Social Insurance: PAYG defined benefits old-age pension	Employee contribution: 11 percent of gross earnings or 27 percent of reference earnings for self-employed. Employer contribution: 10.17 or 12.71 percent of gross payroll, according to the type of enterprise; 16 percent for public sector employers. Government contribution: general revenue, investment income, and earmarked taxes.	Age 65 (men) or 60 (women) with at least 30 years of contributions. The insured may substitute two years of age over the retirement age for one year of missing contributions. A year of contribution is any year in which the insured had at least six months of contributions.	Sum of a basic flat-rate old-age pension, and a compensatory pension based on years of contributions and service. The monthly basic old-age pension is 2,031.04 (September 2015). The monthly compensatory pension is 1.5 percent of the insured's average adjusted monthly earnings in the last 10 years multiplied by the numbers of years of contributions (up to 35). The minimum (maximum) old-age pension is 4,299.06 (31,495.73) pesos as of September 2015. Benefits are adjusted automatically in March and September based on changes in tax revenue, wage indexes, and revenue of the National Social Security Administration.	Employed and Self-employed persons. Special systems for military, security, and the police personnel; civil servants of some provinces and municipalities; university professors; teachers; foreign ministry diplomats; scientific researchers; judicial authorities; and disabled persons working in protected jobs, according to law.	National Social Security Administration.
Social Insurance: PAYG defined benefits advanced old-age pension	Same as old-age pension.	Age 70 with at least 10 years of contributions, including at least five of the last eight years. A self-employed person must have been insured for at least five years.	70 percent of the old-age pension (basic old-age and compensatory pension).	Employed and Self-employed persons.	National Social Security Administration.
Social Insurance: PAYG defined benefits simplified system for self-employed workers with incomplete contribution history (Moratoria)	Government general revenues, investment income, and earmarked taxes. Enrollees pay a single monthly contribution for social security, Value Added Tax, and profits, according to the size of the enterprise.		Basic old-age pension plus a guaranteed minimum.	Self-employed workers with incomplete contribution history.	National Social Security Administration.

¹Ministry of Labor, Employment, and Social Security is responsible for policy development.

²USD 1 = 9.42 pesos

Table 10. Argentina: Pension Projections
(Excluding special regimes, percent of GDP)

	2015	2030	2065	2100
Baseline				
Total pension expenditure	7.8	8.3	13.8	18.9
Contributory (Social insurance)	5.8	6.3	11.8	16.9
Noncontributory (Social assistance)	1.0	1.0	1.0	1.0
Invalidity (Insurance and assistance)	1.0	1.0	1.0	1.0
Pension revenues ¹	7.5	6.9	7.1	7.1
Pension deficit	0.4	1.4	6.7	11.7
PDV of pension spending increases relative to 2015		0.5	74.4	228.0
Reform scenario 1: Women retirement age increase²				
Pension deficit	0.4	0.1	5.0	9.8
PDV of pension deficit increases ("2" 5 decrease)		211.1	23.5	144.6
Reform scenario 2: Benefit reduction³				
Pension deficit	0.4	0.6	5.3	9.8
PDV of pension deficit increases		27.02	39.94	164.70
Reform scenario 3: Contribution base expansion⁴				
Pension deficit ("2" 5 surplus)	0.4	20.5	6.2	12.7
PDV of pension spending increases relative to 2015		0.5	77.2	272.5
Combined reform				
Pension deficit ("2" 5 surplus)	0.4	22.5	3.0	8.6
PDV of pension spending increases relative to 2015		217.6	23.7	125.0

Source: IMF projections.

¹Includes pension contributions, earmarked taxes, and interest returns.

²Increase in retirement age for women from 60 to 65 by 2025.

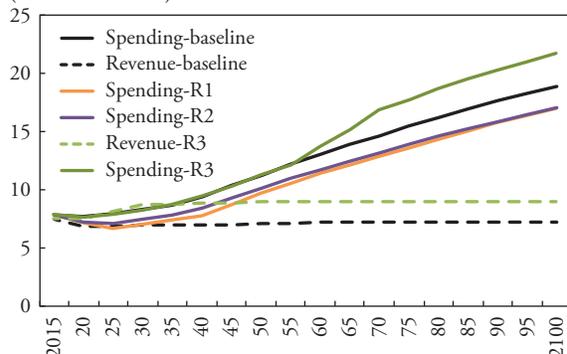
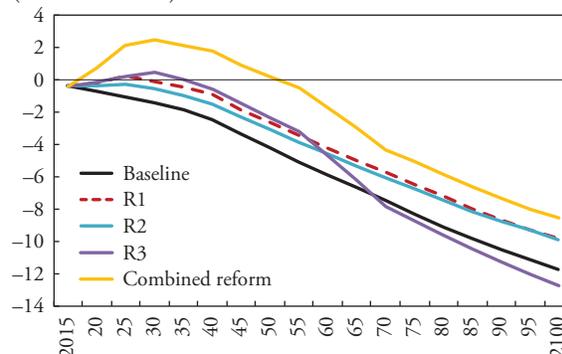
³Reduction in benefits by 10 percent by 2025.

⁴Expansion in contribution base by 15 percent of the labor force by 2030.

Simulation results indicate that a combined reform would keep the system in surplus until 2045, and reduce the present discounted value (PDV) of future pension deficit increases to 22 percent of GDP. In particular, gradually increasing the pensionable age of women to 65 by 2025 would reduce the PDV of future spending increases up to 2100 to 145 percent of GDP. Gradually reducing benefits by 10 percent by 2025 to bring replacement rates closer to the regional average of 62 percent—would lower the PDV of future increases in pension liabilities to 165 percent of GDP. On the other hand, increasing the share of contributing active workers from the current 50 percent to 65 percent of the labor force by 2030 in the absence of other parametric reforms to improve the funding of the system would raise the PDV of future pension spending increases to 273 percent of GDP as the initial increase in contributions would be more than offset by higher pension outlays once the cohorts of newly covered workers retire. A combined reform including all the above measures would keep the system in surplus until 2045 (Figure 42), and reduce the PDV of future pension deficit increases up to 2100 to 22 percent of GDP.

Health Care System

The Argentinean health care system has broad coverage but is segmented. Coverage of health services is shared between the public sector (national, pro-

Figure 42. Argentina: Pension Spending and Balance**1. Pension Spending and Revenue**
(Percent of GDP)**2. Pension System Balance**
(Percent of GDP)

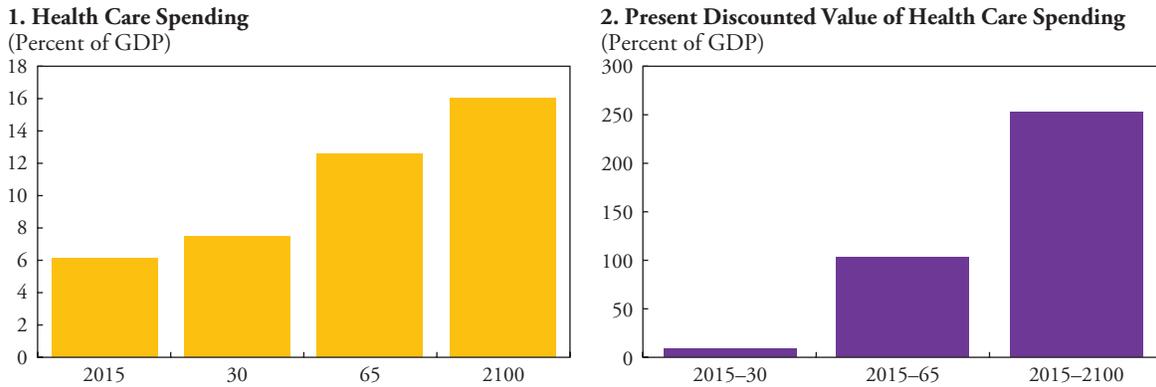
Source: IMF staff calculations.

Note: R1: Women pensionable age increased to 65 by 2025. R2: Benefits reduced by 10 percent by 2025. R3: contribution base increased by 15 percent of the labor force by 2030.

vincial, and municipal); the national social security sector (OSN), for active public workers and their families; the national Institute for Pensioners' Social Services (PAMI), for retirees from the national system; and the private sector. The broad public health insurance system covers 82 percent of the population, including 36 percent who access free public services with no insurance coverage; 33 percent who contribute to national health insurance providers (OSNs), and 14 percent who are covered under the PAMI. The remaining 18 percent of the population receives health insurance from private companies. OSNs include approximately 300 institutions. Financing comes from employees (3 percent of salary) and employers (5 percent). Beneficiaries of the national social security system are automatically included in the PAMI upon retirement. The PAMI is financed with contributions from active workers (3 percent of salary) and employers (2 percent); pensioners (varying between 3 and 6 percent of their income depending on the benefit level); and the national treasury. Beneficiaries of the national security system who obtained their pension through the Moratoria have the same health coverage as those who accredited their years of contributions. PNC beneficiaries are not covered by the PAMI, but by an independent Federal Health Program financed by the Ministry of Health and provincial governments (Rofman, Apella, and Vezza 2015).

Total health care spending amounted to 6 percent of GDP in 2015 and is projected to increase to 16 percent of GDP in 2100. Under a baseline scenario with no reforms to the current system, the present discounted value of health care spending between 2015 and 2100 will add up to about 250 percent of GDP (Figure 43).

Figure 43. Argentina: Health Care Spending Projections



Source: IMF staff projections.

Bolivia

Demographics

Bolivia’s age structure is more favorable than that of many other Latin American countries—less than five percent of the population is over age 65. The old-age support ratio of 9.4 working-age people (15–64) per elderly person (65+) is above the Latin American average of 8.9, and the fertility rate of 3.0 births per woman is the highest in South America. Nonetheless, the old-age support ratio is projected to drop from 9.4 in 2015 to 5.3 in 2050 and 2.3 in 2100. Although this is still above the Latin American average, it means that there will be almost four times as many elderly Bolivians per working-age person than there are today.

Pension System

History

Bolivia’s initial defined-benefit system was replaced by a defined-contribution system complemented by a noncontributory component. Bolivia’s social protection system dates back to social insurance and social security laws passed in 1949 and 1956, which established a PAYG pension system. By the 1990s, management failures, a low ratio of active to passive members, and an erosion of reserves after the hyperinflation of the 1980s had rendered the scheme financially unsustainable. In 1996–97, the defined-benefit system was closed and all active members transferred to a system of defined-contribution accounts with individual capitalization.³ The contributory system was com-

³The reform also affected members of the armed forces, whose pensions were previously administered separately from civilians. For the transition period (non-retired members since before 1997), the government

plemented by Bonosol, a universal pension for all citizens over the age of 65 (von Gersdorff 1997).

Legislative and administrative reforms supported the transformation of the universal (noncontributory) pension and the introduction of a new solidarity pension. In 2007–08, Bolivia replaced the Bonosol with the Renta Dignidad for all citizens over the age of 60, and, in 2010, it introduced semi-contributory solidarity pensions to top up contributor pensions below a certain threshold. The 2010 legislation also created a new authority under the Ministry of Finance to administer the integrated pension system (IPS) of contributory, solidarity, and universal pensions (Autoridad de Fiscalización y Control de Pensiones y Seguros—APS). In 2015, all existing individual accounts were transferred to the APS from the two private pension funds that had previously administered the system (Kritzer and Rajnes 2015).

Current System

The contributory pension system is mandatory for all salaried persons. Workers are required to invest 10 percent of their monthly earnings into their individual accounts with the APS (see Table 12).⁴ Nevertheless, only 30 percent of the working-age population are currently covered by the contributory system (self-employed persons and informal sector workers can enroll on a voluntary basis).

At retirement, members use their accumulated funds to purchase a lifelong annuity. Although there exists a statutory retirement age of 58 years (with reductions for mothers up to 55 and mining workers from 56 to 51), workers can retire as soon as they can finance an annuity of at least 60 percent of pre-retirement earnings (based on the monthly earnings of the previous two years), or they can continue to work to achieve higher pensions. If a person cannot finance the minimum annuity of 60 percent when reaching the statutory retirement age and having at least 10 years of contributions, he or she can receive the solidarity pension. Depending on the years of contributions, this solidarity top-up can bring the total pension from 56 percent to 70 percent (for 35 years of contributions) of pre-retirement earnings. The amount is based on a table of minimum and maximum solidarity limits by contribution years, which the government updates every five years.

committed to cover any future shortfalls compared to the pensions that would have been received under Corporación del Seguro Social Militar—COSSMIL, the generous defined-benefit system for military personnel (IMF 2003).

⁴In addition, employees contribute 1.71 percent of their earnings for disability and work injury insurance, 0.5 percent for administration fees and 0.5–10 percent for the solidarity pension (progressive rates). Employers pay 10 percent of the payroll for illness, maternity and work-related injury benefits, and 3 percent for the solidarity pension.

In addition to the contributory and solidarity pensions, all resident citizens ages 60 or older are entitled to the *Renta Dignidad*, which is financed by the government through a direct tax on hydrocarbons and dividends from state-owned enterprises. The universal pension currently amounts to 3,900 bolivianos (US\$560) per year—3,250 bolivianos if the beneficiary receives another pension. Although it covers 91.2 percent of the population ages 60 or older (more than 900,000 people), the pension is relatively inexpensive due to the limited benefit per person of less than 14 percent of GDP per capita.⁵

Projections under Current Policies

Population aging has different consequences on the different components of Bolivia's pension system. Notably, the defined-benefit system and the noncontributory system run the risk of compromising fiscal sustainability, while the defined-contribution system runs the risk of delivering inadequate pensions.

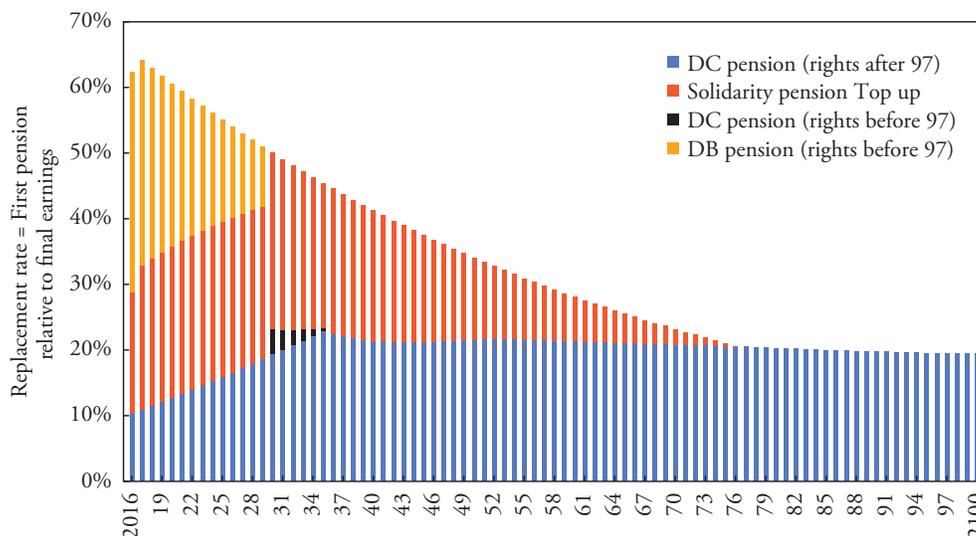
Total government spending on the discontinued defined-benefit scheme and the noncontributory pension is projected to decline gradually. Although Bolivia's defined-benefit scheme was discontinued in 1997, more than 100,000 retirees still receive benefits, which together amount to 1.9 percent of GDP, or a net present value of 20 percent of GDP until no more members remain in the system. Since no more contributions are made to the defined-benefit scheme, these outlays need to be funded by the government. In addition, the government needs to finance expenditures on the noncontributory system, which currently amount to 1.2 percent of GDP. Since expenditures on the defined-benefit system are projected to decline faster than expenditures on the noncontributory system are projected to rise, the earmarked government revenues of 2.0 percent of GDP (funded through a 25.6 percent of the direct tax on hydrocarbons and dividends of state-owned enterprises) are sufficient to keep the system in surplus until 2050–55 (Table 11). In reality, the extent to which the expenditures can continue to be financed with the earmarked revenue share depends critically on the long-term development of hydrocarbon prices and production volumes.

The current defined-contribution system delivers market replacement rates of about 35–40 percent (see paragraphs 61–66 in the main text for a regional comparison). The generosity of the solidarity pension system, however, raises actual replacement rates to about 60–70 percent of earnings for everyone with at least 10 contribution years.

⁵Among households that receive the universal pension, researchers have found a 14–16 percentage point lower poverty rate than in the control group, and a decrease in the incidence of child labor by more than half (Mendizábal and Escobar 2013).

Figure 44. Replacement Rate Development 2016–2100

(Example of males, 75 percent contribution density, with price indexation of solidarity pension)



Source: ???

Under current pension rules, defined-contribution replacement rates are projected to fall to about 20 percent by 2100. To what extent the solidarity pension top-ups offset this decline is, however, difficult to predict based on the current legislation, which states that solidarity limits can be adjusted by the government on a discretionary basis (Figure 44).

Since their introduction in 2010, the maximum solidarity limits were raised by an average of 12 percent. In the same period, prices and wages grew by about 34 and 48 percent, respectively. If this trend were to continue (that is, an indexation by only one-third of CPI inflation or one-fourth of wage inflation), the solidarity pension top-up would become worthless in real terms by 2040. Under the assumption that solidarity limits will be adjusted in line with price indexation, their value would be fully eroded by 2080. Only if wage indexation were applied would replacement rates remain at the same level of 60–70 percent (introducing an issue of financial sustainability, see Tables 11 and 12 in the Technical Annex for an assessment of the impact of a wage indexation).

Reform Options

Even though Bolivia's pension system does not face immediate fiscal or adequacy pressures, the system could be made more sustainable if the retirement age were increased over the medium term. Bolivia has scope to do so, since the normal pensionable age of 58 is below that of most other countries and

Table 11. Bolivia: Measure of Pension Imbalances
(Excluding special regimes, percent of GDP)

	2015	2030	2065	2100
Total DB pension expenditure	3.0	1.9	2.4	3.3
Contributory DB benefits	1.9	0.6	0.0	0.0
Noncontributory benefits	1.2	1.3	2.4	3.3
Pension contributions	0.0	0.0	0.0	0.0
Investment income	0.0	0.0	0.0	0.0
Earmarked taxes	2.0	2.0	2.0	2.0
Pension surplus/deficit	21.1	0.1	20.4	21.4
NPV/2015 GDP	21.1	25.4	49.0	19.5

Source: IMF staff estimates and projections.

not in line with increasing life expectancy. This will be particularly relevant if hydrocarbon prices and production volumes fall to the extent that earmarked government revenues no longer suffice to fund the noncontributory and solidarity pensions. According to staff estimates, boosting replacement rates to about 50 percent, could be achieved by raising the contribution rate to 17 percent (a level similar to that of advanced economies) and the retirement age by one year every two years (until it reaches 67 years) starting in 2018. However, these estimates are provided only to illustrate the extent of reforms required to maintain adequacy, and such large increases in the contribution rate would have to be managed carefully to avoid discouraging formal employment.

Health Care System

Although Bolivia aspires to achieve universal health coverage, the health care system remains more fragmented than the pension system (Alvarez and others 2016). About one-third of the population has health care coverage through the social security system, which is financed by employer and employee contributions. In a series of reforms, Bolivia has attempted to increase the health care coverage in the population, including by offering free primary health care to pregnant women and infants and to residents ages 60 and older.⁶ In 2008, public sector health care expenditures amounted to 3.1 percent of GDP, of which 1.8 percentage points were not covered by social security providers (Pan-American Health Organization 2012). By 2100, these costs could grow to 13 percent of GDP. The costs for the public health care programs are covered by municipalities, including a share of their revenues from the direct tax on hydrocarbons (Pan-American Health Organization 2012).

⁶In 2014, Law 475 transitioned the programs for pregnant women and infants (Seguro Universal Materno Infantil) and elderly people (Seguro de Salud Para el Adulto Mayor) into an integrated system, as another step towards universal health coverage.

Table 12. Bolivia: Characteristics of the Pension System

	Source of Funds	Qualifying Conditions	Benefits	Coverage	Administrative
Zero Pillar (Renta Dignidad)	The total cost is financed through taxes on hydro-carbons and dividends from public enterprises.	Paid to resident citizens aged 60 or older. It is payable abroad temporarily in specific cases	3,900 bolivianos a year is paid for life (2,600 if the person receives another pension). The benefit is adjusted every three years by the executive branch based on available funds.	All resident citizens aged 60 or older	See first pillar.
First Pillar (Individual accounts of salaried workers 1 Solidarity pension)	Mandatory individual accounts: 10 percent of covered earnings for old-age benefits plus 1.71 percent of covered earnings for disability and survivor benefits and 0.5 percent of covered earnings used to calculate contributions are the legal monthly minimum wage. The maximum earnings used to calculate contributions are 60 times the legal monthly wage. The government finances the value of accrued rights under the social insurance system and the funeral grant. Solidarity pension: 0.5 percent of covered earnings of 815.40 bolivianos to 13,000 bolivianos; 1 percent of earnings above 13,000 bolivianos up to 25,000 bolivianos; 5 percent of earnings above 25,000 bolivianos up to 35,000 bolivianos; and 10 percent of earnings above 35,000 bolivianos. For the solidarity pension, employers pay 3 percent of covered payroll (2 percent of covered payroll in the mining sector), 20 percent of employers' and self-employed persons contributions for survivors and disability insurance (work injury) also finances the solidarity pension. Mining cooperatives contribute 2 percent of declared income from sales to the solidarity pension.	Old-age pension: At any age if the accumulated capital in the individual account plus accrued interest is sufficient to finance a monthly pension of 60 percent of the insured's average earnings in the last two years (or over the whole contribution period if the insured has less than two years of contributions), funeral expenses, and survivor benefits for the insured's dependents. Men aged 55 or above and women aged 50 or above with accrued rights for the contributions to the social insurance system, if the accumulated capital in the individual account plus accrued interest is sufficient to finance a monthly pension of 60 percent of the insured's average covered earnings in the last two years (or over the whole contribution period if the insured has less than two years of contributions), funeral expenses, and survivor benefits for the insured's dependents. Insured persons aged 58 (or 56 for miners) with at least 10 years of contributions if the accumulated capital in the individual account plus accrued interest is sufficient to finance a monthly pension that is greater than the solidarity pension. Solidarity Pension: Insured aged 58 (56 for miners) with at least 10 years of contributions, and accumulated capital in the individual account plus accrued interest is insufficient to finance a monthly pension below a legally defined threshold. For both the old age and the solidarity pension, the retirement age for women is reduced by one year for each live birth, up to three. The retirement age for miners is reduced up to five years for work in unhealthy conditions (one year for every two years of work in unhealthy conditions).	Old-age pension: The insured's accumulated capital (contributions plus accrued interest) is used to purchase a fixed or variable life annuity, depending on the total amount of the accumulated capital, (the value of accrued rights under the social insurance system based on contributions made before 1997 is combined with the individual account balance at retirement). pensions are adjusted annually according to the UFV (Unidad de Fomento de Vivienda), calculated by the Central Bank according to the changes in the cost of living. Solidarity pension: The monthly pension is the difference between the benefit based on the accumulated capital in the insured's individual account (contributions plus accrued interest) and a legally defined threshold corresponding to the insured's number of years of contributions. The benefit increases incrementally with 10 years to 35 years of contributions, up to a maximum.	Salaried workers, including military personnel and apprentices.	Pension Fund Administrators (AFPs) administer the old-age benefits (old-age and solidarity pensions) and contract with insurance companies for disability and survivor insurance. Ministry of the Economy and Public Finances (http://www.economiayfinanza.gob.bo/) provides general supervision.
Second Pillar (Individual accounts of salaried workers)	Mandatory individual accounts (see first pillar).	Same as old-age pension in the first pillar.	Same as old-age pension in the first pillar.	Same as in the first pillar.	See first pillar.
Third Pillar (Individual accounts of self-employed persons)	Mandatory individual accounts (see first pillar).	Same as old-age pension in the first pillar.	Same as old-age pension in the first pillar.	Voluntary coverages for self-employed persons.	See first pillar.

Brazil

Demographics

Brazil's elderly population has increased substantially during recent decades. The increase came because of declining fertility rates and increasing life expectancy—the important drivers of demographic changes in Brazil. According to the United Nations, Brazil's old-age dependency ratio (population 65 and older to working-age population) will reach close to 37 percent by 2050 (compared with 11.7 percent in 2015) and will continue to rise toward the end of the century.

Pension System

Informality in the Labor Force and Its Implication for the Pension System

Although Brazil has made progress toward a more formalized workforce, a large share of its labor force remains informal. The informal employment was estimated at about 42.3 percent of total employment in 2014 (down from 54.3 percent in 2004).⁷ However, the recent economic downturn has led to job destruction in the formal sector, which is found to be highly correlated with the business cycle (IMF 2016a).⁸ Besides a reduction in the availability of formal salaried jobs, increasing labor costs and rigidities (such as increased overtime remuneration, leave benefits and firing costs, and reduced maximum working hours) have also contributed to the expansion of informality in Brazil, especially in the metropolitan areas. The establishment of the minimum pension in Brazil, regardless of contribution, compounded this effect and led to more workers deliberately choosing informal jobs after assessing the expected costs and benefits of working in the formal sector (Perry and others 2007).

Social security benefits have been found to negatively affect labor supply in Brazil. In fact, Carvalho Filho (2008) shows that, through an income effect, generous pension benefits in Brazil could considerably reduce the labor supply, particularly of rural elderly people. The study finds that those who receive the benefits work 22.6 hours less per week on average and are 38 percent more likely to quit working than those who do not. This would imply an estimated drop of 1.6 percent in total working hours in the rural sector. Recent studies (Mesquita and Neto 2010; Gagnolati and others 2011) also

⁷Informal employment includes employment in the informal sector, self-employment, and domestic workers.

⁸Since the beginning of 2015, the Brazilian economy has lost 2.7 million formal jobs, with youth employment particularly hard hit.

argue that the current pension system in Brazil disincentivizes formality, especially for low-skilled (low-income) workers, by charging a high contribution rate while at the same time offering a noncontributory program with benefits equal to the minimum wage (discussed in paragraph 123 and Table 13). A high contribution rate combined with the existence of a noncontributory program could undermine pension contributions. In any case, with an aging population, it has become more imperative to address the increasing expenditure of Brazil's pension system (discussed in paragraph 126).

History of Pension Reforms

The monetary benefits to the elderly in Brazil come mostly from the social security and social protection systems. The federal constitution of 1988 formed the legal basis of the modern social security system in Brazil, which comprises three main defined-benefit schemes, a mandatory private sector regime (Regime Geral de Previdência Social—RGPS), a mandatory public sector regime (Regimes Próprios de Previdência Social—RPPS), and a non-contributory pension-like social assistance program for those not qualified for other retirement benefits. These regimes underwent a series of restructurings and modernizations during the 1990s and 2000s to enhance long-term fiscal prospects, with past parametric reforms focused on prolonging the contribution period and expanding coverage. As a result, the old-age coverage ratio (pensioners to population 65 and older) reached 93 percent, while the employment coverage (contributors to working-age population) remained relatively low at 46 percent. The recent reform to the RPPS in 2012 introduced the Complementary Fund for Civil Workers (Funpresp), a defined-contribution pillar aimed at reducing replacement rates for higher earners and enhancing progressivity and equity with respect to the RGPS at a relatively low transition cost.

Nature of the Current Pension System

Both the RGPS and the RPPS are mandatory PAYG schemes. The two regimes are both experiencing shortfalls, which are covered by federal transfers, because of low average retirement age, relatively generous replacement rates, and the current indexation rules (Previdência Social, 2015a and 2015b).⁹ The indexation of minimum pensions to the minimum wage (RGPS, of which about 67 percent of the current beneficiaries receive minimum pensions) and salaries of active civil servants (RPPS) is a particularly large driver of overall pension costs. Recent parametric reforms have helped curb some of the excesses of the system through the implementation of benefit ceilings and vesting periods

⁹The actual average retirement age is lower than the statutory age because a large fraction of contributors retire several years earlier based on the length of their contributing history.

Table 13. Brazil: Pension System Structure (3 pillars)

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administrative
0 pillar (Social Assistance, BPC)	Budget, program cost is around 0.3 percent of GDP.	Elderly 65+ not gainfully employed and with monthly household income less than 25 percent of minimum wage.	880 reais per month (minimum wage).	15 percent of population 65+	Ministry of Labor and Social Insurance (Previdência)
1 pillar (RGPS)	Contributions (employees 8–11 percent, depending on income, and employers 20 percent), ¹ COFINS and CSLL taxes, and budget (to finance administrative costs and any deficit).	For urban workers: 65+ men and 60+ women; for rural workers: 60+ men and 55+ women; full pension when the sum of age and contribution years is equal to 85 for women and 95 for men.	Full benefits are calculated based on the best 80 percent of total (contributory period) monthly earnings. Benefits are indexed annually to inflation. Minimum pension of 880 reais per month (minimum wage) and maximum pension of 5,190 reais per month.	Together with BPC and RPPS, covering 93 percent of population 65+	provides general supervision; National Social Security Institute (INSS) administers benefits for BPC and RGPS, and federal, state and municipal governments manage their own RPPS schemes.
1 pillar (RPPS)	Employee contribution, varying across different public entities (generally lower than RGPS) and budget (costing around 1½ percent of GDP).	60+ men and 55+ women, at least 120m contributions. ²	Benefits are calculated based on the highest salaries from positions held for at least five years, and are indexed to salaries of active civil servants.	Nearly all civil servants	
3 pillar (Funpresp)	Employer matches employee contribution by up to 8.5 percent of salary.	Voluntary contributions.	Annuity based on the account balance.	n.a.	

¹As of January 2016, 8 percent for income up to 1,557 reais, 9 percent for income up to 2,595 reais, and 11 percent for income above 2,595 reais; capped at 5,190 reais.

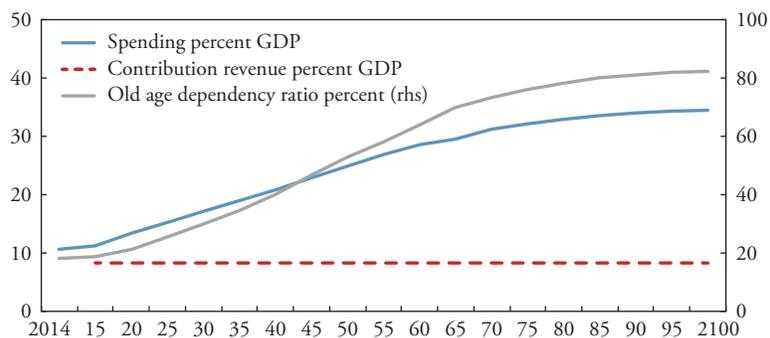
²For those who joined the civil service before the 1998 reform, retirement age is 53 for men and 48 for women.

(through the introduction of the Fator Previdenciário, which was replaced by a progressive 85/95 rule in 2015, discussed in paragraph 125 and in Appendix I). However, they still rely heavily on federal transfers to cover deficits because the increase in expenditures surpassed that of revenues (see Table 13).

Reforms in 2012 and 2015

The 2012 reform added a defined-contribution pillar to the RPPS. Benefits for new civil servants are now subject to the same ceilings as those in the RGPS (that is, lower replacement rate), while participants have the option to enroll in the complementary defined-contribution scheme if they wish to receive a pension beyond the ceiling. Current active civil servants may choose to stay in the old system or switch to the new one. The reform generated a slight transition cost (about 0.1 percent of GDP) due to loss of contributions to the PAYG branch and costs of state's contribution to the individual pension accounts, before the authorities can reap the benefits of the reform due to lower benefits for new civil servants. The overall positive impact is estimated to be about 10 percent of GDP in net present value terms.¹⁰ The

¹⁰See “Macroeconomic Implications of Pension Reform in Brazil” in IMF Country Report 12/192.

Figure 45. Brazil: Pension System Balance (RGPS + RPPS)

Source: IMF staff projections.

reform also introduced a payroll tax on RPPS pension benefits and a penalty for early retirement.

The 2015 reform introduced a new 85/95 rule, the effect of which remains uncertain. The new rule allows workers to retire with full benefits when the sum of age and contribution years equals 85 for women and 95 for men (with a minimum contribution of 30 and 35 years, respectively). With the introduction of the new rule, the use of the *Fator Previdenciario*, introduced in 1999 to provide disincentives for early retirement (essentially an actuarial coefficient based on the insured's contribution rate, contribution period, age, and life expectancy), became optional. The new rule was expected to postpone retirement at the expense of increasing benefits after retirement, essentially shifting pension spending toward the medium-term. However, as of now, large uncertainties remain about the new rule's impact (see Karpowicz and Granados 2016).

Baseline Projections^{11,12}

The gap between Brazil's pension spending and revenue is expected to widen rapidly after 2020 in the baseline scenario as the population aging process accelerates (Figure 45). As of 2015, Brazil's pension expenses were about 11.2 percent of GDP. Based on current demographic trends, they are projected to increase to 17.1 percent of GDP in 2030, 29.5 percent of GDP in 2065, and 34.4 percent of GDP in 2100 (Table 14). In present value (PV)

¹¹Projections presented in this section are based on Karpowicz and Granados (2016).

¹²Some characteristics of the pension system in Brazil are not fully captured in the baseline projections, which are computed at the aggregated level including both the private and public regimes. Moreover, the projections do not include the unrealized impact of past reforms on spending. A parametric reform that aims to contain the growth in social security expenditure is also currently being discussed in Congress. Projections presented in this section reflect current policies under a no-reform scenario, and pension spending in 2015 includes some noncontributory benefits.

Table 14. Brazil: RGPS and RPPS Pension System Imbalances
(Percent of GDP)

	2015	2030	2065	2100
Total pension expenditure	11.2	17.1	29.5	34.4
Total pension revenue	8.2	8.2	8.2	8.2
Pension deficit	3.0	8.9	21.3	26.2
PV of expenditureGDP ¹	—	219.0	814.2	1,399.5
PV of incremental pension expenditure ^{1,2}	—	52.5	364.0	749.1
PDV of pension deficits ¹	—	97.1	484.6	923.3
PDV of incremental pension deficits ^{1,2}	—	52.5	364.0	749.1

Source: IMF staff estimates and projections.

¹Discount rate is assumed to be 1 percent.

²Relative to the expendituredeficit in 2015.

terms, the increase in spending relative to its 2015 level is projected to be 53 percent of GDP by 2030, 364 percent of GDP by 2065, and 750 percent of GDP by 2100. In NPV terms, the imbalance between benefits and contributions between now and 2030 is close to 100 percent of GDP, which is projected to increase to over 900 percent of GDP by 2100.

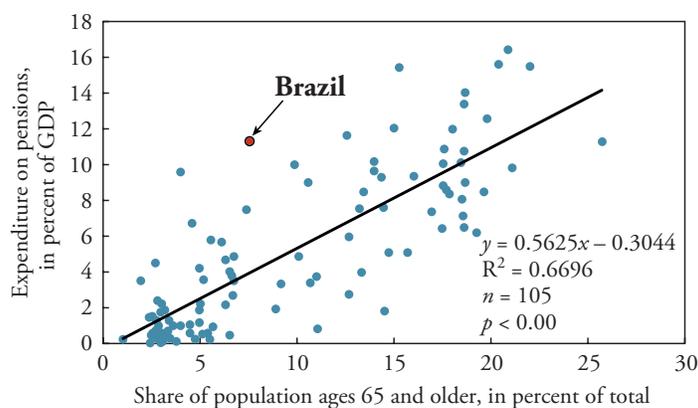
Key assumptions underlying the projections are in line with those characterizing the general methodology used in this paper. Specifically, assumptions include: (1) a constant replacement rate (that is, initial pension grows with average wages); (2) underlying demographic trends from the United Nations projection; (3) mature systems in terms of coverage; and (4) a minimum wage (to which minimum pension is indexed in the current systems) that grows in line with labor productivity.

Assessment

Brazil has a relatively younger population than many countries in the region, but its pension spending is already among the highest and could soon become unsustainable without reforms. The retirement age is low by international standards (57 in Brazil compared with 64 on average in the OECD). Retirement ages are also lower for public workers than private workers. Benefits are growing faster than revenues, because of the aging population, limited incremental gains from labor formalization, and the indexation to minimum wage that pushes pension spending growth above growth of GDP. Total pension spending and spending per pensioner in Brazil are higher than the advanced and emerging economy averages (Figure 46). The average gross replacement rate, at about 53 percent for women and 69.5 percent for men, is also relatively high in Brazil.¹³ Despite a high old-age coverage ratio, employment coverage (about 46 percent of the working-age population) is relatively low while the contribution rate (between 28 and 31 percent under

¹³Gross replacement rate estimates by OECD, the World Bank, and the IDB (2014).

Figure 46. Brazil: Expenditure on Pensions
(2014 or latest available estimate)



Sources: World Development Indicators; and IMF staff estimates based on a sample of 184 countries.

RGPS) is already high, and any further increase may risk repressing the formal labor market.

Reform Options and Simulated Impacts

Labor market reforms should focus on increasing labor participation. Specifically, reforms should: (1) halve the gap between female and male labor participation rates (currently at about 65 and 85 percent, respectively); and (2) increase the labor participation rate of the population ages 55–64 (currently at 56 percent, compared to the 81 percent for the population ages 25–54). Karpowicz and Granados (2016) estimate that halving the gender gap and the elderly gap would reduce the age-related spending in Brazil by 3 and 1.3 percent of GDP, respectively, by 2050.

Parametric pension system reforms could considerably alleviate sustainability concerns. These reforms could include (1) containing benefits and eligibility through increases in retirement ages, which remain relatively low; (2) reducing replacement rates by abolishing the strong link between minimum pensions and minimum wages (for example, by replacing it with CPI indexation), lengthening the period over which the pensionable wage is estimated, modifying benefit formulas and accrual rates, and/or imposing temporary benefit freeze; and (3) potentially increasing revenues by taxing pensions for upper-income groups and/or reducing payroll tax exemptions. An ambitious package would even create space to gradually lower the currently high pension contributions, with an overall neutral effect on spending over the long term. Table 15 shows illustrative reform options to (1) stabilize pension

Table 15. Brazil: Pension System Reform Options

	2015–2030	2015–2065
	Percent of GDP	
Projected spending increase	5.9	18.3
Impact of reforms	26.3	215.4
Retirement age increase by 3 years ¹	22.9	...
Retirement age increase by 5 years ¹	...	25.7
Benefit indexation to CPI inflation	22.6	26.8
Benefit reduction by 10 percent ²	20.8	22.9

Source: IMF staff estimates and projections.

¹Phased over five years.

²Equivalent to a benefit freeze for about 18 months.

spending between 2015 and 2030 and (2) cap increases in pension spending between 2015 and 2065 at 3 percent of GDP.

Health Care System

Nature of the Current Health Care System

Brazil’s Unified Health System was established by the 1988 Constitution with the objective of providing universal health care in an equitable way. The health system is mostly financed through general revenues (of the federal, state, and municipal governments) and social contributions. The system has gone through a decentralization process over the past two decades, with an increasing share of services being contracted out to the private sector. Total public health care expenditure in Brazil has been growing at 5 percent a year on average (in real terms) since 1995, faster than the average of Latin American countries. Moreover, a complementary law passed in 2012 stipulated that federal government spending on health care should grow at least in line with the previous year’s nominal GDP. This was followed by a constitutional amendment in 2015 that set federal government minimum spending on health care at 13.2 percent of net current revenues, which is to increase gradually until it reaches 15 percent in 2019.

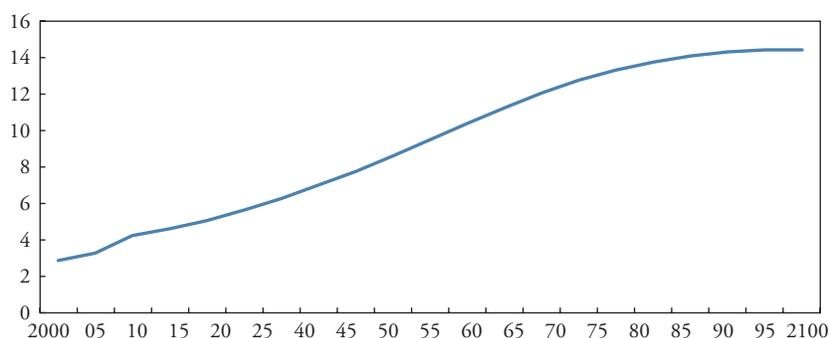
Projections show a large rise in health spending.¹⁴ Under current policies, with population aging and an assumed excess cost growth of 1 percent a year, Brazil’s total public health expenditure to GDP ratio is projected to gradually increase from 4.6 percent in 2015 to 6.3 percent by 2030, 12 percent by

$$f = \frac{Tc * a}{Es} * \frac{[1 + (Id + Tc * a)]}{100}$$

2065, and close to 14½ percent by 2100 (Table 16; Figure 47).

¹⁴Based on calculations included in Clements and others (2015).

Figure 47. Brazil: Projected Public Health Care Expenditure
(Percent of GDP)



Source: IMF staff projections.

Table 16. Brazil: Total Public Health Care Expenditure
(Percent of GDP)

	2015	2030	2065	2100
Total public health care expenditure	4.6	6.3	12.0	14.4
Increases relative to 2015	—	1.7	7.4	9.8
PDV of total public health care expenditure	—	79.6	307.9	552.0
Increases relative to 2015	—	11.4	123.2	285.2

Appendix I: The Formula for Calculating the Fator Previdenciario

where f = Fator Previdenciario
 E_s = life expectancy at retirement
 T_c = length of contribution
 I_d = age at retirement
 a = contribution rate, currently at 31 percent

Chile

Demographics

The population is aging rapidly. The share of the population over age 64 should triple over the next 50 years, from 11 percent in 2015 to 32 percent in 2065, to 35 percent in 2100.¹⁵ Over the same period, the median age is projected to reach 49.5 in 2065, from 34 today, and 51 in 2100.

¹⁵Projections from the UN World Population Prospects. Different assumptions regarding net migration balances could reduce the projected dependency ratio.

Pension System

History

The Chilean pension system underwent a major reform in 1980 replacing the existing PAYG systems with a single defined-contribution system. The existing PAYG systems were replaced by a single, nationwide, mandatory, individually-funded system, managed by Pension Fund Administrators (AFPs). Each, private or public worker contributes 10 percent of his or her monthly earnings, up to a maximum of 75.7 *unidades de fomento*¹⁶ (UF, equivalent to about 2 million Chilean pesos), to individual capitalization accounts. Pension contributions are exempt from income tax. Upon retirement, the accumulated amounts can be used to buy a life annuity or to take programmed withdrawals.

In addition to the mandatory contribution pillar, the system includes a solidarity pillar, expanded in 2008, and provides elderly and disability pensions. The new solidarity pillar, introduced in 2008, has two programs: the basic solidarity pension indexed on inflation (equal to 104,646 pesos per month in September 2017) for elderly or disabled individuals with no pension, and the pension solidarity supplement, which supplements low pensions from the defined-contribution pillar. Both schemes are means-tested and have residence requirements. The solidarity pension system also includes a state-funded allowance for mothers of each child born alive or adopted (*bono por hijo*), equivalent to the full-time minimum salary contribution during 18 months, plus the average rate of return on defined-contribution plans from the birth of the child until the mother's 65th birthday. The allowance is transformed into a pension flow upon retirement (see Table 17).

Last, workers can contribute to voluntary retirement plans (Ahorro Previsional Voluntario–APV). In 2008, new tax incentives were introduced for contributing workers and for firms that offer savings plans that complement voluntary contributions made by workers (Law 20.255).

The armed forces and the police have kept their own PAYG systems. These systems are managed by the Social Security Department of the Chilean Police and the National Defense Social Security Fund.

Funding

The defined-contribution pillar is financed by mandatory contributions from workers. The 2008 reform of the solidarity pillar extended the contribution requirement to all independent workers who receive taxable income, with a

¹⁶As of January 2017.

Table 17. Chile: Pension System Structure

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administration
0 pillar (poverty reduction pillar)	Central government's budget	Individuals above 65 and disabled individuals between 18 and 64 who belong to the poorest 60 percent of the population. 20 years of residence in Chile, and at least 4 years of residence during the 5 years prior to application. The pension solidarity supplement is payable to individuals whose defined-contribution pension is below the maximum pension with solidarity contribution (PMAS)	Elderly and disability pension. Two schemes: 1) basic solidarity pension (Pensión Básica Solidaria or PBS), and 2) pension solidarity supplement (Aporte Previsional Solidario or APS)	About 2 percent of the population aged 15–64 (disability pension). 55 percent of the population above 65 (elderly pension).	Social Security Institute (Instituto de Previsión Social)
1st pillar (mandatory, defined contribution individually funded)	Individual contributions, equal to 10 percent of monthly earnings, up to a maximum of 60 UF	65 years of age for retirement benefits (60 for women)	Old-age (or retirement) and early retirement benefits, disability and survivors benefits	Contributors: 58 percent of the economically active population	Pension Fund Administrators (AFPs)
2nd pillar (voluntary savings supported by tax incentives)	Voluntary savings	To avoid income tax on contributions, withdrawals cannot occur before retirement age	Contributions and generated interest are tax exempt. Low income workers who are not subject to income tax before retirement do not pay tax on withdrawals and get a 15 percent bonus if savings is used for pension.	Contributors: About 15 percent of the economically active population	AFPs, mutual funds, investment funds, life insurers, and so on

six-year transition period. Compulsory participation has been fully effective since 2015. Overall, the occupational coverage rate, defined as the share of the labor force contributing to the system, is approaching 60 percent. The solidarity pillar is financed by the general national budget.

Benefits

Apart from the noncontributory benefits paid out by the solidarity or poverty reduction pillar, pension benefits are directly related to individual past contributions. Replacement rates then depend on each individual's work history and on the return on investment of accumulated savings. Assuming an actuarially fair annuity and using specific annuity rates for men and women, the OECD estimates a net replacement rate for the median earner of 54.9 percent for men and 44 percent for women. Workers who were affiliated to the old PAYG system, before the 1980 reform, and decided to switch to the defined-contribution system receive recognition bonds (*bonos de reconocimiento*), which reflect their contributions to the previous system, when they retire.

Projections

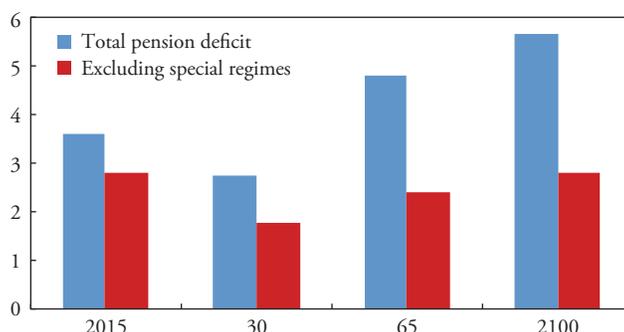
The public pension expenditure projections below include three elements:

- The transition costs from the previous PAYG regime (operational deficit as the government continues to pay pensions to affiliates to the old system, without receiving contributions from future participants, plus the cost of the recognition bonds for former affiliates who have switched to the defined-contribution system) and the old solidarity pillar (former state guarantee of minimum pension);
- The cost of the new solidarity pillar (basic solidarity pension, pension solidarity supplement *bono por hijo*); and
- The deficit of the special PAYG regimes for the armed forces and the police.

The cost of the solidarity pillar and the deficit of the special regimes are projected to triple between 2015 and 2065. As the transition costs decline to reach zero in 2050, the public pension deficit (public pension expenditures minus pension contributions) initially decrease from 3.6 percent of GDP in 2015 to 2.8 percent in 2030, before rising again to 4.8 percent in 2065 (Figure 48).¹⁷ The deficits of the special regimes for the armed forces and

¹⁷Estimates of the transition costs are from Arenas de Mesa and others (2009). Projections for the cost of the new solidarity pillar are from the Chilean Ministry of Finance (*Informe de Pasivos Contingentes*, 2015) up to 2028. They are extended to 2100 by assuming that the ratio of expenditures/GDP grows with the

Figure 48. Chile: Total Pension Deficit/GDP
(In percent)



Sources: Gobierno de Chile, Dirección de Presupuestos; Superintendencia de Pensiones; and IMF staff calculations.

Table 18. Chile: Measure of Pension Imbalances
(Percent of GDP)

	2015	2030	2065	2100
Total pension expenditures ¹	4.1	3.0	4.8	5.6
Pension deficit	3.6	2.8	4.8	5.6
Old PAYG system	1.9	0.5	0.0	0.0
Solidarity pillar ²	0.8	1.2	2.4	2.8
Special regimes	0.8	1.0	2.4	2.8
PDV of pension spending increases relative to 2015	—	210.2	220.9	0.8
PDV of pension deficits/GDP	—	45.4	137.3	232.5
PDV of deficit increases relative to 2015/GDP	—	28.2	27.5	23.2

¹Includes the pension deficit for special regimes. Pension expenditures are equal to the pension deficit after the transition from the old PAYG regime is completed in 2050.

²Previous solidarity pillar, BPS, APS, and bono por hijo.

the police are projected to decrease as a share of GDP between 2065 and 2100, which would reduce total spending at the end of the projection period (Table 18). Under current policies, the projected deficits of the two special regimes for the armed forces and the police would still account for half of the overall public pension deficit in 2100.

The present discounted values of projected public pension deficits until 2030, 2065 and 2100 represent about 45, 137, and 232 percent of GDP, respectively.

Assessment

The main challenge posed by the Chilean pension system is one of adequacy of benefits in a mostly defined-contribution system. Replacement rates for

age-dependency ratio. Projections for the deficit of the special regimes until 2050 are also from the authorities and were extended by assuming that the ratio of expenditures/GDP grows with the age-dependency ratio of the whole population.

the average male wage-earner with a 75 percent contribution density are projected to decline from 35 percent in 2030 to less than 25 percent in 2100. Replacement rates for women are expected to be even lower, as women's life expectancy is longer. Replacement rates assuming a 100-percent contribution density still fall short of the current average replacement rate in OECD countries.

Occupational coverage would need to significantly increase to reduce the cost of the solidarity pillar. The incentives introduced in the 2008 reform to facilitate labor formalization and participation in the defined-contribution system (*bono por hijo* and a subsidy for young workers) and to expand the tax benefits of the APV, seem to have been insufficient at boosting occupational coverage so far.

Reform Options

A reform that results in a zero deficit of the special regimes could reduce the PDV of public spending expenditures by more than 30 percent at the 2100 horizon. Under the reform scenario considered in paragraph 76, by combining a gradual increase in the retirement age to 69 and enacting an immediate rise in contribution rates to 17 percent, adequacy ratios would double at the 2065 and 2100 horizons, reaching 54 percent in 2065 and 52 percent in 2100 for men (48 and 47 percent for women, respectively).¹⁸ An increase in the mandatory contribution rate may, however, adversely affect labor formalization. Therefore, the overall effect on the solidarity pension expenditures is unclear.

Health Care System

Like the pension system, the Chilean health insurance system combines a solidarity system and a contributory system (Fajnzylber and Paraje 2015). Health insurance is provided by the public National Health Fund (*Fondo Nacional de Salud* or FONASA) or private Pension Health Institutions (*Instituciones de Salud Previsional* or ISAPREs). ISAPREs are allowed to select the risks they want to cover, and they insure mostly young, relatively high-income individuals. FONASA covers the rest of the population, including indigents and low-income people who benefit from free medical treatment. In total, 87 percent of the elderly are covered by FONASA. The cost of medicines is not covered by ISAPREs nor by FONASA for the majority of ailments. Universal access with explicit guarantees (*Acceso Universal con*

¹⁸This reform simulation exercise should not be interpreted strictly as a policy recommendation, but as an illustration of the extent of reforms required to ensure the adequacy of the Chilean defined-contribution system.

Table 19. Chile: Public Health Expenditures
(Percent of GDP)

	2015	2030	2065	2100
Total health expenditures	3.8	5.2	9.5	11.3
PDV of health expenditures/GDP	—	66.0	251.4	443.2
PDV of increases in health expenditures relative to 2015/GDP	—	9.2	97.8	221.3

Garantías Explícitas) was introduced in 2005 for a list of medical conditions. The reform set minimum medical treatment standards and maximum out-of-pocket spending levels depending on the insured's income.

Total public health expenditures are projected to increase from 3.8 percent of GDP in 2015 to more than 11 percent in 2100. In the absence of reform, the present discounted value of public health expenditures until 2100 exceeds 443 percent of 2015 GDP (Table 19).

Colombia

Demographics

Colombia's aging is expected to progress broadly in line with the average of emerging economies in the region. The share of the population ages 65 and older, relative to those between 15 and 64 is projected to increase from 10 percent in 2015 to 33 percent in 2050 and 60 percent in 2100, while the median age of the population would increase from 30 in 2015 to 50 in 2100. The projections assume a broad stabilization of the fertility rate at about 2 (it declined sharply over the past quarter-century) at current levels, with migration playing a relatively small role going forward.

Pension System

History

The Colombian pension system's evolution has reflected an expansion of social guarantees and subsequent reforms to deal with its fiscal sustainability implications. The system was created in 1946 as a PAYG scheme only for public employees. In 1967 the system was extended to private employees. It gradually evolved into a complex, multi-layered scheme, with many special regimes—including for specific public enterprises (ECOPETROL, and so on)—that varied greatly; some of which had extremely generous benefits. The 1991 Constitution enacted a requirement whereby the minimum pension cannot be lower than the (relatively high) minimum wage, adding to the distortions and imbalances. Several fragmented reforms (with

the most significant of those occurring in 1993, 2003, and 2005) aimed to address growing fiscal and social sustainability problems in light of expected population aging. The key element of those reforms was the emergence of a defined-contributions system as the key pillar and a competitor to the defined-benefits pillar. But results were mixed. On the one hand, coverage has remained low, inequality remains high, and competition between the two main pillars that are subject to different rules has created loopholes. Meanwhile, actuarial imbalances have persisted, with the fiscal cost of pensions remaining sizable. On the other hand, some of the reforms have lessened future fiscal and social imbalances with respect to the pre-reform situation, including due to the (1) emergence of a second pillar with its own financing base, (2) rationalization of the special regimes (almost all such regimes, except for that of the army, have ceased accepting new members), and (3) bolstering noncontributory benefits to the very poor at a relatively limited fiscal cost (Table 20).

Current Characteristics

The current pension system is multi-pillar and highly fragmented on the institutional side. There are two main pillars: the PAYG and the defined contribution pillars, which compete for the same group of contributors. Contributor transfers between these two pillars can occur provided the five-year minimum stay requirement is satisfied and the time remaining until the statutory retirement age is 10 years or more. Some 30,000 to 50,000 contributors transfer annually from the defined-contribution to the defined-benefit pillar, which is particularly advantageous for higher-income individuals. The core pillars are supplemented by non-negligible, noncontributory (for the poor), and voluntary pillars (generally for those with higher incomes), but there is no comprehensive oversight of the pension system as a whole. The system's overall coverage ratio is relatively low (about one-third), mainly due to the high share of the informal economy. The fiscal deficit of the system is currently about 3½ percent of GDP. The system is highly unequal: 80 percent of the implicit subsidies accrue to the richest 20 percent of participants of the system.

Projections and Risks

In a baseline scenario, the presently high pension-related fiscal deficit is expected to decline moderately, but coverage (excluding small benefits under means-tested programs) would remain low and replacement rates would decline. The projections are subject to substantial risks, and in particular, substantial uncertainty over how the affiliated individuals in the system exercise their choices between participating in the defined-benefit versus defined-contribution system.

Table 20. Colombia: Pension System Structure

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administration
0 pillar (Programa de Protección Social de Adulto Mayor)	Financed by taxing incomes of high-income contributors of (i) more than four minimum salaries (1 percent) and (ii) more than 16 minimum salaries (2 percent), supplemented with budget resources. Cost estimated at 0.11 percent of GDP in 2013	Minimum age is 3 years below the one required for general pension benefits. Income equal or less than 32 percent of the minimum salary (qualifying for special means-tested programs 1 and 2). Be Colombia's resident for the last 10 years.	Poverty line based on assessed food basket with minimal nutrition needs. In practice in recent years the level of benefits has been reduced below that line, as the priority has been to expand coverage. In 2015 benefits were about \$35 per month.	About 1 million beneficiaries, 21 percent of the population in the respective age bracket	Administered by the government (Colpensiones). A special sub-account (Fondo de Solidaridad Pensional) is created for this purpose.
Intermediate ("01") pillar (Beneficios Económicos Periódicos Low-income contributors who would not qualify for a normal pension.)	Accumulated contributions with returns plus government subsidy (20 percent of qualifying contributions and additional 20 percent on the stock accumulated at retirement). Cost has been around 0.1 percent of GDP.	Income of less than 85% of the minimum wage and qualify for means-tested programs, levels 1–3. Priority targeting for aged 65 and over.	Annuity (paid every 2 months) from accumulated contributions with returns plus government subsidy (40 percent of contributions). The level of benefits is not subject to the minimum wage threshold.	Together with 0 pillar, covers about 40 percent of those 65 and over.	Administered by the government (Colpensiones).
1st pillar (defined benefit, PAYG)	16 percent of "base income" (salary over the last 10 years) with 13pp into general fund accounts, 1.9 pp life insurance and pension fund administrative costs; and 1.1 pp to cover administration costs of Colpensiones. Budget transfers (1.1 percent of GDP) supplement those resources.	Minimum age of 57 for women and 62 for men; 1,300 weeks of contributions required	Replacement rate of at least 65 percent and higher based on the contributing period. Those contributing from the minimum wage get a replacement rate of 100 percent (Constitutional guarantee). Maximum pension is equal to 20 minimum wages.	6.5 million affiliated individuals (but less than one-third are active contributors)	Administered by the government (Colpensiones).
2nd pillar (defined contribution, individually funded) competes with the first pillar	16 percent of "base income," with 11.5pp financing individual accounts, 3 pp life insurance and pension fund administrative costs; and 1.5 pp minimum pension fund	Retirement at any age is possible if resources are sufficient to finance a lifetime pension of 110 percent of minimum wage; 1,150 weeks of contributions and minimum age of 57 for women and 62 for men required for rights to a minimum pension (689,000 pesos per month in 2016)	Pension equal to an annuity stream from assets (3 sub-options). A minimum pension equal to the minimum wage is guaranteed by the state for those who are fulfilling qualifying requirements.	12 million affiliated individuals (but less than one-third are active contributors)	Pension funds supervised by Superintendencia Financiera de Colombia
3rd pillar (voluntary contributions)	Voluntary contributions	Need to stay in the system for 5 years to qualify for tax benefits	Tax benefits (both contributions and pensions income)	Relatively small (voluntary accumulated savings are about 6 percent of total pension system savings)	Pension funds, fiduciary companies

Table 21. Colombia: Pension System Projections
(percent of GDP, unless otherwise indicated)

	2015	2030	2065	2100
Public pension spending ^{1,2}	5.1	4.1	3.0	3.5
Public pension revenues ¹	1.6	0.9	0.6	0.6
Public pension deficit	3.5	3.2	2.4	2.9
PDV of increases in pension spending relative to 2015 ³	—	213	259	292
Defined-benefit replacement rate (baseline scenario) ⁴	72	78	60	56
Replacement rate for the average wage earner (alternative scenario) ⁵	na	68	68	68
Coverage (ratio of pensioners to population 60 and older, percent) ⁴				
Public	33	16	8	9
Total	34	23	27	33

Sources: IMF staff calculations based on information from public official sources and IDB (2015).

¹Spending and revenues for 2015 are estimated using budget reporting information as well as calculations based on prior-year information for segments of the pension system where fully disaggregated updated data is not available.

²Includes military, police, and social pensions. Assumes military and police pension fund spending is frozen as percent of GDP starting from 2030 (similar assumption to that of IDB (2015)).

³The discount rate is real GDP growth plus 1 percentage point.

⁴The baseline scenario assumes a gradual transition toward the Defined Contribution pillar (similar to Clements others. (2012) and IDB (2015)), with the average replacement rate calculated as a percentage of GDP per active population.

⁵The calculations are based on the actuarial model developed in this paper (see technical appendix).

- The baseline scenario assumes that there is a gradual but sustained transition toward participation in the defined-contribution system, which is similar to the assumptions made in the recent comprehensive studies of the Colombian pension system (Clements and others 2012; Bosch and others 2015). Under this scenario, the present discounted value of declines in pension-related fiscal spending through 2100 is assessed at over 90 percent of GDP and the annual deficit of the pension system is expected to gradually decline from about 3½ percent of GDP currently to about 2½ percent of GDP in 2065, largely reflecting the projected role of the dominant second pillar in reducing the fiscal costs (Table 21). Nonetheless, the deficit would start to gradually creep up thereafter due to demographic pressures. Overall coverage (excluding means-tested benefits) is expected to remain low at about one-third of the population aged 60 and older.
- At the same time, there are important fiscal risks to this projection due that the pension benefits are substantially more attractive in the defined-benefit system (although the defined-contribution system remains more attractive at the low end of the income range because of the lower number of weeks that are required for a pension). In an alternative scenario that gives higher weight to the public defined-benefit system, the fiscal pension deficit

would be about 4 percentage points higher by 2100 than under the baseline scenario, although pensions would be better from the adequacy perspective, with the replacement rate for the average wage earner estimated at 68 percent based on the harmonized cohort model explained in the Technical Appendix. Further risks include additional pressures to raise coverage and replacement rates, as well as the uncertain evolution/indexation of the minimum pension (these risks are mostly of a fiscal nature and would have a relatively minor effect on the adequacy of pensions as per sensitivity calculations).

Reform Options

Parametric reforms are important for addressing fiscal and actuarial imbalances and risks. These reforms would include: (1) adjusting prudently the level and indexation parameters of the minimum pension, (2) raising the minimum retirement age (which remains below key comparator countries), (3) changing the replacement rate formula in the first pillar, and (4) taxing pension-related income. An automatic adjustment of parameters in line with future increases in life expectancy would also be advisable. These reforms would both reduce the fiscal costs of the overall system and help support replacement rates in the defined-contributions segment (via a higher retirement age).

Reforms to boost coverage would be important to cementing the system's social sustainability. These steps would include: (1) increasing coverage of the basic noncontributory pillar, (2) expanding access to the minimum pension, and (3) strengthening the “intermediate” pillar to ensure a life-time pension (instead of a lump-sum reimbursement) for those who fall short of the qualifying requirements.

A number of other important reforms could be considered to address the particular institutional bottlenecks of Colombia's fragmented system. These steps comprise: (1) eliminating competition between the first and second pillars by possibly transforming the former into a strengthened basic non-contributory pillar (see Bosch and others, 2015), and (2) streamlining the institutional structure to permit better coordination and consistency in the decision making.

Health Care System

Colombia's health care system is mixed, combining basic publicly-funded benefits and substantial private sector participation in the provision of additional benefits. The 1991 constitution proclaimed a person's health a basic

Table 22. Colombia: Projections of Health Spending
(Percent of GDP)

	2015	2030	2065	2100
Total health expenditures	5.5	7.6	14.3	17.5
PDV of spending increases relative to 2015	—	14.0	147.3	341.1

human right that applies to all citizens and foreign residents. A major reform was enacted in 1993 that introduced private insurance and expanded the coverage of public health care (85 percent of the population was covered in 2007, versus 21 percent pre-1993). The General System of Social Security in Health (Sistema General de Seguridad Social en Salud) was created with two regimes: the contributory for those who can afford to pay, and the subsidized for those who cannot. Colombia has one public health insurance company, Nueva EPS, and dozens of private companies. All Colombian policyholders have the same basic health care plan, which includes medical, dental, and vision care. Private companies offer premium policies that expand on the basic coverage. Dependent employees pay 12.5 percent of their salary—8.5 percent paid by the employer and 4 percent by the employee. Independent workers must pay the entire 12.5 percent from their own funds. Retirees pay a slightly lower rate—12 percent. Copayments vary by income level. Public health care spending in Colombia was 5.5 percent of GDP in 2015 (Table 22).

Costa Rica

Demographics

Costa Rica is one of the countries in the Latin America region for which population aging is more advanced. Low rates of both fertility and mortality result in a projected stagnant population over the long term, with the share of the population over 60 increasing from less than 14 percent in 2015 to 38 percent in 2050 and 56 percent in 2100.

Pension System

History

The pension system has evolved since the establishment of the Costa Rican Department of Social Insurance (CCSS) in 1941. The CCSS started with civil servants and was progressively expanded to other sectors until 1975, when coverage was completed with the inclusion of the agriculture sector. Several special PAYG pension regimes for central government employees were closed to new participants in 1992, but substantial legacy costs still weigh on

the budget. In addition, there are three subsystems for the judiciary, teachers, and firefighters outside of the budget. In 2000, the general pensions system was reorganized into a mixed system that includes a PAYG component and a mandatory individually funded defined-contribution component (Law 7983). In 2005, agreement was reached to gradually increase contribution rates for the PAYG component to 10.5 percent by 2035, although the expected path is unclear.¹⁹ The first pillar is administered by the CCSS for most contributors. The second pillar can be managed by the CCSS or private pension fund administrators under the supervision of the pension superintendency. The CCSS has also been in charge of noncontributory elderly and disability pensions since 1975.

Current Characteristics

The pension system is a combination of defined-benefits PAYG, defined-contributions capitalization, and noncontributory schemes. The system has one of the highest coverage ratios in Latin America, at about 60 percent and also one of the highest average replacement rates, above 75 percent—guaranteed replacement rates under noncontributory and minimum contributory pensions are about 20 and 30 percent, respectively (see Table 23). The PAYG-system is still in surplus, with accumulated reserves of about 6½ percent of GDP.

Projections

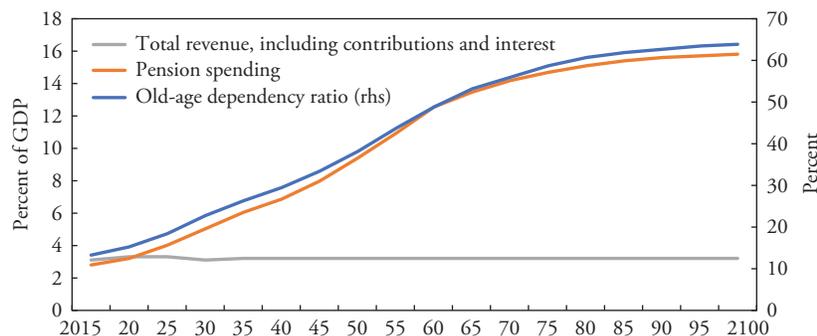
Costa Rica has one of the largest long-term fiscal gaps in the region. Under current policies, including agreed gradual increases in the contribution rate until 2035, pension expenditures of the defined-benefit system would increase from about 2¾ percent of GDP in 2015 to over 13 percent of GDP by 2065 and almost 16 percent of GDP by 2100, driven by a sharp projected increase in the old-age dependency ratio (Figure 49). Reserves would run out between 2025 and 2030, when the system would start having cash deficits resulting in large and rapidly growing actuarial deficits over the long term.²⁰ The long-term fiscal gap measured by the PDV of projected government pension spending increases until the year 2100 is almost 400 percent of GDP

¹⁹The 2005 agreement implied gradual increases of 0.5 percent every five years from 2020. However, following the publication of an independent actuarial report (Universidad de Costa Rica) in late 2016, the CCSS announced a temporary increase in worker contributions of 1 percent of wages effective from June 2017, pending the conclusion of a national dialogue on reform options to maintain the sustainability of the PAYG system.

²⁰Projections do not include a 0.7 percent increase in government contributions introduced in late 2016 or the temporary 1 percent increase in worker contributions announced by the CCSS in early 2017. These do not make a material difference in the estimated size of the long-term fiscal gap. The projections are broadly consistent with those in the latest independent actuarial report commissioned by the CCSS (Universidad de Costa Rica 2016).

Table 23. Costa Rica: Pension System Structure

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administration
0 pillar	Budget, program cost is about 2¼ percent of GDP; about 2 percent for the closed special regime for teachers, about ½ for the closed special regime for other civil servants, and about ¼ percent of GDP for noncontributory pensions—this is financed by the fund social development Fund (FODESAF), which is by employers with a 5 percent payroll tax; SOEs also make direct transfers to CCSS to cover the additional cost of noncontributory pensions not covered by budget transfers (about 0.1 percent of GDP in 2015)—subject to legal cap on SOE transfers of 15 percent of their profits.	Closed systems for teachers and other civil servants with acquired rights prior to 1992. For noncontributory pensions, adults over 65 and low-income disabled individuals not eligible for the contributory system.	Cash transfers. The noncontributory pension is about \$150 a month.	Closed regimes for teachers and civil servants cover about 11 percent of the population over 60 years old. Non-contributory pensions cover about 1 percent of the population above 60 years old (in 2012).	Labor Ministry for closed systems for teachers and civil servants, and CCSS for noncontributory pensions.
1st pillar (defined benefit, PAYG)	Employers' contributions (5.1 percent of payroll), workers' contributions (2.8 percent of gross earnings)—self-employed contribute 7.9 percent of gross earnings—and government (1.2 percent of gross income of all workers and self-employed). Contributions are scheduled to increase 0.5 percent every five years from 2020 to 2035.	Old age: 65 years of age and 25 years of contributions. Reduced pension possible after 65 years of age and 15 years of contributions, or after 25 years of contributions and 62 years of age for men and 60 for women—though this early retirement option is being phased out between 2015 and 2018. Late retirement is possible, except for civil servants. Disability pension: Assessed loss of at least 2/3 in earning capacity, with additional requirements of minimum contributions depending on age. Survivor pension: Widow(er), children of up to 18 years of age, or dependents parents or siblings.	Old age and disability pensions determined as a percentage of average earnings in the last 20 years of contributions, with percentage falling from 52.5 percent to 43 percent as average salary of last 5 year rises from less than 2 times the minimum wage to 8 or more. Percentage applied increases by about 1.5 percent with each year of additional work beyond the age of 65 under late retirement option. Pensions are indexed to the CPI. There is a minimum contributory pension of about \$250 monthly, and a maximum pension of almost \$3,000. Survivor pension: 20 to 70 percent of old-age or disability pension of the deceased, depending on relation and age of the beneficiary.	Contributors: About 65 percent of the economically active population. Beneficiaries: about 50 percent of the population above 65 years of age is currently receiving old age pension.	CCSS for most contributors. Special funds for teachers who joined after 1992, as well as for magistrates and firefighters.
2nd pillar (defined contribution, individually funded)	Contributions in percent of wages, with 3.25 percent paid by the employer and 1 percent by the worker (self-employed persons are excluded).	Same as for pillar 1 for the share contributed to the mandatory pension system (minimum 2 percent out of 4.25 percent total contributions), and its earned interest. The remaining part can be withdrawn every 5 years or when changing employers.	Old-age, disability and survivors' pensions.	Same as pillar 1.	CCSS, Banco Popular, BNCR, BCR, and BAC.

Figure 49. Costa Rica: DB Pensions System Balance

Sources: Caja Costarricense de Seguridad Social; and IMF staff calculations.

Table 24. Costa Rica: Projections of Pension Imbalances
(excluding special regimes, percent of GDP)

	2015	2030	2065	2100
Total pension expenditures	2.8	5.0	13.5	15.8
Noncontributory benefits	0.3	0.3	0.3	0.3
Contributory benefits	2.6	4.8	13.3	15.6
<i>PDV of pension spending increases</i>		18	172	391
Pension revenues ¹	3.1	3.1	3.2	3.2
Pension deficit	0.3	22.0	210.3	212.6
<i>PDV of pension deficits</i>		211	2155	2367

¹Includes pension contributions, transfers from the budget and SOEs to fund noncontributory pensions, and interest earned on reserves.

(Table 24). Taking into account projected increases in contributions from reforms approved in 2005, the PDV of pension system deficits would reach more than 350 percent of GDP.

Key assumptions are in line with this report's general methodological approach. Specifically: 1) underlying demographic trends are based on UN projections; 2) a 45-year transition period is assumed for the system to mature—with gradual increases in coverage of the pensioner-age population up to the current level of contributions' coverage among the working-age population (the latter is assumed to remain constant as it is already one of the highest in the region),²¹ and 3) replacement rate is assumed to remain constant (that is, initial pension grows with average wages).

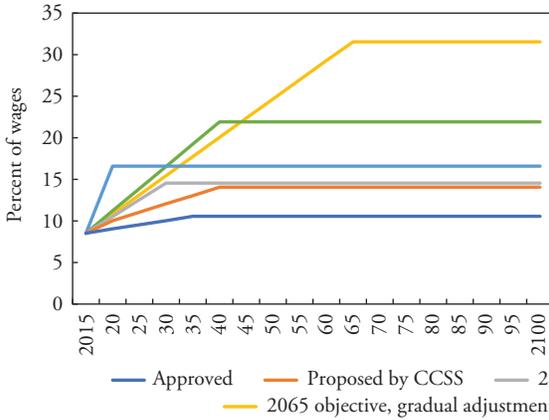
Reform Options

Larger and more frontloaded increases in contribution rates than are currently planned would be needed to reduce the size of the long-term fiscal

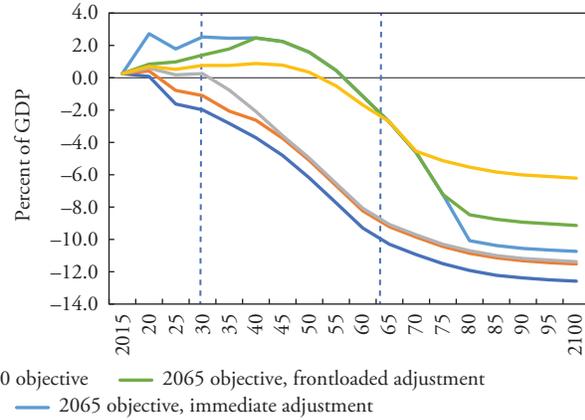
²¹Assuming an increase in active coverage to 75 percent as in the actuarial report of the CCSS (2015) would not substantially reduce the PDV of the system's projected deficits over the long term because this would also be reflected in passive coverage by the time the system matures.

Figure 50. Costa Rica: DB Contribution Rates and Pension System Balance Under Reform

1. DB Contribution Rates under Reform Scenarios



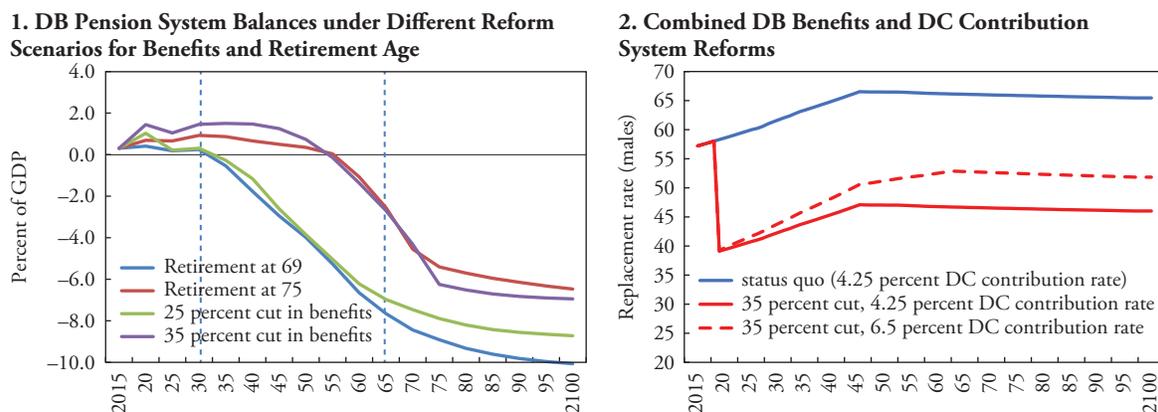
2. DB Pension System Balance under Reform Scenarios for Contribution Rates



Sources: Caja Costarricense de Seguro Social; and IMF staff calculations.

gap. The CCSS has floated a possible additional gradual increase in contribution rates to 14 percent by 2040, but this would delay the depletion of the reserve by only about five years and reduce projected pension deficits only moderately. To prevent an increase in the pension deficit by 2030, a similar but more frontloaded increase in contribution rates would be sufficient to reach the first objective set in the reform scenarios laid out in this report. The second objective of limiting the increase to 3 percent of GDP by 2065 could also be accomplished with an immediate doubling of contribution rates to 16.4 percent (Figure 50). Under more gradual reform scenarios, contributions would need to rise to 22 or 31.5 percent of wages depending on the extent to which the adjustment is frontloaded. Under almost all scenarios without reforms in benefits and retirement age, however, system deficits would continue to rise over the long term because demographic pressures would eventually offset the buffers built with higher contribution rates.

Cuts in benefits and increases in retirement rates could also address long-term fiscal gaps. Reducing spending through adjustments in benefit calculation formulas to reduce replacement rates, and especially—given very adverse population trends—by gradually increasing the retirement age as population aging continues to advance seem like inevitable options to reduce long-term fiscal gaps in Costa Rica. In particular, cuts in benefits of about 25 and 35 percent or gradual increases in retirement age to 69 by 2030 and to 75 by 2065 would be needed to achieve the objectives of preventing an increase of the pension deficit by 2030 and limiting the deterioration to 3 percent of GDP by 2065, respectively (Figure 51). Moderate increases in defined-contribution contribution rates, from 4.25 to 6.5 percent of wages, would be sufficient to maintain pension adequacy, defined as the replacement rate around the

Figure 51. Costa Rica: Combined DB and DC Pension System Reforms

Sources: Caja Costarricense de Seguro Social; and IMF staff calculations.

OECD average (paragraph 55), even under the scenario where sustainability of the defined-benefit system is achieved solely through a cut of 35 percent in benefits.²²

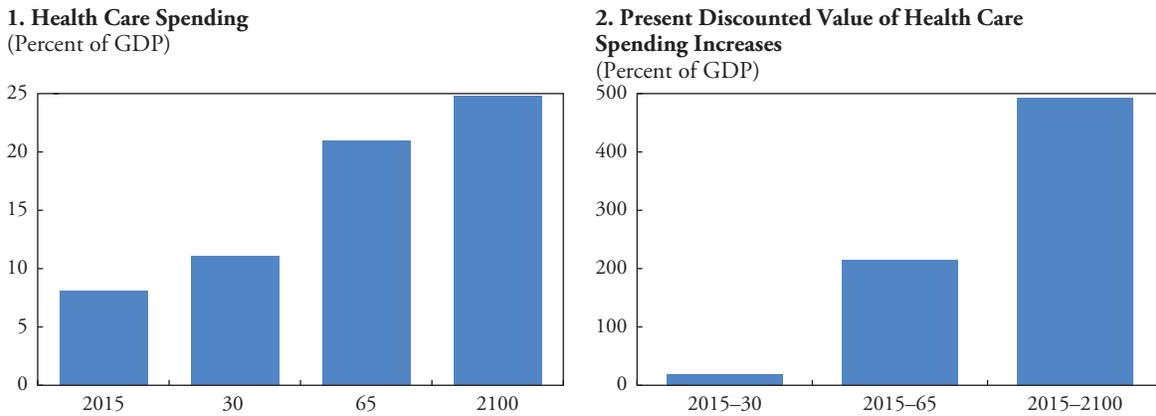
International comparisons suggest a likely greater focus of parametric reforms on contribution rates and cuts in benefits, rather than on substantial increases in the retirement age. Given the comparatively high replacement rates and low contribution rates in Costa Rica, a reform to ensure sustainability of the pension system is more likely to entail a combination of increases in contribution rates and cuts in benefits than substantial early increases in the retirement age, which is already relatively high in the region, consistent with the already mature stage of the demographic transition in the country.

Health Care System

Health insurance is a universal access program with open benefits, organized as a PAYG system also administered by the CCSS. As of 2013, 47½ percent of the population was directly insured as salaried workers, pensioners, or self-employed and 47 percent as dependents of the directly insured, while 5½ percent of the population was covered through assistance for the uninsured.

²²This reform simulation exercise should not be interpreted as a policy recommendation, but as an illustration of the extent of reforms required to ensure the adequacy of the mixed defined-benefit/defined-contribution system. The simulation is for combined defined-benefit/defined-contribution replacement rates of male pensioners, assuming 75 percent contribution density, consistent with the baseline scenario for cross-country simulations presented earlier (paragraph 61). This assumes that 100 percent contribution density would leave the replacement rate in line with the OECD average after the cut in benefits needed to restore the fiscal sustainability of the defined-benefit system, eliminating the need for higher contribution rates in the defined contribution system to maintain pension adequacy.

Figure 52. Costa Rica: Health Care Spending



Source: Fund staff estimates and projections.

Financing comes from employees (5.5 percent of salary for salaried workers and 12 percent of income for the self-employed), from employers (9.25 percent), and from the state (0.25 percent of the average contributory base for each insured group, plus an additional 14.3 percent of the minimum contributory base for the uninsured).

Public health care costs are expected to rise substantially over the long term. Total health care spending amounted to 8 percent of GDP in 2015 and is projected to increase to 25 percent of GDP by 2100, with a PDV of spending increases equal to almost 500 percent of GDP (Figure 52).

Dominican Republic

Pension System

Demographics

The age structure of the Dominican Republic is slightly more favorable than in other Latin American countries. The old-age support ratio is 9.5 working-age people (15–64) per elderly person (65+), compared with 8.9 on average in Latin America, and the fertility rate is 2.5 births per woman, compared with 2.1. As fertility is projected to drop below the replacement fertility rate by 2030, however, the old-age support ratio is projected to converge towards the regional average of 1.8 in 2100, meaning that every elderly person will be supported by only 20 percent of the current number of workers (1.9 in 2100, compared with 9.5 in 2015).

History

Up until the early 2000s, the pension system was a state-run defined-benefit system. The social protection system of the Dominican Republic dates back to the social security laws of 1947. Like in other Latin American countries, the pension system was historically based on a state-run defined-benefit system. Following the economic crisis of the early 2000s, the Dominican Republic phased out this publicly managed a defined-benefit pension scheme and in 2003 replaced it with a privately managed defined-contribution scheme (Social Security Law 87–01). The same legislation also introduced a semi-contributory minimum pension scheme (“subsidized-contributive regime”) and foresaw a noncontributory social assistance scheme (“subsidized regime”) (Palacios, 2003), that has not yet been implemented.

Current System

Participation in the contributory pension system is mandatory for all public and private sector employees, as well as for self-employed persons. About 2.9 million participants (“*afiliados*”) are registered in the defined-contribution system; only about 200,000 individuals remain in the previous defined-benefit system or in special regimes for some public sector employees.²³ However, less than half of the participants are actively contributing to the system (1.4 million contributors, or “*cotizantes*”). Given the low contribution density, this means that only 30 percent of the labor force can expect to receive contributory pensions—one of the lowest shares in Latin America.

Among the elderly, less than 15 percent currently receive pensions (Gasparini and others 2007), the majority of which are below the national minimum wage.²⁴ This means that most people must continue to work well beyond the official pension age of 60–65 years. The labor market participation rates are estimated to be almost 40 percent in the age group 65–69, about 25 percent in the age group 70–74, and almost 20 percent in the age group 75–79.²⁵

The current pension system is financed by employee and employer contributions. Contributions are 2.87 percent and 7.10 percent of covered earnings for employees and employers respectively. Of these contributions, 8 percentage points are invested in individual pension accounts, while the

²³About 100,000 people (private sector workers ages 45+ in 2003 and public sector workers of all ages who opted to remain under the existing system) are still covered by the previous defined-benefit system (of which 40,000 are active contributors), and about 100,000 additional people are covered by special regimes for specific public institutions (SIPEN Boletín, March 2016).

²⁴<http://hoy.com.do/el-69-poblacion-adultos-mayores-de-rd-esta-en-la-pobreza-extrema/>.

²⁵<http://www.diariolibre.com/economia/existe-una-edad-de-retiro-en-republica-dominicana-XL2793044>.

Table 25. Dominican Republic: Pension System Structure
(excluding special regimes)

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administrative
0 pillar (Social Pension)	Government budget	Age 601 with incomes below the legal minimum wage	Proposal of law 87-01: 60% of the legal monthly minimum wage for public sector workers of DOP 5,117.50	No payments have been made under the social pension (FIAP 2011)	
1 pillar (PAYG DB plan, closed to new entrants in 2003)	Previous contributions; Government budget			Pre-2003 coverage: Public employees (Law 379-81) and a small number of low-income private employees. Current coverage: Some previous DB-participants allowed to remain (about 100,000 in total remaining)	Finance Ministry (Ministerio de Hacienda)
2nd pillar (mandatory, DC, individually funded)	Employee contributions: 2.87% of covered earnings; Employer contributions: 7.10% of earnings (8% goes towards pensions; 1.97% is for other purposes, including a solidarity fund and life insurance)	Age 601 with at least 30 years of contributions	Price-indexed annuity or programmed withdrawals from the individual account	Mandatory for private workers aged less than 45 in 2003 and new public sector workers. Voluntary for private workers aged 451 in 2003 and existing public sector workers	Private pension funds; National Social Security Board provides overall governance; Superintendent of Pensions provides general supervision and fiscal control
Guaranteed minimum pension	0.4 percentage points of 2 nd pillar contributions; Government budget	Age 651 with at least 25 years of contributions and insufficient account balance to finance the legal minimum pension	Difference between the individual annuity and the minimum legal old-age pension (5legal monthly minimum wage for public sector workers of DOP 5,117.50)	No payments have been made under the guaranteed minimum pension (FIAP 2011)	See above

remainder goes toward disability and survivor insurance, administrative fees, and the solidarity fund.²⁶ Participants can use their pension accounts to purchase an annuity as soon as they reach 60 years of age and 30 years of contributions, or at age 55 if their annuity amounts to at least 150 percent of the minimum pension (equivalent to the lowest national minimum wage) (Table 25).

²⁶One percentage point goes to disability and survivor insurance, 0.5 percentage points to administrative fees, 0.4 percentage points to the solidarity fund, and 0.07 percentage points to the Superintendent of Pensions' operating costs.

Provision has been made for a guaranteed minimum pension. If participants do not reach the 25 years of contributions by age 65, they are eligible for a guaranteed minimum pension (*Pensión Mínima Garantizada—PMG*), which is financed through the solidarity fund.²⁷ The PMG is a top-up to reach the minimum legal old-age pension, which is in line with the legal monthly minimum wage for public sector workers (and thus grows in line with wage inflation). Since the semi-contributory system was only recently introduced, no payments have been made yet under the PMG (FIAP, 2011).

In addition to the contributory and semi-contributory systems, the new pension legislation also foresees a noncontributory social assistance scheme. In theory, a pension of 60 percent of the public sector minimum wage should be available to all needy residents ages 60 and older (SSA 2016, OECD 2016). In practice, however, there is no evidence that this system has come into effect as of today (see also FIAP 2011; Rofman and Oliveri 2012).²⁸

Pension Projections under Current Policies

Risks to financial sustainability could arise from the social pension and guaranteed minimum pension. Given that the defined-benefit system has been phased out and only a few members continue to receive pensions, the net present value of the future funding gap amounts to less than 1 percent of current GDP, and does not pose a risk to fiscal sustainability.²⁹ If the means-tested noncontributory pension is implemented as foreseen in the current legislation, however, liabilities could rise to at least 1.7 percent of GDP by the end of the century. This would lead to a gap of at least 90 percent of current GDP (under the conservative assumption that only 25 percent of the elderly population will qualify for social assistance pensions; Table 26).³⁰ This gap could increase further if the guaranteed minimum pension is implemented as foreseen in the current legislation, and if the wage growth for

²⁷The PMG is also available to members who were ages 45 or older in 2003, who did not manage to accumulate sufficient funds at age 60 (*afiliados de ingreso tardío*).

²⁸The noncontributory pension is not listed on the website of the Social Assistance Administration (Administradora de Subsidios Sociales: http://www.adess.gov.do/v2/P_SoloTexto.aspx?EntId=241). The only age-related social assistance program is a small monthly supplement (RD\$ 400) for elderly people (65+) living in households that also receive food grants under the “Comer es Primero” program (RD\$ 820 per household).

²⁹Excluding special regimes; assumption: all remaining defined-benefit pensioners receive the minimum pension (assumption made due to missing data on expenditures, based on news reports on pension adequacy: <http://www.diariolibre.com/noticias/pensiones-que-trasgreden-el-retiro-por-vejez-IWDL1169771>).

³⁰The assumption that 25 percent of all elderly people will qualify for the noncontributory pension is taken from Palacios (2003). This estimate is highly conservative, given an elderly coverage rate of only 15–30 percent and the prevalence of old-age poverty (<http://hoy.com.do/el-69-poblacion-adultos-mayores-de-rd-esta-en-la-pobreza-extrema/>).

Table 26. Dominican Republic: Measures of Pension Imbalances

(Excluding special regimes, percent of GDP)

	2015	2030	2065	2100
Contributory DB benefits	0.1	0.0	0.0	0.0
Noncontributory benefits ¹	0.0	0.6	1.1	1.7
Pension contributions	0.0	0.0	0.0	0.0
Pension surplus/deficit	20.1	20.6	21.1	21.7
PDV of future spending increases ²	...	5.6	23.8	47.4

¹Assuming 25 percent of the elderly qualify for pension benefits.

²Relative to 2015.

public sector workers (which determines the minimum pension) exceeds the growth of contributions to the solidarity fund.

The main challenge posed by the Dominican Republic’s pension system is one of adequacy of benefits. The adequacy ratio, measured as the starting pension relative to average wages in the economy, is projected to reach a maximum of less than 20 percent of earnings when the defined-contribution system matures in 2045, then decrease to 17 percent in 2100, for an average wage earner with a contribution density of 75 percent. With a lower rate of return (2.5 percent in real terms) than in the base scenario (3.5 percent in real terms), the average replacement rate may fall to only 12 percent in 2100 (see Technical Annex; Table 8).

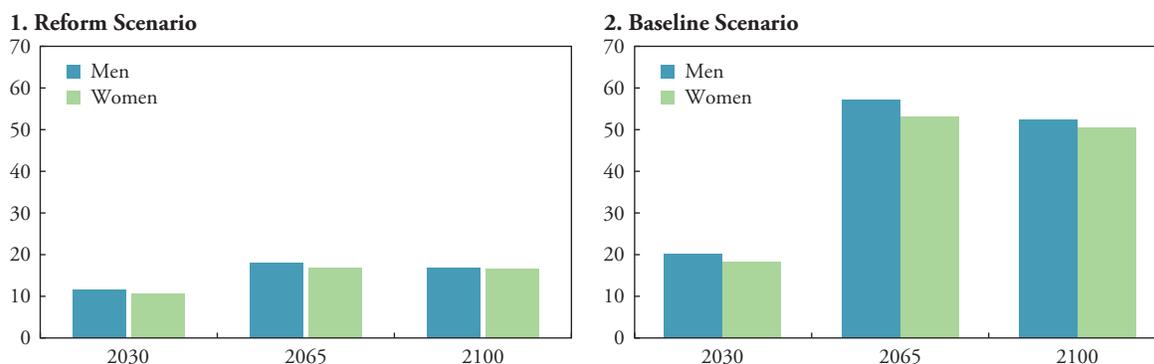
Reform Options

Unless reforms are implemented, the low projected adequacy ratios may mean that many workers will not have sufficient resources at the age of retirement. Under the standard reform scenario for defined-contribution systems,³¹ the pension adequacy picture is significantly improved, with adequacy ratios in 2065 and 2100 rising to above 50 percent of the average wage (Figure 53). Under this scenario, the increase in the contribution rate is 9 percentage points in one year, plus a seven-year increase in the retirement age by 2030 to 67 years.³² For 2030, adequacy remains low, due to the much lower contribution rates before 2018 and the shorter average contribution careers of retirees because of the relative youth of the defined-contribution system. To increase pension adequacy, the Dominican Republic should consider raising both the retirement age and pension contribution rates, which are currently below the Latin American average.

³¹The reform scenario involves a gradual increase in the retirement age to 67 and an increase in the contribution rate to 17 percent starting in 2018. See paragraph 0 in the main report for a full description.

³²The reforms under this scenario represent significant changes in the case of the Dominican Republic and should be regarded as being indicative for policy analysis purposes rather than as concrete policy recommendations.

Figure 53. Dominican Republic: Adequacy Ratios Under the Baseline (RHS) and Reform (LHS) Scenarios
(In percent of average wage)



Health Care System

The public health care system of the Dominican Republic is based on the Social Security System legislation that was passed in 2001 and implemented in 2007. The Family Health Plan comprises a contributory, a noncontributory and a mixed component. The contributory health insurance system, which covers salaried workers and their families, is financed through employer and employee contributions equal to 10.13 percent of covered earnings. The noncontributory system provides universal basic health care services, and is financed entirely by the government. The mixed system (contributory-subsidized) covers self-employed individuals, whereby the government subsidizes the employer-portion of the contributions (7.09 percent of covered earnings) in lieu of the company.³³

Public health care spending currently amounts to 2.8 percent of GDP—about one-third of total health care spending—and is expected to grow steadily. The remainder consists of patients' out-of-pocket expenditures on pharmaceuticals, as well as on private health insurance contracts that expand coverage and care. By 2100, public health care costs could grow to 9 percent of GDP, based on the model described in paragraph 18.

Ecuador

Demographics

The share of Ecuador's population over 65 has increased from 4.3 percent in 1990 to 6.5 percent in 2010. This population aging is expected to accelerate

³³<http://www.sisalril.gov.do/Sfs.aspx>

Table 27. Ecuador: Pension System Structure (2 pillars)

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administrative
0 pillar (Social Pension)	Budget, program cost is 0.4 percent of GDP in 2014	Elderly 651 who do not have a pension and live in conditions of poverty.	\$50 per month, 7 percent of GDP per capita	55 percent of population 651	Ministry of Social and Economic Inclusion
1 pillar (IESS, core pension system)	Contributions (employees 8.64 percent and employers 1.1 percent) ¹ and Budget (prior to 2015 reform, government contribution to cover 40 percent of pension benefits)	At any age: 480m contributions; at 60, 360m contributions; at 65, 180m contributions; at 70, 120m contributions.	A percentage of average wage for last five years (50 percent for 10y contributions, 75 percent for 30y, 81.25 percent for 35y, and 100 percent for 40 y) Minimum pension of \$177 a month and maximum pension of \$1,947 a month; Replacement rate is currently above 90 percent for average earners.	40 percent of population 651	Social Security Institute (IESS)

¹For public sector, employees pay 6.64 percent and employer pays 3.1 percent.

in the coming decades, with the share of the population over 65 forecast to increase to 17 percent by 2050 and to 30 percent by 2100.

Pension System

History

Social security is a constitutional right for workers and their families in Ecuador, where the public pension system provides nearly universal old-age coverage. Ecuador's social protection systems for the elderly started in 1928 through the creation of several specialized retirement plans for civil service, military, and bank employees. In 1970, Instituto Ecuatoriano de Seguridad Social (IESS), a PAYG defined-benefit system, was created, which represents the current form of core pension system in Ecuador. A noncontributory social pension (Pension para Adultos Mayores) was launched in 2006 to provide old-age benefits for vulnerable individuals ages 65 and older who do not receive other public pensions (Table 27).

Current System

The current pension system is PAYG, with defined benefits, and it covers 45 percent of the workforce in 2014 (increased from 27.2 percent in 2007). This implies that any reform plan to balance the system in the medium term should especially take into account its effects on workers' incentives to

Table 28. Ecuador: IESS Pension System Imbalances
(Percent of GDP)

	2015	2030	2065	2100
Total pension expenditure	2.7	3.5	6.4	8.7
Total pension revenue	2.5	2.8	2.8	2.8
Pension deficit	0.1	0.8	3.7	6.0
PV of expenditure/GDP ¹	—	46.7	171.2	308.2
PV of incremental pension expenditure ^{1,2}	—	7.3	64.6	154.2
NPV of pension deficits ¹	—	6.4	61.1	148.8
NPV of incremental pension deficits ^{1,2}	—	4.3	55.5	140.7

Source: IMF staff estimates and projections.

¹Discount rate is assumed to be 1 percent.

²Relative to the expenditure/deficit in 2015.

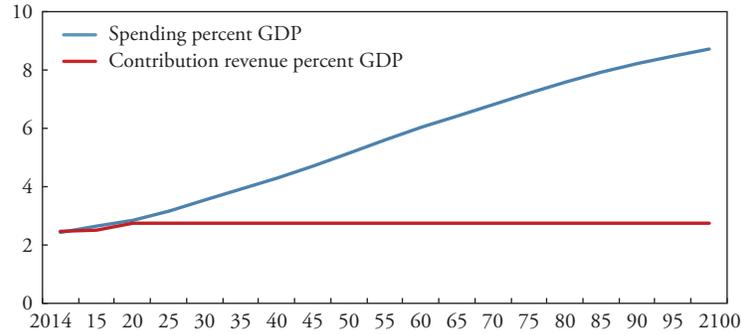
enter into formal employment and avoid damaging such incentives. After years of surpluses, the pension fund has grown to 9.1 percent of GDP in 2014, equivalent to four years of benefits. Currently, the pension system is adequately financed by contributions and investment returns (the latter amounted to 0.4 percent of GDP in 2014).

There is no imminent imbalance in the IESS system; all benefits are currently financed by contributions. However, as the population ages, the system will eventually start to generate deficits over the medium term (Fenochietto and Soto 2015). The authorities introduced an important reform in 2015 to index benefits to inflation (previously increased through annual adjustments ranging between 4.3 percent and 16.1 percent, inversely proportional to the amount of the benefit), to contain expenditure growth going forward. In addition, the 2015 reform also eliminated the government's contribution to the system (40 percent of pension benefits and its explicit guarantee for benefit payments).

Baseline Projections

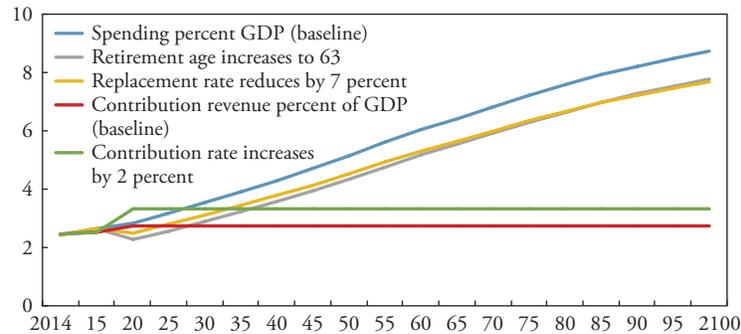
Reforms in 2015 are projected to help stabilize pension spending at about 3 percent of GDP over the medium term, but they are not enough to ensure long-term sustainability. However, as population aging accelerates, substantial imbalance is projected to emerge in the long term, with pension spending projected to increase to 3.5 percent of GDP by 2030, 6.4 percent of GDP by 2065, and 8.7 percent of GDP by 2100 (Table 28). In present value terms, the increase in spending relative to its 2015 level is projected to be 7.3 percent of GDP by 2030, 65 percent of GDP by 2065, and 154 percent of GDP by 2100. In NPV terms, the imbalance between benefits and contributions (between now and 2050) is more than 30 percent of GDP, surpassing the value of the fund assets today. On current policies, the pension fund is projected to deplete by 2033. In addition to

Figure 54. Ecuador: IESS Pension System Balance



Source: IMF staff projections.

Figure 55. Ecuador: Simulated IESS Pension System Balances



Source: IMF staff projections.

Table 29. Ecuador: IESS Pension System Reform Options

	No Increase in Deficit by 2030	Less than 3 percent of GDP Increase in Deficit by 2065
Reform options:		
Increase in retirement age (years)	3	3
Reduction in replacement rate (percentage point)	11	7
Increase in contribution rate (percentage point)	2	2

the IESS, spending on the noncontributory social pension is also projected to increase from 0.35 percent of GDP in 2014 to 0.55 percent of GDP by 2045 (Figure 54).

Baseline projections show the pension spending increases as the population ages, and are based on key assumptions including (Table 29; Figure 55): 1) constant replacement rate (that is, initial pension grows with average wages); 2) underlying demographic trends from the United Nations projection; 3) a gradual increase in labor market formality between 2015 and 2020; and 4)

administrative costs and nominal rate of return on investment remain constant at their historical levels.

Assessment and Reform Options

As population aging accelerates, increasing imbalances are expected to emerge in the IESS system after 2020, which would pose a significant fiscal risk. The total pension spending and replacement rate in Ecuador are broadly in line with the average of emerging markets, but the contribution rate is at the low end. However, given the currently low employment coverage, any proposal to balance the system should consider its effect on workers' incentives to enter into a formal work relationship.

Parametric pension reforms should focus on improving the affordability and increasing the contribution rate of the defined-benefit system. These reforms could include 1) gradually increase the retirement age in light of the aging population and increasing life expectancy; 2) adopt a new benefit formula to base benefits on the amount of overall contributions; 3) increase the contribution rate to align it with the emerging markets average while continuing to strengthen efforts to reduce labor market informality to improve the financial situation in the short term, and hence, provide more time to gradually implement other reforms; and 4) diversify the investment portfolio (currently invested heavily on government bonds) to reduce exposure to sovereign risk.

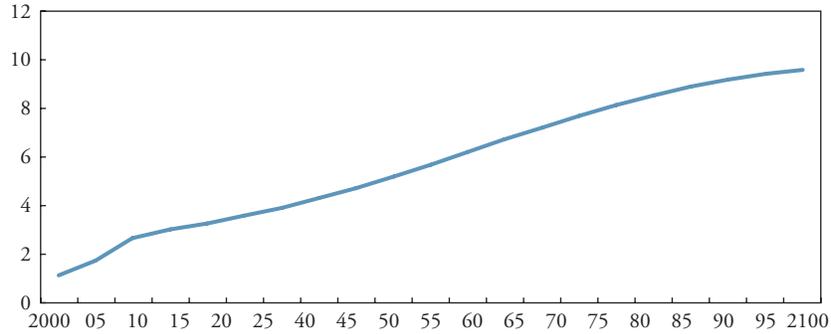
Health Care System

Health care in Ecuador has improved during recent periods, following the adoption of a new constitution in 2008 that mandates access to health care for all citizens, with annual public health care funding more than doubled from previous levels. Ecuador offers two levels of public health care: (1) *social security health care*, administered by IESS, offers services available to contributors to the IESS system (through payroll deductions) and voluntary members (through monthly fees); and (2) *public health care*, financed by budget, provides services free of charge to everyone but receives less funding on a per patient basis than social security health care. Social security health care covers all health care costs including medicine, with no restrictions on age or preexisting conditions. There are, however, restrictions in public health care, with certain services and supplies normally reserved for only high-risk patients.

Projections show a large increase in health spending.³⁴ Under current policies, with population aging and an assumed excess cost growth of 1 percent

³⁴Based on calculations included in Clements and others (2015).

Figure 56. Ecuador: Projected Public Health Care Expenditure
(Percent of GDP)



Source: IMF staff projections.

Table 30. Ecuador: Total Public Health Care Expenditure
(Percent of GDP)

	2015	2030	2065	2100
Total public health care expenditure	3.0	3.9	7.2	9.6
Increases relative to 2015	—	0.9	4.2	6.6
NPV of total public health care expenditure	—	51.0	188.8	342.3
Increases relative to 2015	—	6.1	67.6	167.3

a year, Ecuador’s total public health expenditure to GDP ratio is projected to gradually increase from 3 percent in 2015 to 4 percent by 2030, 7 percent by 2065, and close to 10 percent by 2100 (Table 30; Figure 56).

El Salvador

Demographics

Like many other countries in the region, El Salvador’s population is relatively young on average, but the demographic profile is expected to shift over the coming decades. The share of the population over 64 compared with the population ages 15–64 is projected to surge from 13 percent currently to 28 percent in 2050 and 69 percent in 2100. The median age would rise from 27 now to 42 in 2050 and 53 in 2100. Emigration has been another factor affecting the Salvadoran age structure and the labor force, as most of the migrants have tended to be relatively young.

Pension System

The financial imbalances that accumulated in the PAYG system prompted reforms that lessened the fiscal burden via a transition in the late 1990s toward a defined-contribution system. Prior to 1998, switch toward a

defined-contribution system in the late-1990s. Prior to 1998, the system was a PAYG scheme with generous, subsidized benefits in exchange for token contributions which covered a small part of the population. In 1998, increases in contribution rates and other modest parametric reforms helped cut this generosity somewhat. Since then, the system has been transitioning from a defined-benefit to a fully-fledged “self-financed” defined-contributions system. But the process was slowed down and became costly in budget terms because of periodic extensions of DBs to various cohorts which, over time, reduced savings from 1998 reforms. At the same time, the system’s coverage has remained very low. The perceived “self-financing” of the defined-contribution segment lessened the pressure to adopt needed parametric adjustments as key parameters, including retirement age, remained unchanged for two decades.

Currently, the system is mixed but transitioning toward a full-fledged defined-contribution system. The defined-benefit segment dominates pension benefits while almost all contributions accrue to the defined-contribution segment. The defined-contribution system has a minimum wage guarantee, which effectively implies a permanent (if small in the baseline scenario) defined-benefit component (Table 31).

Under current rules, the long-term fiscal burden of the system is projected to be contained, but this would come at a cost of low coverage and replacement rates. Under current policies, *public* spending on pension benefits would edge up by 2020 and be in the range of 2½–3 percent of GDP in 2020–29, before falling to 0.7 percent of GDP in 2065 and 0.2 percent in 2100 (Table 32). Total (private and public) pension spending is projected to rise to about 5½ percent in 2065 and 6½ percent in 2100, reflecting the impact of aging on the defined-contribution system. Average replacement rates would decline from about 65–70 percent currently to about 40 percent or lower when the defined-contribution system would be fully phased in. The relatively high minimum wage guarantee would cushion this decline in replacement rates for some of pension system participants. However, the replacement rates could be yet lower (20–30 percent) for high-income contributors, particularly women. Likewise, coverage under current policies would remain low due to both the low proportion of contributors in the labor force and the low density of contributions; only a minority of the workforce would be expected to claim 25 full years of contribution in the *formal* sector (currently only about 40 percent of contributors receive a full pension, and this proportion is unlikely to change much under current policies). Thus, pension adequacy would remain unsatisfactory for the majority of pension system participants. Key risks to these projections include: (1) lower GDP growth, (2) lower returns on pension fund assets (which could further lower replacement rates and/or increase the cost of the minimum pension

Table 31. El Salvador: Pension System Structure

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administrative
0 pillar	Budget, program cost is 0.07% of GDP	701 years of age, reside in municipalities with extreme poverty and not receiving any type of pension benefit	\$50 per month, or about a quarter of the minimum contributory pension	8% of eligible population, less than 1% of total population	Administered by municipalities (with means-testing against a social assistance package)
1 pillar (being phased out)	Initially from the budget, since 2006 forced borrowing from pension funds at LIBOR10.75%, which was nearing its limit in 2016. The interest rate was raised	Born before (April 15) 1962, 25 full years of contributions; at least age 55 for women and 60 for men. (Excludes those born between 1943 and 1962 and opted for a private system, see below)	Benefits a proportion of last 10 years of a “basic wage.” Replacement rate estimated at around 70%.	Less than 2% of total population	A special institution (FOP) is in charge of financing. ISSS and INPEP manage administrative issues
2 pillar (core pension system)	Compulsory contributions (13%, o/w 2.2 pp are commissions) and returns on pension fund assets (accumulated contributions and recognition bonds)	Born after (April 15) 1962, 25 full years of contributions; at least 55 for women and 60 for men; early retirement possible if accumulated contributions sufficient to finance a pension 60% above a minimum pension. Also includes a majority of individuals born between 1943 (1948 for women) and 1962 who opted for the private system. Those who opted for this system (born before April 1962) are guaranteed the replacement rates of the first pillar).	Pension equal to an income stream from assets (mostly “programmed withdrawal”). Minimum pension of \$207 month. Replacement rates expected to fall from the current 70 percent (due to top-ups) to around 40 percent after the system is fully phased in.	Only about 25% of affiliated individuals are paying contributions and yet fewer are expected to get pension benefits (those who contribute less than 25 years will get a lump sum reimbursement).	Two private pension funds compete for contributors and administer individual accounts. Restrictions on asset allocation important (floor for investing in government bonds; ceiling for investing in different instruments, including abroad).
3 pillar	Voluntary contributions	Mostly work as top-ups to pillar 2 (same conditions)	Pension benefits equal to an income stream from assets (tax incentives apply).	Negligible	Pension funds

guarantee);³⁵ and (3) a higher number of estimated beneficiaries and a lower number of contributors, partly depending on migration trends. Overall, the relatively low *public* pension spending is driven by the technical assumption that the system would be maintained as currently envisioned, as a largely “self-financed” defined contribution system, which may not be fully realistic.

While the *public* cost of pensions does not seem to be high at the baseline, fiscal sustainability is still a potential problem. This reflects (1) questionable “social sustainability” due to declining replacement rates and low coverage, which can create political pressure for the government to step in; (2) a weak overall fiscal position and high public debt (as of 2015–16); (3) limited fund-

³⁵Based on an alternative model in the Technical Appendix, the fiscal cost of the minimum pension guarantee alone could be in the range of 1¼ to 1½ percent of GDP in 2065 and 2100, respectively.

Table 32. El Salvador: Pension System Projections
(Percent of GDP, unless otherwise indicated)

	2015	2030	2065	2100
Current policies				
Public pension spending ¹	2.6	2.3	0.7	0.2
Main (contributory) pillar	2.5	2.3	0.6	0.1
Supplementary (noncontributory) pillar	0.1	0.1	0.1	0.1
Public pension revenues ²	0.0	0.0	0.0	0.0
Public pension deficit ²	2.6	2.3	0.7	0.2
PDV of increases in pension deficits relative to 2015 ³	n/a	4.2	230.0	269.3
Total estimated replacement rate ⁴	65–70	60	40	40
Replacement rate for DC pensions with average earnings ⁵	n/a	46	46	46
Coverage				
Percent of affiliated individuals paying contributions	24			

Sources: Salvadoran authorities and Fund staff calculations

¹Most of the calculations are based on the actuarial model developed by the Salvadoran authorities (Financial Superintendency in cooperation with the central bank and the Ministry of Finance), with the exception of what is listed under 5/. While there was an effort to make the two models comparable (and the results are broadly similar) full comparability cannot be achieved due to model complexity. Public pension spending includes issuance of recognition bonds, which is not fully recorded in fiscal accounts. The spending excludes military pensions, which follow special (defined-benefit) rules and should have a relatively contained, if adverse, impact on fiscal accounts.

²In El Salvador public pension revenues are negligible and are netted out from public pension expenditures. Thus, annual public spending is equal to public pension system deficits.

³The assumed discount rate is 1 percentage point higher than GDP growth.

⁴The replacement rate reflects an estimated average for all pensioners, but could be lower (or higher) for selected categories, depending on income, gender, and participation in DC vs. DB system.

⁵The calculations are based on the actuarial model developed in this paper (see Technical Appendix). The calculated replacement rate assumes that contributors with average earnings fulfill the requirement of 25 full years of contributions.

ing sources for public spending obligations (the government has been relying on pension fund financing, the scope for which had considerably diminished by 2016); and (4) a fragile contribution base, with a projected decline in replacement rates undercutting compliance. As a result, these problems are likely to trigger changes to the current pension system that entail higher fiscal obligations than currently projected.

Reflecting the system's potential fiscal and social sustainability problems, several alternative reform proposals are being considered. In February 2016, the government submitted a proposal for a mixed pension system, which would return most of the private segment to a public PAYG pillar, thereby reducing measured public debt and deficits (for accounting reasons). However, the proposal eschews parametric reforms and thus may not improve the pension system's underlying sustainability. As of early-2017, the proposal did not make headway due to lack of political support and alternative proposals have emerged, some of which consider parametric reforms. These proposals indicate that the effects of parametric reforms would be important over the long term, since they would jointly address both fiscal (public spending) and social sustainability (for example, replacement rate) problems. In particular, it has been estimated that a package of selected parametric reforms would reduce the estimated fiscal liability by about one-third (in NPV terms) while raising replacement rates by 10–12 percentage points (Table 33).

Table 33. El Salvador: Example of Effects of Selected Pension Measures on Reducing Unfunded Pension Liability^{1,2}
(Percent of GDP, PDV terms)

Changing the method of calculating benefits	19
Increasing the minimum contributions period to 30 years	11
Raising retirement age by five years	9
Raising contribution rates	5

Source: Superintendency of Financial System of El Salvador

¹The effect of each measure is partial and could be different in a package.

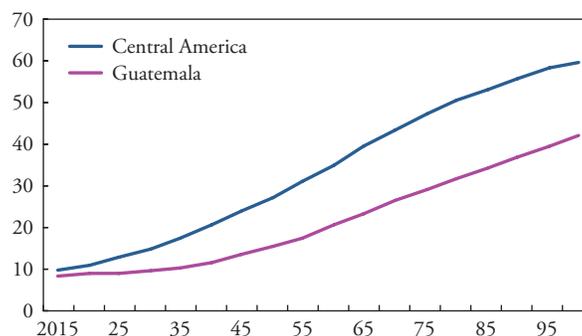
²The calculation does not take into account the beneficial effects of these reforms on raising replacement rates in the new system, which are important for improving “social sustainability.”

The parametric reforms should be a key building block of a comprehensive reform strategy. These reforms represent the only *durable* way to address the system’s actuarial imbalances, even though, given the accumulated delays and transition commitments, their effects would be relatively back-loaded. Thus—and without prejudging whether the system would remain as a fully-fledged defined-contribution system or be converted into a mixed system—a viable reform strategy should incorporate: (1) deep parametric reforms (from a menu of “standard” options) that would put key parameters in line with best practices (however, increases in contribution rates within a parametric package should play a relatively limited role to avoid excessive pressure on the formal labor market and contribution compliance); and (2) a credible commitment to “fiscalize” residual transitional pension benefits by creating space in non-pension fiscal accounts to raise expected pension levels, increase the system’s coverage, and support contributor confidence. These steps could be supplemented by incentives for greater contributions compliance and formal labor market participation.

Health Care System

The system is largely publicly funded and fragmented. The medical services provided by the public health system are composed of: the Ministry of Health (MSPAS), Salvadoran Institute of Social Security (ISSS), Teacher’s Welfare, Military Health, Higher Council for Public Health, and Salvadoran Institute for the Rehabilitation of Disabled Persons. The public health system is regulated by the Ministry of Health and Social Welfare and has 30 public hospitals in the country and various primary care facilities. According to Salvadoran law, all individuals who are not insured shall be covered and given basic health services in public health institutions. Only 20 percent of El Salvador’s total population has health insurance: 18 percent from the Salvadoran Institute of Social Security and 2 percent from private health insurance companies. The MSPAS provides free health services about 80 percent of Salvadorans who do not have the ability to pay for medical bills. The ISSS covers those who are formally employed and provides medical services for

Figure 57. Guatemala: Old-Age Dependency Ratio
(Population aged 65+/Population aged 15–64)



Sources: UN, World Population Prospects, 2015.

Table 34. El Salvador: Projections of Health Spending
(Percent of GDP)

	2015	2030	2065	2100
Total health expenditures	4.4	5.8	11.3	14.8
PDV of spending increases relative to 2015	—	8.8	102.6	264.8

injuries and hazards related to their work. Health Care spending is assessed at 4.4 percent of GDP and is financed from the budget and compulsory social security contributions of 10.5 percent of wages (Table 34). High growth in the spending ratio in recent years is partly explained by the mechanism of indexation (*escalafon*), which is particularly generous for health care workers.

Guatemala

Demographics

Guatemala faces a relatively favorable demographic transition. Thanks to its fertility rate, which is the highest in Central America and projected to remain above replacement rates until 2060, the economically active population ages 15–64 years is projected to continue to grow until 2045. However, the percentage of the population ages 65 and older is also expected to increase from 5 percent of population in 2015 to 25 percent in 2100 (Figure 57). Consequently, the old-age dependency ratio will increase from 8 to 42 percent over the same period but remain consistently below the Central American average, with support ratios on the rise to 2060.

Table 35. Guatemala: Active (contributing) and Passive Workers by Employer (December 2015)

	Total	Private Sector	Public Sector ¹	
			Long-Term	Short-Term
Active	1,267,429	1,059,913	167,773	39,743
Passive	284,395	174,789	109,606	

Sources: IGSS; and IPM.

¹Includes 6,836 active and 6,588 passive military personnel.

Pension System

History

Guatemala has a fragmented pension system, composed of three base schemes and several complementary plans. The base schemes include: (1) the old-age, disability and survivor pension (IVS) administered by the Guatemala Social Security Institute (IGSS), the (2) the system for public sector employees administered by the National Office of Civil Service (ONSEC), and (3) the scheme for military personnel administered by the Institute of Military Care (IPM). The IGSS was created in 1946, but the IVS dates back only to 1977. Affiliation with the IVS is compulsory for all dependent employees, including short-term public workers. The IPM was founded in 1966, and the ONSEC in 1969. The complementary pension schemes (currently about 13) were mostly created during the 1970s by autonomous institutions with the objective of supplementing the benefits provided by the IVS, but over time most of them converted into parallel plans. As of 2015, about 62 percent of pensioners in the base schemes were covered by the IGSS, 36 percent by the ONSEC, and 2 percent by the IPM (Table 35). Overall, the base schemes account for more than 90 percent of pensioners, the remaining being covered by parallel schemes. Due to unstable working conditions—which make it difficult to comply with the minimum requisites or years of contributions—only about 50 percent of the base schemes’ beneficiaries were receiving old-age pensions, with the rest receiving disability and survivor benefits.

A noncontributory scheme covers needy nationals over 65 years of age. Beneficiaries of this program (*Aporte Económico Adulto Mayor*) are Guatemalans who can demonstrate, through a socioeconomic assessment conducted by a social worker, that they lack economic resources and are extremely poor. The program is financed by government resources and covers 16 percent of the population ages 65 years and older, with benefits averaging 18 percent of national per capita income, just above the Latin American average.

Recent parametric reforms raised the vesting period. In 2010, the pensionable age was raised from 60 to 62 years and the minimum years of contributions

required for eligibility to the national scheme (IGSS) was raised from 15 to 20, with a gradual increase after 2011. However, in 2012 the Constitutional Court ruled out the increase to 62 years, leaving in place the increase in vesting period.

Current System

With less than 1 percent of GDP in 2015, Guatemala's pension spending is one of the lowest in Latin America. The low pension spending is a result of both its relatively young population and its low pension coverage: only 14 percent of persons are of statutory pensionable age, one of the lowest in the region. The latter stems from a very low coverage of the economically active population because of informality, with less than 20 percent of the total workforce contributing to the system. On the other hand, Guatemala's average replacement rate of 70 percent of economy-wide earnings is above the regional average.

The system is financed through contributions as well as untargeted government revenues and reserve interest. At 5.5 percent of covered earnings, of which 1.83 is paid by employees (Table 36), Guatemala's social security contributions are also among the lowest in the region. Besides contributing as an employer, the government is expected to contribute to the base schemes with 25 percent of the total contribution paid, but payments have been partial in recent years due to revenue shortfalls. As of December 2015, the IVS program's total spending (including administrative costs) was 94 percent of contributions and 63 percent of total revenue (including reserves interest), while the program's reserve fund amounted to 3.6 percent of GDP (Table 37). The ONSEC does not have a reserve fund: the government covers the financial deficit, which amounted to 0.4 percent of GDP in 2015—about one-third of the budget deficit—and is expected to increase to 0.5 percent of GDP in 2016. The IPM balance turned negative in 2014 and the deficit—equal to 21 percent of contributions in 2015 (including partial contributions by the government)—is being covered by the returns from invested reserves.

Projections

Under current policies, the consolidated spending of the base schemes and the noncontributory pension will reach 3.2 percent of GDP by 2100, with a PDV of future spending increases of 45 percent of GDP. According to the IGSS actuarial projections, in the absence of reforms the IVS contributions will fall short of total spending in 2017. Interest income from reserves will cover the gap up to 2023, after which the stock of reserves will start to be drawn down, and will run out in 2030/31. Under current policies, the consolidated spending of the base and noncontributory schemes would increase to about 3.2 percent of GDP by 2100 (see Table 38). Assuming a

Table 36. Guatemala: Pension System Parameters

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administrative
Social Assistance: Noncontributory old-age pension	Government general revenues.	Age 651 and extremely poor.	GTQ 400 (US\$ 52) per month since 2007.	Guatemalan citizens.	Ministry of Social Development.
Social Insurance: PAYG defined benefits old-age pension	Employee contribution: 1.83 percent of gross earnings or 5.5 percent of declared earnings for self-employed. Employer contribution: 3.67 percent of gross payroll. Government contribution: 25 percent of total contribution paid, also contributes as an employer.	Age 601 with at least 240 months of contributions.	50 percent of the insured's average earnings in the last 60 months plus 0.5 percent for each six-month period of contributions exceeding 120 months. A dependent supplement of 10 percent of the insured old-age pension is paid for each dependent. Eligible dependents include a spouse or partner, children younger than age 18, (no limit for disabled), and disabled parents with no other source of income. The minimum (maximum) monthly pension, including supplements, is GTQ 340 (4,800). There are 13 payments a year plus a December bonus of GTQ 500. Benefits are adjusted periodically depending on financial resources.	Employees, including agricultural workers, and public sector employees on a limited-term basis. Voluntary coverage for self-employed persons. Special system for public sector employees, including executive and military personnel.	IGSS administers the program. The Ministry of Labor and Social Welfare provides general supervision.
Social Insurance: PAYG defined benefits old-age pension for public sector employees	Employee contribution: from 9 to 15 percent of gross earnings according to salary level. Government contribution: 10 percent of gross payroll.	Age 501 with at least 10 years of contributions.	40–100 percent of the insured's average earnings.	Public sector employees, excluding short-term (covered by IVS).	ONSEC
Social Insurance: PAYG defined benefits old-age pension for military personnel	Employee contribution: 8 percent of gross earnings. Government contribution: from 20 to 25 percent of gross payroll.	At least 20 years of contributions.	50–100 percent of the insured's average earnings.	Military personnel.	IPM

Sources: IGSS; ONSEC; IPM.

Table 37. Guatemala: Revenue and Expenditure of the IVS Program
(Million Quetzales)

	2011	2012	2013	2014	2015
Initial Reserves	10,471	11,498	12,856	14,375	15,968
Revenue					
Contributions	1,921	2,195	2,390	2,595	2,758
Interest	936	1,041	1,185	1,266	1,378
Other	2.63	4.15	7.09	8.01	8.33
Total Revenue	2,860.11	3,240.46	3,581.74	3,868.58	4,144.10
Expenditure					
Benefits	1,705	1,745	1,904	2,102	2,433
Administration and other	131	136	158	169	171
Total Expenditure	1,835.98	1,881.24	2,061.31	2,270.66	2,603.78
Reserve Fund	1,024	1,359	1,520	1,598	1,540
Annual Change	3.08	21.92	20.65	25.05	4.94
Final Reserves	11,498.38	12,855.68	14,375.47	15,968.35	17,513.61

Source: IGSS.

Table 38. Guatemala: Pension Projections
(Base schemes and Aporte Economico Adulto Mayor, percent of GDP)

	2015	2030	2065	2100
Baseline				
Total pension expenditure	1.0	1.1	2.2	3.2
Pension revenues ¹	1.1	0.9	0.8	0.8
Pension balance	0.0	20.3	21.5	22.5
PDV of future pension spending increases		0.4	14.3	44.9
PDV of future pension balance increases		21	222	257
Reform scenario 1: Retirement age²				
Pension spending	1.0	0.8	1.6	2.6
Pension balance	0.0	0.0	21.0	21.9
PDV of future pension spending increases		21.6	1.8	22.1
PDV of future pension balance increases		1	29	234.
Reform scenario 2: Contribution rates³				
Pension spending	1.0	1.1	2.2	3.2
Pension balance	0.0	0.4	20.3	21.4
PDV of future pension spending increases		0.4	14.3	44.9
PDV of future pension balance increases		4.8	12.2	22.4
Combined reform				
Pension spending	1.0	0.8	1.6	2.6
Pension balance	0.0	0.7	0.2	20.7
PDV of future pension spending increases		21.4	1.9	22.2
PDV of future pension balance increases		6.7	24.8	20.5

Sources: Staff projections.

Notes: ¹Includes pension contributions and interest returns. ²Increase in retirement age from 60 to 65 years by 2025.

³Gradual increase in contribution rates to 15.5 percent of gross salaries by 2040.

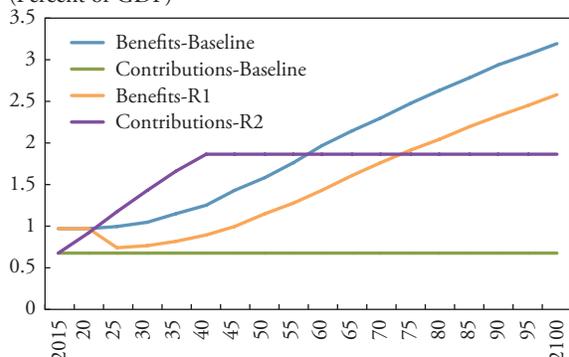
constant share of contributions, the system will turn into deficit in 2030 and reach about 2½ percent of GDP by 2100, with a present discounted value of future spending increases of 45 percent of GDP (Table 38).

Reform Options

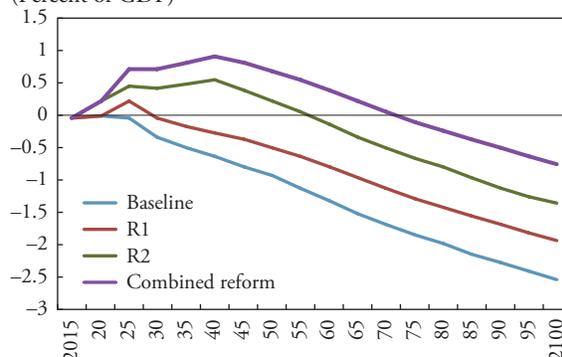
Parametric reforms should prioritize increasing the pensionable age and contribution rates. Gradually increasing the pensionable age for both men and women to 65 years by 2025 would reduce pension spending by about ½ percent of GDP per year, on average, and halve the projected increase in future government pension liabilities (Table 38 and Figure 58). Increasing contributions rates by 2 percentage points of wages every five years to reach 15.5 percent in 2040 would increase revenues by 1 percent of GDP per year on average and hold the system in surplus until 2055. A combination of these parametric reforms would reduce pension spending while increasing revenues and retain surpluses until 2070, reducing the system deficit at the end of the projection horizon to 0.7 percent of GDP, less than one third the deficit under the baseline scenario.

Figure 58. Guatemala: Pension System

1. Guatemala: Pension System Spending and Revenue
(Percent of GDP)



2. Guatemala: Pension System Balance
(Percent of GDP)



Source: IMF staff calculations.

Note: R1: Pensionable age for both men and women increased to 65 years by 2025. R2: Contribution rates gradually increased from 5.5 to 15.5 percent of gross salaries by 2040.

Table 39. Guatemala: Contributions to EMA Program
(Percent of gross salary)

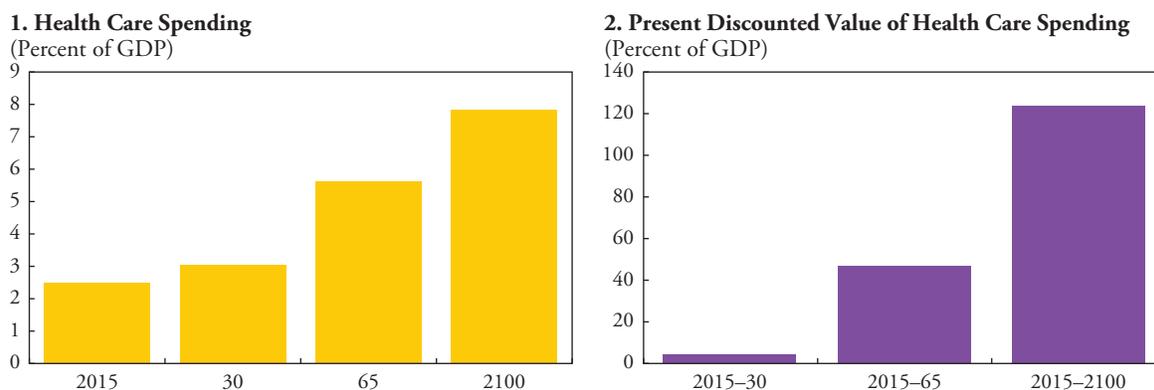
Contributor	Sickness and Maternity	General Accidents	Total
Employee	2	1	3
Employer	4	3	7
Government	2	1.5	3.5
Total	8	5.5	13.5

Source: IGSS, Actuarial and Statistics Department.

Health Care System

The IGSS provides health care benefits through the Program Sickness, Maternity, and Accident (EMA) program. The Accident Program was created in 1948 to cover the risk of accidents at work and extended in 1949 to the protection of common accidents. Coverage started in the Municipality of Guatemala and was gradually extended to other municipalities and departments to cover the whole country in 1978. The Maternal Child Program began in 1953 also in the Municipality of Guatemala, while coverage for the risk of disease was implemented in 1968, when both risks were merged for funding purposes into the Program for Disease and Maternity. The extension of coverage to the rest of the country was gradually carried out according to the IGSS’s ability to meet demand, to cover the entire Republic of Guatemala in 2010.

The EMA program is a PAYG scheme funded by contributions, including from the government, and returns from reserves. Financing for medical care provided to IGSS pensioners comes from an integrated system of contributions of the EMA program (Table 39) and returns from a specific reserve created for this purpose (PRECAPI). As of February 2016, the EMA program

Figure 59. Guatemala: Health Care Spending Projections

Sources: IMF staff projections.

(including PRECAPI) had a reserve stock of 1.7 percent of GDP. Medical care provided to pensioners of the public sector should be financed by the government but revenue shortfalls have resulted in partial payments over the last years.

Total health care spending amounted to 2 ½ percent of GDP in 2015 and is projected to increase to 8 percent of GDP in 2100. Under a baseline scenario with no reforms to the current system, the present discounted value of health care spending between 2015 and 2100 will total about 120 percent of GDP (Figure 59).

Honduras

Demographics

Honduras has a relatively young population but falling fertility rates and higher life expectancies will result in a significantly older population by 2100. Honduras is one of the youngest countries in Latin America, with about two-thirds of the population being under 30 years of age. However, this advantage will dissipate substantially over the next few decades: the share of those ages 65 and older relative to the population ages 15–64 will increase from 8 percent in 2015 to 20 percent in 2050 and 56 percent in 2100. The fertility rate is projected to drop from its current 2.5 to 1.8, while emigration is expected to decelerate sharply over the medium term. Life expectancy is projected to increase by about 13 years by 2100, to 86 years.

Pension System

History

Honduras introduced social protection schemes for the elderly relatively late compared with other Latin American countries, and to date they continue to operate on a PAYG basis. Five pension-related institutions were created in the second half of the 20th century. The first, and the most important, institution is Instituto Hondureño de Seguro Social (IHSS), which has been operating since 1959 and covers private sector workers. The national institute for providing pension benefits to civil servants (INJUPEMP) was created in 1971, followed by the national institute for teachers' pensions (INPREMA) and the Institute for Military Pensions (IMP), both in 1980, and by the Institute of the Employees of the National Autonomous University of Honduras (INPREUNAH) in 1989. The last two schemes are relatively small. A private savings fund also exists (*Régimen de Aportaciones Privadas*—RAP) that is funded by a 3 percent contribution on total wages. As part of the social safety net, Honduras has a limited noncontributory scheme called “*Bono Vejez*”. In 2015, a social protection framework law introduced several reforms to the pension system, including channeling the RAP's 3 percent contribution to the IHSS. The law also outlines structural changes to the pension scheme that would be spelled out in a new IHSS law and the private pension funds' law. Also, since 2004, several reforms have been made to the special regimes for public sector employees, generally aimed at raising their contribution rates and retirement ages to improve financial sustainability. For example, gradual increases in the contribution rate for the INJUPEMP and the INPREMA are currently being implemented and will continue over the next few years.

Current System

The pension system is a highly fragmented defined-benefit PAYG scheme that runs surpluses but provides very low coverage to private sector workers (Table 40). About one-half of current retirees worked in the private sector, but their pension bill is a much smaller proportion of the country total (about a quarter) reflecting higher (reported) incomes in the public sector than in the private sector. The private sector has very low coverage ratios due to high informality: 12 percent for men and 18 percent for women. For public sector schemes coverage rates are substantially higher. The three main PAYG systems (IHSS, INJUPEMP, and INPREMA) currently run surpluses on a flow basis. However, in the IHSS this does not fully reflect the financial situation of the institute due to a sizeable stock of net outstanding liabilities instead of reserves that are typically associated with surpluses. Supplementary

Table 40. Honduras: Pension System Structure

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administration
0 pillar	Envisioned in the 2015 framework social protection law but not introduced yet, with specifics yet-to-be defined.				
1st pillar (defined benefit, PAYG) – highly fragmented and different between the private sector (IHSS) and various public sector sub-segments	Contributions of 6.5% of wages in the private sector (since 2016), 19% for civil servants, 20% for teachers. The contributions are subject to a maximum wage ceiling that is indexed to inflation.	<u>Old age:</u> private sector: 65m/60f years of age and 15 years of contributions. Civil servants: 65m/55f and 20 years of contributions. 55m for “high-risk” occupations. Teachers: 25 years of contributions and case-by-case retirement age. <u>Disability pensions:</u> IHSS assessed loss of at least 65% in earning capacity, with additional requirements of 15 years of contributions and 10-year residency. <u>Survivor pensions:</u> Widow(er), children of up to 18, or dependents parents or siblings meeting requirements of 15 years of contributions and 10-year residency.	<u>Old age:</u> private sector: base of calculation: average salary for last 180 months. Minimum legal replacement rate of 50% and maximum 80%. If qualifying conditions are not met contributions are returned as a lump sum payment. Civil servants: minimum 60 percent of last year’s salary. Maximum 80 percent, or 90 percent if retirement is postponed. Teachers: minimum 60 percent of base salary and maximum 3 times base salary <u>Disability:</u> 40-80 percent of salary in the private sector and 70 percent <u>Survivor:</u> 20 to 90 percent of old-age or disability pension of the deceased, depending on relation and age of the beneficiary.	<u>Private sector:</u> Coverage is low at 12-18 percent of economically active population. <u>Public sector:</u> coverage is high with respect to public sector workers.	IHSS for private sector coverage and INJUPEMP, INPREMA, IMP, and INPREUNAH for the special regions. The government is a guarantor of the pension benefits as defined in the laws should any of the schemes run out of funds.
2 and 3 pillars (defined contribution, individually funded)	Envisioned in the 2015 framework social protection law but not introduced yet, with specifics yet-to-be defined. There would be both mandatory (2 nd pillar) and voluntary (3 rd pillar) parts of the scheme.				

schemes are currently being designed for basic noncontributory and supplementary contributory benefits (both mandatory and voluntary).

Projections

Under current policies, fiscal surpluses are expected to turn into relatively moderate deficits over the long term, but coverage would remain low. The projections were made for the three main schemes (IHSS, INJUPEMP, and INPREMA) separately, given the different dynamics driving them, using an actuarial report of the ILO (2014) for projecting public schemes. Pension expenditures would modestly increase from 1.4 percent of GDP in 2015 to 1.7 percent in 2030, with further gradual increases to 2 percent of

Table 41. Honduras: Pension System Projections¹
(Percent of GDP, unless otherwise indicated)

	2015	2030	2065	2100
Public pension spending	1.4	1.7	2.0	2.4
Public pension revenues	2.4	2.4	1.0	0.7
Public pension deficit	21.0	20.6	1.1	1.7
PDV of increases in pension spending relative to 2015 ²	—	3.1	13.9	28.2
Coverage				
Percent of eligible individuals paying contributions in the private sector	15			

Sources: Honduran authorities; and IMF staff calculations

¹Based on assessment of the main private sector scheme, civil servants, and teachers. Excludes pension schemes of the military and the national autonomous university.

²The assumed discount rate is 1 percentage point higher than potential growth.

GDP in 2065 and 2.4 percent of GDP in 2100, as the increase in the old age dependency ratio would be mitigated by the impact of recent reforms, expected limits to growth in the schemes for public employees, declines in replacements rates for some categories of pensioners, and assumed continued limited coverage (Table 41). The financial position of the key pension funds is expected to shift from deficit to surplus around 2040 and reserves would run out between 2050 and 2060, when the system would start to have cash deficits. The deficits would be relatively modest—below 2 percent of GDP by 2100. However, the sustainability of the low coverage is a major concern and it could present upside risks to the spending and deficit projections.

Reform Options

Although the financial deterioration of the pension system under current policies would be relatively limited, reforms are needed to avoid financing pressures, and to address key risks stemming from the low coverage and declining replacement rates and their fiscal implications. Thus, additional increases in contribution rates may be needed to improve the financial position and pension adequacy in the private sector, and therefore, improve sustainability. For example, increasing the contribution rate by 4 percentage points to 10.5 percent in the private sector would help to avoid any increase in the pension-related deficit between 2015 and 2030. Steps to increase the very low coverage in the private sector (via improving formalization of labor markets) are essential. In the public workers’ pension schemes, there is scope for reducing spending by making adjustments to benefit calculation formulas, as well as by gradually increasing the retirement age.

Health Care System

The Honduran health care system is mostly publicly funded and highly fragmented. The system consists of three key elements: (1) the Ministry of Health (Secretaria de Salud), which is both the regulator and a key provider of services, (2) the social security institute (IHSS), and (3) the private sector.

Table 42. Honduras: Projections of Health Care Spending (Percent of GDP)

	2015	2030	2065	2100
Total health expenditures	4.5	5.9	12.0	16.1
PDV of spending increases relative to 2015	—	9.1	110.8	289.3

Overall, coverage (as of 2004) was above 80 percent—with the Ministry of Health accounting for almost three-quarters of the coverage while the private sector served only about 5 percent of the population. The Ministry of Health has the largest installed capacity and aims to cover all citizens who require health services, although this objective is difficult to achieve in practice, especially in remote rural areas. It is financed by taxes, external loans, and grants. There is no definition of a package of minimum health care services. Given the fragmentation of the system, it would benefit from greater coordination and unification of requirements. In this context, an ongoing reform aims to achieve universal coverage of health services, whereby the Ministry of Health would strengthen its regulatory function and the IHSS would serve as an insurance company intermediating consumers and health services providers (both public and private).

Honduran health care spending amounted to 4½ percent of GDP in 2015 and is projected to increase to about 16 percent of GDP in 2100 (see Table 42).

Mexico

Demographics

Mexico's population has aged significantly since 1990 and this process is expected to continue rapidly. Since 1990 the median age has risen from about 20 to 28 years (as of 2015) and is expected to reach 42 and 51 years by 2050 and 2100, respectively. Correspondingly, some 7 percent of the total population is over age 64, compared with about 4 percent in 1990. This population cohort is expected to exceed 18 percent of the total population by 2050, and reach 34 percent of the total population by 2100.³⁶ These changes present a significant demographic challenge for Mexico and have important implications for the pension and health care systems.

Pension System

Mexico traditionally used unfunded defined-benefit pensions. Private workers obtained these pensions from the Mexican Institute of Social Security

³⁶Based on UN data, medium variant.

(*Instituto Mexicano del Seguro Social*, IMSS) and most public workers from the Social Security Institute for Public-Sector Workers (*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado*, ISSSTE). Separate pension schemes exist for some employees, such as those employed by state-owned enterprises, the states, universities, and armed forces.

Most of the defined-benefit systems have been replaced by defined-contributions systems with individual accounts,³⁷ which are run by private pension fund administrators (*Administradoras de Fondos para el Retiro—Afores*). Individuals who were already participants before the reform were, however, grandfathered in. In case of IMSS contributors, they also contribute to the new individual accounts, but they retain the option of giving up the accumulated funds in return for a—typically much more generous—defined-benefit pension under the old rules when they retire. In the case of the ISSSTE, contributors could opt immediately to stay in the old system, but they were then subject to higher contributions and a higher minimum retirement age. Hence, in both cases, these grandfathered individuals did not only retain the entitlements already accumulated at the time of the reform, but were even allowed to continue accumulating entitlements thereafter (although in the case of the ISSSTE under less favorable rules). For IMSS contributors, the switch to defined-contribution plans occurred in mid-July 1997, and for ISSSTE contributors it occurred in 2007. Some of the smaller defined-benefit schemes have also transitioned to defined contributions, but some still apply today (Table 43).³⁸

Mexico also has housing funds, which primarily aim to support home ownership, but the funds also have links to the pension system (Infonavit for private, Fovissste for public employees). These institutions are funded by a payroll contribution of 5 percent. Paid-in contribution can be used as a down payment for the purchase of a home, in combination with a loan from these institutions. If not used, or not fully used, then the remaining stock at the end of the working life is added to the other pension savings.

Because of the reforms toward defined-contribution systems with extensive grandfathering, there are extreme inequities in the system, that may not be politically sustainable. Specifically, replacement rates are 80–100 percent for those grandfathered under the defined-benefit system, but expected to be

³⁷In 1992, a mandatory retirement savings system (Sistema de Ahorro para el Retiro) with individual retirement savings account was introduced, but this was small and came in addition to the usual pension system.

³⁸For example, in early 2016, the state-owned oil company, Petróleos Mexicanos (PEMEX), reached an agreement with its workers' union, whereby the retirement age for workers with less than 15 years of service was increased to 60 years from the current 55 years. Furthermore, new employees will have individual pension accounts under a defined-contribution scheme instead of the current defined-benefit scheme. Similar to IMSS and ISSSTE reforms, existing PEMEX employees have the option to either join the defined-contribution scheme or continue with the defined-benefit scheme.

Table 43. Mexico: Pension System Structure

	Sources of funds	Qualifying conditions	Benefits	Coverage	Administrative
0 pillar (Pensión para Adultos Mayores)	Federal budget	People aged 65 years and over, who do not receive other old-age or disability benefits exceeding a specified threshold.	Bimonthly cash transfer	More than 60 percent of the population over 65 (end-2014)	Ministry of Social Development (Secretaría de Desarrollo Social)
1 pillar (DB PAYG scheme; applicable only to grandfathered individuals).	Contribution of 6.5 percent for private workers, 13.9 for public workers, divided between workers, employers, and federal government transfers (for private-sector workers).	Workers aged 65 years and over (early retirement is possible from age 60, but a 5 percentage point penalty applies for each year before 65 years); for ISSSTE-affiliated workers early retirement is possible depending on years of contributions.	Annual pension, survivors benefits (90 percent of deceased's pension), minimum lifetime annuity, housing benefit	Formal sector employees who first contributed before mid-1997 in the private sector, 2007 in the public sector.	IMSS (private employees), ISSSTE (most public employees)
2 pillar (DC scheme)	Total contribution of 6.5 percent (private-sector) and 11.3 percent (public-sector) divided between employees, employers, and, for the private sector, the federal government. Additional tax-funded contributions for low-wage earners.	Workers aged 65 years and over (with some conditionality on the total years of contributions, which differ for IMSS- and ISSSTE-affiliated workers; early retirement possible from 60 years as in DB PAYG system)	Annual pension, survivors benefits, minimum lifetime annuity, housing benefit	Formal sector employees.	Retirement fund administrators (Administradoras de Fondos para el Retiro)
3 pillar (voluntary scheme)	Voluntary contributions. In the case of ISSSTE: for up to 2 percent of earnings on up to 10 times the minimum wage, contributions are matched 325 percent.	Voluntary.	Similar to 2 pillar.	Formal sector employees (public sector for matching)	Similar to 2 pillar.

about 30 percent for those entitled to a defined-contribution pension (mitigated by the housing fund).

The new defined-contribution system is mostly self-funded, except that there is a minimum pension for contributors fulfilling certain requirements about minimum years of contributions. Most of the public funding pressure is, however, due to the individuals grandfathered under the old defined-benefit pensions, as well as the remaining defined benefit pensions for some worker categories, especially at the state level. The calculations and estimates presented here take into account only the federal pensions (IMSS, ISSSTE, and the social pension (Table 44).

Mexico has a large informal sector. About 27 percent of the employed Mexican people work in a narrowly defined informal sector. Informal employment, including in other sectors, is even higher at 57 percent of employees. Since 2013 employment growth in the formal sector has consistently exceeded total employment growth, slowly raising the share of formal employees.

Table 44. Mexico: Projections of Pension Imbalances¹
(Percent of GDP)

	2015	2030	2065	2100
Total pension expenditures	1.7	2.3	1.8	0.6
IMSS (private sector employees)	0.9	1.3	0.8	0.1
ISSTE (public sector employees)	0.6	0.7	0.7	0.5
Social pension	0.2	0.3	0.2	0.1
Pension revenues	0.2	0.3	0.0	0.0
Pension deficit	1.5	2.0	1.8	0.6
NPV of pension deficits/2015 GDP	1.5	25.1	97.0	129.0
NPV of deficit increases relatively to 2015/2015 GDP	—	10.1	73.5	103.9

¹Excludes special regimes, such as for the armed forces, state-owned enterprises, state-level public institutions.

Reform Options

Reforms should address the very low replacement rates under the defined-contribution pensions, estimated by staff at below 20 percent, and the extreme inequities between participants who first contributed before or after the cutoff dates. According to staff estimates, boosting replacement rates to about 50 percent, could be achieved by raising the retirement age to 67 years and contribution rates to 17 percent. Such large increase in contribution rates would have to be managed carefully to avoid discouraging formal employment. Part of the increase could be achieved by shifting the contributions to the housing fund into the pension funds. Moreover, to reduce the inequities, parametric changes to the defined-benefit system could be undertaken, or it could be closed for all future accumulation of rights, honoring only entitlements already earned and leaving affected individuals with a mixture of a defined-benefit and defined-contribution pension. This would have the advantage of pension levels falling slowly with the number of years worked after the reform.

Recent Analyses

A wide body of recent analyses, by both official bodies and independent researchers show results in line with the analysis presented here. The OECD (2016) prepared a comprehensive analysis of the pension system, comparing it to best practice. The paper reports estimated replacement rates and pension deficits, and makes recommendations on aspects ranging from the contribution to the accumulation and pay-out phases of the system, for both the defined-contribution and the legacy defined-benefit system. Another comprehensive analysis was prepared by the regulator of the pension system (CONSAR 2015). This also discusses a range of challenges faced by the system and presents suggestions for strengthening it, with illustrative calculations of the financial implications of various changes to system parameters (including contributions rates and the minimum retirement age). Alonso and others (2015) developed a model of the Mexican pension system to simu-

Table 45. Mexico: Projections of Health Spending
(Percent of GDP)

	2015	2030	2065	2100
Total health expenditures	3.3	4.4	8.7	11.3
NPV of spending increases relatively to 2015/2015 GDP	—	7.2	84.2	208.4

late coverage and expected replacement rates through 2050. Like the other studies, they find very low replacement rates. They consider various reforms, including higher contributions, later retirement, and higher noncontributory pensions, and show the expected benefits with their model. Moreover, Mexico is covered in various multi-country studies, such as SURA Asset Management (2015).

Health Care System

Mexico's health system is fragmented, with both coverage and provision of services provided by different institutions, depending on the status of participants. Formal sector employees are covered by the social insurance system. As in the case of pensions, the IMSS covers private employees and the ISSSTE most government employees. Informal sector employees can become members of a basic insurance plan (Seguro Popular), with contributions dependent on income, and free participation for the poorest households. Some further public institutions exist, notably those by the states and some state-owned enterprises such as PEMEX. Last, private provision and insurance play a major role, especially as the coverage and sometimes quality of public provision are not always adequate. Based on demographic developments and rising expectations about the quality of health care, spending is projected to rise significantly in the coming decades (Table 45).

Nicaragua

Demographics

Demographic characteristics in Nicaragua have changed significantly in recent years, with declining fertility rates and increasing life expectancy. Nicaragua's demographics are expected to evolve broadly in line with the Latin American average. According to the United Nations, currently only 5 percent of the population is over age 64, but this is expected to increase to about 18 percent by 2050 and 34 percent by 2100.

Pension System

History

The Nicaraguan Social Security Institute (INSS) was established in 1956 and serves both government and private sector employees. Apart from the old age, disability, and survivor (IVM) program, the social security system also provides health insurance, insurance for workplace-related disability, and disability and survivor benefits for victims of the civil war. There are also two other social security systems, one for the military and the other for police, firefighters, and prison employees.³⁹ In the early 2000s, there was an attempt to change the system to one based on defined contributions. Despite being passed into law, the initiative failed during implementation because the fiscal costs of the transition were deemed unmanageable. A parametric reform was finally passed in 2013 and implemented in 2014. The reform was mainly focused on increasing contributions through a phased-in, 3 percentage point increase in employer contributions and an increase in the amount of earnings subject to contribution. However, the reform also attempted to slow the growth of benefits by linking them to the increase in the average, rather than the minimum, wage.

Current Characteristics

Coverage is relatively low but is on an increasing trend. Active coverage has increased from 19 percent of the labor force in 2006 to 28 percent in 2015. At the same time, about 35 percent of the population over age 60 receives an INSS-IVM pension. By various definitions, most businesses and workers in Nicaragua are informal, which presents a significant barrier to further expanding coverage. Theoretical net replacement rates are relatively high—at an estimated 94 percent for those earning an average wage or less, and 77–78 percent for those earning more than an average wage (OECD, the World Bank, and IDB 2015)—based on 40 years of contributions.⁴⁰ By contrast, the average pension as a percent of the average formal sector wage was 60 percent in 2015. The difference between these two measures of pension benefits is partly because many workers do not contribute to the INSS on a sustained basis throughout their career. As an illustration, 30 percent of INSS pensioners currently receive a partial pension (*pension reducida*), which was introduced in 2013 to benefit those with between 250 and 750 weeks of contributions. There is no noncontributory system or other safety net for the

³⁹There is no publicly available information on these two pension systems, so they are excluded from this analysis.

⁴⁰These estimates are based on pre-2014 reform policies. The adjustments made in the 2014 reform to the benefit formula were only for those retiring with an income greater than two minimum wages and are not expected to change these estimates significantly.

Table 46. Nicaragua: Pension System Structure

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administrative
0 pillar	There is no basic old age pension for the elderly.				
1 pillar (defined benefit, PAYG)	The largest share comes from mandatory contributions from employers (10 percent in 2017) and employees (4 percent). Maximum pensionable income set at C\$72,410 monthly; increases annually with average wage. Other sources of income include budgetary transfers (US\$10m annually) and investment income (but reserve fund is small relative to the size of pension obligations).	60 years of age; 55 years for teachers and miners. At least 750 weeks (equivalent to 15 years) of contributions required for an ordinary pension. As of 2013, those with contributions between 250–750 weeks receive a partial pension (“pension reducida”).	Benefits are determined by a formula based on the average salary and number of weeks of contributions. Pensioners receive a 13 th payment in December. The amount of the partial pension depends only on the number of weeks of contributions, and is set in law, with no automatic adjustment.	As of end-2015, about 17 percent of the population over 60 received an ordinary INSS old age pension. An additional 8 percent of the population over 60 received a partial pension.	Funds are administered by the social security institute (INSS), which is part of the general government.

elderly. As with most other Latin American pension systems, INSS coverage increases with income (Rofman and Oliveri 2012, Table 46).

The fiscal sustainability of the social security system is becoming an increasing concern. The INSS has run an overall deficit since 2013, despite the higher contribution rate resulting from the recent parametric reforms. This deficit partly due to additional obligations, including the partial pension, and the growth of health care expenditures and administrative expenditures. The INSS also has a growing portfolio of social investments, including investments in social housing, which has reduced investment fund returns.

Projections indicate that Nicaragua’s IVM pension system will run large deficits over the longer term as demographic pressures increase. Projections were undertaken for the component of the social security system most affected by aging, namely IVM. Expenditure and revenue for the IVM were projected using the model described in Chapter 2, assuming that key parameters such as the ratio between the average pension and average wage and the percentage of the working population contributing to the INSS remain unchanged (Table 47).

Reform Options

The magnitude of the reforms required to ensure sustainability over the next 15 years appears manageable. Table 48 shows the results of an exercise

Table 47. Nicaragua: Projections of Pension Imbalances (IVM System)
(Percent of GDP)

	2015	2030	2065	2100
Total pension expenditures	2.7	3.8	9.7	13.0
Noncontributory benefits	0	0	0	0
Contributory benefits	2.7	3.8	9.7	13.0
Pension contributions	2.8	2.8	2.8	2.8
Pension surplus/deficit	0.1	21.1	27.0	210.2
PDV of increase in pension spending	..	7	104	266

Source: IMF staff estimates.

Table 48. Nicaragua: Estimated Impact of Reforms

Objective	Zero Deficit by 2030	Keep Fiscal Gap under 3 Percent of GDP through 2065
Raise retirement age for men and women	Raise retirement age to 62 in 2020 and 65 in 2025.	Raise the retirement age incrementally starting in 2045 to 70 by 2065.
Reduce benefits	Reduce average pension by 25 percent in 2020 (relative to 2015 levels) and by an additional 5 percent in 2030.	Reduce benefits by 10 percentage points every 5 years starting in 2045.
Increase contribution rate	The contribution rate would need to increase from the current 14 percent to 18 percent by 2030.	Increase the contribution rate to 15 percent by 2045, 20 percent by 2050, 24 percent by 2055, 28 percent by 2060 and 32 percent by 2065.
Reduce the number of beneficiaries (for example, by increasing the minimum contribution period)	Reduce the number of beneficiaries by 30 percent, starting in 2020.	Reduce the number of beneficiaries by 10 percent relative to the baseline by 2045, gradually increasing the reduction to 40 percent by 2065.
Combination	Eliminate the partial pension by 2020 and raise the retirement age to 65 by 2030.	Eliminate the partial pension by 2045. Gradually increase the retirement age to 67.

on reform options using the model described in Chapter 2.⁴¹ Given recent gains in life expectancy, a gradual increase in the retirement age from 60 to 65 by 2025 would be appropriate and could significantly reduce the pension system’s deficit. An elimination of the partial pension, possibly by replacing it with a noncontributory pension financed through the budget, plus a gradual increase in the retirement age to 65, offers another pathway to sustainability. Given the relative generosity of the system, a reduction in benefits could also be considered; however, this could also have a negative impact on current and future contributions if it dissuades workers from contributing. A similar disincentive effect would exist with higher contribution rates, particularly since Nicaragua’s contribution rates are already the highest in Central America. Beyond 2030, as the population begins to age more rapidly, the magnitude of reforms required becomes much larger.

Health Care System

The public health system consists of services provided by the Ministry of Health (MINSa) and the social security institute. Health expenditure is US\$177 per capita with households paying on average 38 percent of expenses

⁴¹The reform options in Table 48 should not be taken as policy recommendations, given the complexity of the pension system and the presence of many unique characteristics that cannot ⁴² captured by the model. They are intended merely to give an idea of the potential magnitude of the reforms required.

Table 49. Nicaragua: Projections of Health Expenditure
(Percent of GDP)

	2015	2030	2065	2100
Health spending (percent of GDP)	4.7	6.3	13.2	17.5
PDV of future health spending	..	81	318	601
PDV of increase in health spending	..	11	129	328

Source: IMF staff estimates.

out of pocket. Approximately 5 percent of health care spending is financed from abroad (WHO 2015).

The majority of the population accesses services provided by MINSA. According to the INSS, 30 percent of the population was covered by social health insurance in 2015; however, this also includes those dependent (female) spouses whose benefits are limited to maternity coverage (INSS 2016). INSS insurance also covers children ages 12 and younger. Spending by the general government on health was about 25 percent of total government expenditure and 5 percent of GDP in 2014 (WHO 2015). Of this, 1.8 percent of GDP was expenditure by the INSS (INSS 2016).

The services provided by the INSS are of generally higher quality than what can be obtained through MINSA. The INSS does not have its own health care facilities but contracts with private providers and MINSA on a fee-for-service basis. The INSS also covers the cost of purchasing medicine from pharmacies. The cost per patient in the INSS system has increased at an average rate of 13 percent per year since 2007, partly owing to the growth of special programs such as dialysis and oncology and to the commitment to cover all prescribed drugs, no matter the cost (INSS 2016).

The growth trajectory of public health expenditure is predicted to be even steeper than that of pensions. The model predicts an increase in public health expenditure from 4.7 percent of GDP in 2015 to 6.3 percent of GDP in 2030, with it reaching 17.5 percent of GDP by 2100 (Table 49).

Panama

Demographics

Panama currently has a higher life expectancy, a lower birth rate, and a lower child mortality rate than the Latin American average. About 8 percent of the population was over 64 in 2015; this is expected to increase to about 18 percent in 2050 and 29 percent in 2100. These figures already take into account a positive future net immigration, which could help to mitigate some of the impact of population aging.

Pension System

History

Panama's social security was established in 1941 as a defined benefit, contributory system, and then it was reformed in 2005 with the introduction of a mixed system. By the 1990s, it had become clear that the pension system was unsustainable; however, it took over a decade of discussion before a reform strategy was agreed upon, during which time the Caja de Seguro Social (CSS) ran down its reserves significantly (Rodriguez Mojica 2013).⁴³ A law was passed in 2005 that tightened qualifying conditions, and introduced a parallel mixed system with both a defined benefit and a defined contribution component (DBM/DCM). The parameters of the pre-reform social security scheme (SEBD) were left unchanged, while new entrants were channeled to the new system. Workers under age 35 at the time of the introduction of the new system could choose whether to remain in the SEBD or join the new system. A noncontributory system was introduced in 2009.

Current Characteristics

While the 2005 reform is expected to improve fiscal prospects, it is also likely to reduce replacement rates markedly. About 34 percent of the population 65 years and older receives a pension from the social security system, and 30 percent receives a means-tested social pension financed by government revenue (Table 50). Participation in the contributory system is at about 53 percent of the population ages 20–60 and is increasing gradually, which should eventually lead to high coverage among the elderly. SEBD pensions are financed by both contributions and budget transfers. The government has also created a trust fund to finance SEBD deficits, and has committed to transfer US\$140 million annually to the fund. The replacement rate for the SEBD system is currently about 64 percent of the economy-wide average wage. The new system has a defined-benefit component that is financed solely by current contributions, while the defined-contribution component is fully funded. The new system has not begun to pay out pensions yet, but it is anticipated that replacement rates will be about half those enjoyed by SEBD pension recipients in 2030 and may decline gradually after that, if no further reform measures are taken. Currently, the SEBD system is running a deficit while the mixed system is accumulating substantial reserves.

⁴³CSS reserves were 15 percent of GDP in 2001 compared with 4.9 percent of GDP in 2015.

Table 50. Panama: Pension System Structure

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administrative
0 pillar	Budget ("120 a 65" program)	651 without any other pension income.	\$120 per month, not indexed regularly (e.g. to inflation).	30 percent of people over 65	Central government
1 pillar (SEBD; DBM)	Contributions (13.5 percent, of which 9.25 percent is from the employer); legally set budget subsidies; returns on reserves; for SEBD, a solidarity contribution paid by members of the post-2005 mixed system; drawing down accumulated reserves.	Retirement age is 62 years for men and 57 years for women; two years of early retirement permitted. 20 years of contributions; partial pensions with 15 years. SEBD is for workers older than 35 in 2008.	Benefits a proportion of last 10 years of average nominal wage (both SEBD and DBM). For SEBD, accrual rate of around 72½ percent after 30 years of service. Min benefit of \$235; two maxima: \$1500 and \$2500. Increases are ad hoc. For DBM, benefit calculation ceiling of \$500 per month. Replacement rates for DBM not available as it hasn't started paying out. Will be much lower than for SEBD.	SEBD is closed to new labor market entrants and is expected to be extinguished by 2055–60. Coverage of entire CSS has been increasing gradually, and currently stands at 53 percent of the 20–60 age group. Of this, about 32 percent of workers participate in the mixed system.	Caja de Seguro Social (CSS). The government bears no direct financial responsibility for the solvency or liquidity of CSS.
2 pillar (DCM)	Contributions from workers (mandatory)	Workers earning more than \$500 per month.	Pension equal to an annuity stream from accumulated assets.	See above	CSS

Projections

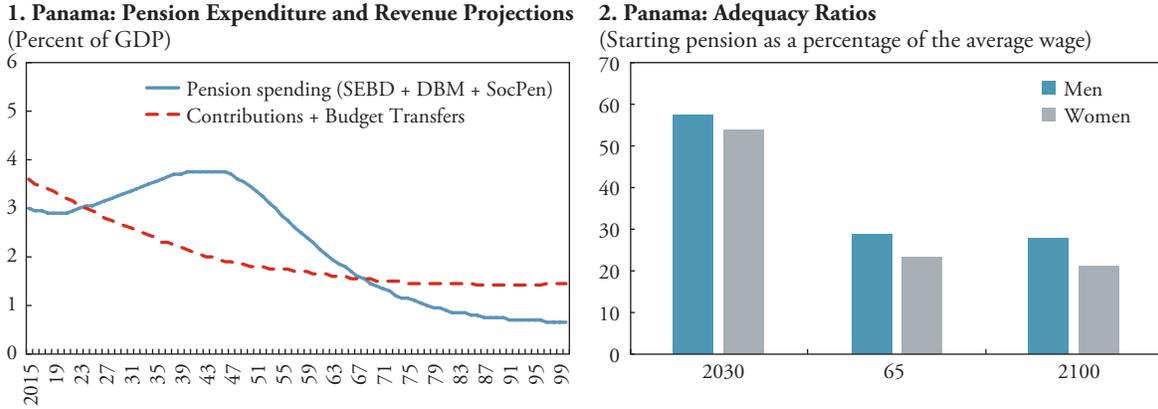
The SEBD system is already running deficits. The new DBM/DCM system currently has very few beneficiaries, given its relative youth, so it is expected to run surpluses until about 2050. However, the surpluses of the new system will be insufficient to cover the deficits of the old system, as an increasing proportion of pension contributions will be channeled into the defined-contributions component. The projections illustrate the transition costs faced by the system, which are likely to force a drawdown of reserves to fund pension expenditure in the near future (Table 51, Figure 60).⁴⁴

A number of issues need to be addressed to ensure the sustainability and enhance the fairness of the system. Replacement rates in the SEBD system are generous, in contrast to the mixed system, where replacement rates are significantly lower. Also important is the 500 balboa (US\$500) limit on the DBM contribution base, which gradually increases the relative size of the defined contribution component, and therewith transition costs.

Pensions are also not indexed but are increased on an ad-hoc basis, which creates uncertainty and perceptions of unfairness. Last, the investment of reserves is conservative, limited to domestic fixed income securities and cash. In practice, this means that approximately 90 percent of assets are held in government bonds, generating low levels of returns.

⁴⁴Note that the drawdown of reserves is included in revenue projections. Reserves currently stand at 4.9 percent of GDP

Figure 60. Panama: Estimated Pension Spending, Revenue and Adequacy Ratios 2015–2016¹



¹Adequacy ratios refer to the initial starting pension as a percentage of the average wage. They reflect a contribution density of 75 percent (see the Technical Annex for further details).

Table 51. Panama: Pension System Projections
(Percent of GDP)

	2015	2030	2065	2100
Total public pension expenditure	3.0	3.3	2.2	1.3
Expenditure - SEBD	2.6	2.6	0.9	0.0
Expenditure - DBM	0.2	0.4	0.9	1.0
Social pensions	0.3	0.3	0.3	0.3
Total revenues	3.6	2.7	1.3	1.1
Contributions - SEBD	2.2	1.1	0.0	0.0
Contributions - DBM	0.5	0.6	0.2	0.0
Budget subsidies - SEBD	0.6	0.8	0.8	0.6
Budget subsidies - DBM	0.0	0.0	0.1	0.1
Taxes for social pensions	0.3	0.3	0.3	0.3
Pension balance	0.6	20.6	20.8	20.2
PDV of future pension spending increases ¹	..	0.6	9.5	217.5

¹Relative to 2015

Reform Options

Increasing the retirement age for men and women to 65 would ensure that the system remains solvent until the early 2030s. In addition, indexing the DBM contribution ceiling to wages, and pension benefits to prices would help to reduce transition costs and ensure greater predictability. However, reforms to secure solvency will not necessarily raise replacement rates to adequate levels. For example, under an indicative scenario where the retirement age is gradually increased to 67 and contribution rates are raised to 17 percent, the adequacy ratio for the outer years is higher than under the baseline

Table 52. Panama: Projections of Public Health Care Spending
(Percent of GDP)

	2015	2030	2065	2100
Total public expenditure on health	5.5	7.2	12.8	16.4
PDV of health spending increases ¹	..	92.9	342.9	609.1

¹Relative to 2015

but remains below 50 percent.⁴⁵ This suggests a need for a revision of the investment policies of the defined contribution component. Consideration should also be given to revising CSS investment policies to allow for more diversification, which should permit higher average returns.

Health Care System

The majority of the population is covered by the social security system. About 76 percent of the population is covered by the CSS, with the remainder utilizing either the private health care system (10 percent) or services provided by the Ministry of Health (PAHO 2012). Health care spending per capita was US\$959 in 2014, with 22 percent of this covered by household out-of-pocket spending. Health expenditures accounts for 15 percent of spending by the general government, and 5.5 percent of GDP, which is on the high side relative to comparator countries (WHO 2015; Table 52). However, the concentration of health care facilities in urban areas means that there are significant disparities in access to health care between rural and urban communities.

Paraguay

Demographics

Paraguay's demographics are more favorable than in many other Latin American countries. The old-age support ratio of 10.6 working-age people (15–64) per elderly person (65+) is above the Latin American average of 8.9, and the fertility rate of 2.5 births per woman is higher than in many other countries. Nonetheless, the old-age support ratio is projected to drop from 10.6 in 2015 to 5.2 in 2050 and 2.2 in 2100, as the share of elderly people will increase six-fold from 5 percent to just under 30 percent of the total population. Although the old-age support ratio will still be above the Latin American average by the end of the century, there will be four times as many elderly Paraguayans per working-age person than there are today. This will likely strain the social security system if the current parameters remain in place.

⁴⁵Note that both the DBM and the DCM components are included in Panama's case. This scenario is an indicative one for policy analysis purposes and should not be taken as a policy recommendation.

Pension System

History

Paraguay's social security system dates to the establishment of the Social Insurance Institute (Instituto de Prevision Social—IPS) in 1943, which still administers the main contributory pension system, a defined-contribution PAYG system. Over the 35 years of military dictatorship (1954–89), however, the social insurance system was largely disregarded (Lavigne, 2012). After the new Constitution of 1992, several legal changes enshrined the mandatory nature of the social security system and extended it to larger shares of the population (most recently to self-employed persons and household workers). In 2010, the contributory pension system was supplemented by a noncontributory food-support pension for elderly individuals who are not covered by the contributory system (Pensión Alimentaria).

Administration

Paraguay's pension system is a defined-benefit PAYG pension system that is integrated into a wider social protection system that also provides health-related insurance. Although the system is fragmented, the IPS and the Ministry of Finance (Caja Fiscal de Jubilaciones y Pensiones or Caja Fiscal) together cover more than 90 percent of all contributors to the social protection system. The IPS, which covers private sector employees, by itself covers almost 85 percent of all contributors (according to its own data, see IPS 2015).⁴⁶The Caja Fiscal administers the system for public sector workers, and the six remaining funds exist for employees of certain organizations (Itaipú Binacional, the national electricity administration, and the parliament) and industries (bank, railroad, and municipal employees).⁴⁷

Coverage

Coverage of the social security system is relatively low. Although recent reforms have allowed self-employed persons, household workers, and homemakers to enroll in the system on a voluntary basis and have increased coverage of the IPS significantly, informal sector workers (who constitute 55–75 percent of the total employed population) remain outside the social security system (ILO 2014; IMF 2015). Due to the high prevalence of informal employment in Paraguay—more than half of the population works under informal conditions—it is estimated that only 17 percent of the

⁴⁷In addition to contributory pensions for public-sector workers, the Caja Fiscal also administers noncontributory pensions for war veterans and their survivors as well as ex-gratia pensions.

Table 53. Paraguay: Pension System Structure

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administrative
0 pillar (Social assistance)	Social assistance funded by the government	Pensión Alimentaria for resident citizens aged 651 who are assessed as being in need; Special pensions for war veterans / ex-gratia pensions	Not less than 25% of the legal minimum wage	Ca. 25% of the population aged 651 ^[1]	Directorate for Non-contributory Pensions; Caja Fiscal
1 pillar (Social insurance)	Social insurance system financed by contributions of employees (9% of gross earnings), employers (14% of the gross payroll), and the government (1.5% of gross earnings of employees), 54.3% of which (12.5%) goes to pensions	Regular pension: 601 years and 1,2501 weeks of contributions; Early pension: 551 years and 1,5001 weeks of contributions; Reduced pension: 651 years and 7501 weeks of contributions.	Regular pension: replacement rate of 100%; min: 33% of legal minimum monthly wage; max: 300 times minimum daily wage ^[2] ; Early pension: 80-96% (ages 55-59); Reduced pension: 60-100% (15-29 contribution years); Survivors benefits	Ca. 20% of the population aged 651	IPS; Caja Fiscal; 6 other pension funds

^[1]<http://www.pension-watch.net/country-fact-file/paraguay/>

^[2]Replacement rate based on average monthly earnings, which are calculated over the last 36 months before retirement. Pension benefits are only paid under the condition that all other income-generating activities cease. In addition to the monthly pension, an additional annual benefit equal to one month of pension is paid if the financial viability of the Fund allows this. Benefits are adjusted annually in line with changes in the Consumer Price Index, also subject to financial viability.

working-age population is covered by the regulated pension schemes (IPS 2015; Table 53).⁴⁸

Benefits

For those people who are covered by the social security system, the pensions are generous in international comparison. Regular pensioners are entitled to 100 percent of their average monthly earnings (calculated over the last three years before retirement) when they reach the legal retirement age of 60 and have made contributions for at least 25 years. Substitution rates are proportionally lower for earlier retirement or shorter contribution periods. Since substitution rates do not increase if beneficiaries contribute longer than the required amount of time (25 years for ages 60+, 30 years for ages 55+), there is little incentive to work beyond the legal pension age (Table 53).

Noncontributory Pensions

In addition to the defined-contribution pension system under the social security system, the noncontributory old-age food-support grant (Pensión Alimentaria) provides pensions of no less than 25 percent of the legal mini-

⁴⁸Although the relatively high social security contributions of 23 percent of the payroll (of which 9 percent is paid by the employee and 14 percent by the employer) may in itself contribute to the high levels of informality in the economy, empirical studies suggest that informality is well explained by factors related to Paraguay's relatively low level of economic development, notably the importance of agriculture, the prevalence of small and micro enterprises (ILO 2014), and the low levels of government effectiveness, regulatory quality, and corruption control (IMF 2015).

Table 54. Paraguay: Projections of Pension Imbalances
(Excluding special regimes, percent of GDP)

	2015	2030	2065	2100
Total pension expenditure	2.8	3.5	6.9	9.4
Contributory benefits	2.3	2.8	5.4	7.3
Noncontributory benefits	0.5	0.7	1.5	2.1
Pension contributions	3.1	3.1	3.1	3.1
Investment income	0.4	0.5	0.0	0.0
Earmarked taxes	0.4	0.4	0.4	0.4
Pension surplus/deficit	1.0	0.4	23.4	26.0
PDV of pension spending increases relative to 2015	—	5.9	58.1	153.8
NPV/2015 GDP	0.3	21.8	270	2244

Includes contributory pensions administered by the *Instituto de Protección Social* and *Caja Fiscal* as well as non-contributory pensions (*Pensiones Alimentarias*). Earmarked taxes denote the 1.5 percent contribution by the government on the gross payroll, which has not currently materialized.

mum wage to elderly people in poverty. To receive the grant, a person needs to be at least 65 years old and assessed as needy, and may not receive any other incomes or pensions. Currently, about 140,000 people (about 45 percent of the elderly population that is not covered by the contributory pension system) receive the grant, up from only 7,000 beneficiaries in 2010 (Moreno 2015; Ramirez 2015). If informality or unemployment were to increase, the *Pensión Alimentaria* is likely to increase in importance.

Fiscal Sustainability

Paraguay still has a favorable ratio between contributors and beneficiaries. The IPS-administered pension fund generates a surplus in the order of 1.0 percent of GDP from its operations and investments (IPS 2015), and the contributory scheme administered by the *Caja Fiscal* generates a surplus of 0.3 percent (Ministerio de Hacienda 2015). Nevertheless, the spending on noncontributory pensions already amounts to 0.6 percent of GDP, which constitutes more than half of the general government deficit (Ministerio de Hacienda 2015). As the ratio between contributors and beneficiaries becomes less favorable, the fiscal sustainability of the pension system is projected to worsen under the current parameters.

Projections under Current Policies

The projections, focus on the IPS and the *Caja Fiscal*, which together cover more than 90 percent of beneficiaries of the contributory pension system, as well as on the noncontributory *Pensión Alimentaria*. Under current policies, the model suggests that pension expenditures would increase from 2.8 percent to 9.4 percent of GDP in 2100, while contributions stay constant at 3.1 percent of GDP and investment incomes dwindle as the reserves are drawn down (Table 54). The net present value of future deficits between

2015 and 2100 amounts to about 245 percent of current GDP, most of which will be incurred in the latter half of the century. Three-quarters of this increase are driven by contributory schemes; one quarter by noncontributory pensions (Table 54).

Comparison with Official Projections

The total fiscal gap from this model is similar to the projections provided by the IPS and the Caja Fiscal. For the IPS, these projections are somewhat more pessimistic than the actuarial forecasts (IPS 2015). This may be due to the IPS's more optimistic assumptions about the underlying demographic developments, as well as to their expectations about the number of contributors: the IPS projects that the old-age support rate will drop to 3 by 2100, while the UN forecasts 2.2, the IPS also expects the number of participants to triple between 2015 and 2100, while this model projects that coverage rates will remain roughly stable.⁴⁹

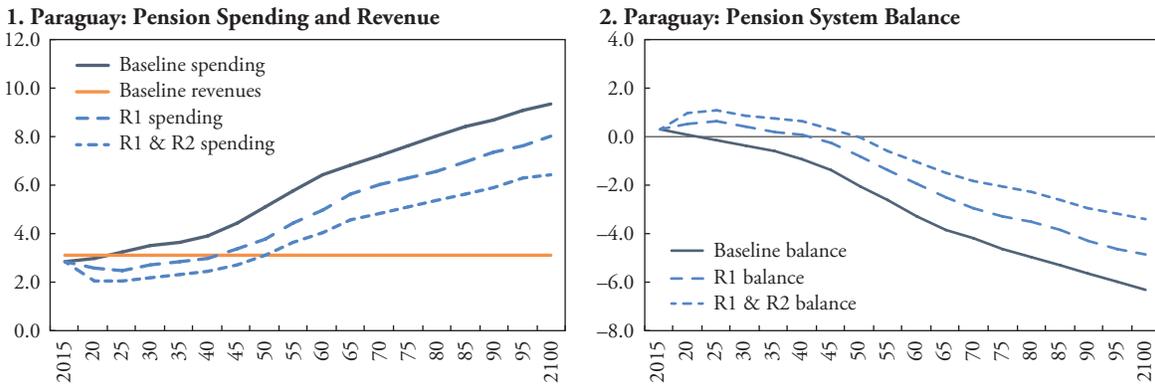
For the Caja Fiscal and the Pensión Alimentaria, no detailed actuarial projections have been published. A study conducted by the IDB for the Ministry of Finance in 2014, however, suggests that the present value of the combined actuarial deficit of public contributory and noncontributory schemes managed by the Caja Fiscal could reach 40–50 percent of current GDP by 2045 (ABC Color 2014). This is more pessimistic than the model of this report, which predicts that the NPV of the Pensión Alimentaria may reach 25 percent by 2045, but that the contributory scheme of the Caja Fiscal may remain sustainable if the passive coverage rates declined in line with the currently much lower active coverage rate (if not, the estimates are similar to those of the Caja Fiscal).

Reform Options

Simulations for the impact of various reforms are presented in Figure 61. Increasing the retirement age from 60 to 65 years by 2020 would improve the system's sustainability, lowering pension spending by 1½ percentage

⁴⁹The IPS predicts that the current balance will turn into a deficit in 2045; in this report's model, the turning point is reached between 2030 and 2045, depending on the assumptions on coverage rates. In the IPS actuarial model, the deficit will reach 1.5 percent of GDP in 2100; in this report's model, it will be between 1.6 and 3.7 percent. The difference between the high and low scenario stems from assuming whether passive coverage rates (8.6 percent of the population ages 60+) converge fully to the much higher active coverage rates (14.5 percent of the population ages 15–59). The difference between the two scenarios largely evens out when we consider the IPS and the Caja Fiscal are considered jointly, as the relationship between active and passive coverage is the reverse for the Caja Fiscal. In other words, because IPS has a higher active than passive coverage while the Caja Fiscal has a higher passive than active coverage. The convergence between active and passive coverage balances out when projecting both systems in parallel.

Figure 61. Paraguay: Pension System Spending and Balance



Source: ???
 Note: R1: Increase in retirement age from 2020. R2: Reduction in replacement ratio from 2020.

points by 2100 (from 9.4 to 8.0 percent of GDP). Reducing replacement rates of contributory pensions, which are currently up to 100 percent of pre-retirement earnings, by 20 percent would reduce spending by the same amount (to 6.5 percent of GDP in combination). Assuming that the earmarked government contribution in the order of 1.5 percent of the payroll (0.4 percent of GDP) materializes, these reforms would keep the pension system in surplus until 2045, and result in a deficit of only 3½ percent in 2100.

Health Care System

Like pension, disability and survivor benefits, health and maternity benefits are administered through the social security system, primarily the IPS. Of the 23 percent of earnings that are contributed to the system by employers and employees, 54 percent (12.5 percentage points) go to pensions and 39 percent to health (IPS; 2015), with the remainder to administration.⁵⁰ The health care system therefore suffers from the same limitations as the pension system: high fragmentation and low coverage. Less than 20 percent of the population is covered through the IPS, and less than 10 percent by private health care providers. The majority of the population therefore relies on the noncontributory public health care provision, which is funded through the government. By 2100, health-related public expenditures could increase from 4.6 percent of GDP to almost 14 percent of GDP.

Peru

Demographics

Even though Peru is currently at a moderate stage of population aging, the continued increase in life expectancy and declining fertility rates are expected to accelerate the rate of population aging. Currently, the share of the population ages 65 and older in the total population is about 6 percent; however, this share is expected to increase to 17.1 percent in 2050 and 30 percent in 2100. The current pension system (public and private) covers about one-fourth of the population ages 65 and older, with even lower coverage for those who live in rural areas and in the poorest regions of Peru.

Pension System

History

The Peruvian pension system comprises of two main plans that operate in parallel—a public pension plan (defined benefit), and a private plan of individual accounts (defined contribution). Unlike in other Latin American countries, where the transition to a private pension scheme was accompanied by closure of the public plan, in Peru, the two plans coexist. Before 1992, old-age income security was ensured entirely through the public, unfunded, (PAYG) system, composed of a national pension regime (SNP), and the preferential restricted regime Cedula Viva. To alleviate pressures of the pension system on government finances, a fully-funded, voluntary, private pension plan was introduced alongside the public plan in 1992. Individuals who switched from the public to the private plan were compensated with recognition bonds. To induce more active contributors to move to the private plan, two reforms were undertaken in 1995 and 1997 that gradually reduced the SNP's generosity by increasing the retirement age and the contribution rate. While the dual system allows for more individual choice concerning old-age security, the pension system remains fraught with financial imbalances, social inequities, and operational inefficiencies. Moreover, political pressures have been growing to reverse the pension reform, owing to inequities resulting from differentials in contribution and benefit rates, inefficiencies in the administration and investment of pension assets, and potential local asset market distortions (Table 55).

Table 55. Peru: Pension System Structure

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administrative
1 pillar (PAYG defined benefit plan, being phased out)	Employee contributions (13% of gross earnings).	At least 20 years of contributions required. The retirement age is 65 for both men and women. However, compensatory minimum pensions were introduced in 2001 for individuals with less than 20 years of active participation.	The benefit is established as a percentage of the remuneration of reference calculated by an average of the last 60 remunerations (5 years) and it is paid at a rate of 14 pensions a year. The system also gives benefits for physical disabilities, loss of a spouse, loss of parents, and ascendants that are equivalent to a percentage of the pension or the referred to remuneration. The legal minimum pension is 515 Nuevo soles.	Wage earners and salaried employees in the public and private sectors, employees of worker-owned and cooperative enterprises, and certain self-employed workers. Only 24 percent of the work force participated in the SNP and could access a pension in future	This system is administered by the Oficina de Normalización Previsional (PNO)
2 pillar (Private pension plan; Defined contribution plan)	10% of gross earnings (old age benefits) plus an average of 1.25% of gross earnings (administrative fees) and 1.23% of covered earnings (disability and survivor (life) insurance).	20 full years of contributions; early retirement possible if accumulated contributions sufficient to finance a pension 60% above a minimum pension.	Pension equal to an annuity stream from assets. Minimum pension of \$207 per month.	Public- and private-sector employees. Voluntary coverage for self-employed persons. Only 13 percent of the work force participated in the SPP and could access a pension in future	Four private pension funds compete for contributors and administer individual accounts. Restrictions on asset allocation (floor for investing in government bonds; ceiling for investing abroad)

Nature of the Current Pension System

The public pension plan (Sistema Nacional de Pensiones—SNP) is a defined-benefit, PAYG pension scheme. It covers a total of 2.6 million persons (16 percent of the labor force), of which 70 percent are active contributors from both the private and public sectors (and the rest are pensioners). This PAYG system is an unfunded, defined-benefit pension scheme. The contribution rate is 13 percent of gross earnings. The SNP is administered by the National Pension Office, and contributions are collected through the national tax collection agency. The SNP offers pensions based on rules that include a minimum contribution period of 20 years, minimum and maximum pension values, and a replacement rate that depends on the number of contributions made and the beneficiary’s birth cohort. As with any defined-benefit system, the financial sustainability of the SNP is mainly based on the ratio of contributors to pensioners and the generosity of the pension.

On the other hand, the private pension program (Sistema Privado de Pensiones—SPP) is an optional, self-financing system based on individ-

ually funded accounts. It covers 4.6 million people or about 30 percent of the labor force. The contribution rate is 10 percent of gross earnings. Each insured member must choose from one of four existing Pension Fund Administrators (Administradoras de Fondos de Pensiones—AFPs) that will manage and invest the contributions and the returns they generate. At retirement age, the member has access to the final balance of this account and must choose one of several pension options offered by different insurance companies in the market or from the AFP that administered the account. These options include scheduled withdrawals, full annuities, or annuities combined with withdrawals and different percentages for spousal pensions. The private pension plan has high operational costs and commissions. The fees charged by the AFPs (3.5 percent of the rate of return) are among the highest in Latin American countries that have adopted private pension schemes with individual accounts. The high commissions reflect mainly the relatively low level of assets managed by the AFPs, which in turn results from low affiliation rates and low collection rates of contributions. Low affiliation is due to the optional character of the private plan (in contrast to the compulsory system of individual accounts in Chile, Mexico, and Bolivia). Low collections occur because about 60 percent of total affiliates do not make regular contributions, mainly reflecting temporary unemployment spells of private-sector workers and poor compliance by national government entities and municipalities.

Projections of Fiscal Costs

The fiscal cost of the public pension system is affected by various factors. Specifically, there are three main components: (1) the recognition bonds that were issued to workers who switched from the public to the private system, (2) the unfunded liabilities accrued under the SNP system of both current and future workers, and (3) the budget transfers to the public pension plan. The value of outstanding recognition bonds as of 2010 was 13 billion nuevo soles (about 5 percent of GDP) and the amortization of these bonds peaked around 2010 at 0.2 percent of GDP. Moreover, the government treasury also needs to transfer funds (about 0.3 percent of GDP) to pay the SNP pensioners who have transferred to the SPP as the SNP's contribution base has been reduced by the creation of the SPP. Under current policies, public spending on defined pension benefits would increase from 1 percent of GDP to 3 percent of GDP by 2065, and to 4 percent of GDP by 2100 (Table 56). This assumes that the replacement rate under the defined-benefits system is maintained at the 2015 rate of 35 percent.⁵¹ The PDV of pension deficits would increase to 27 percent of GDP by 2065 and to 41 percent of GDP by 2100.

⁵¹If the pension spending was held constant at 1 percent of GDP. The replacement rate will decline over time to about 9 percent by 2100.

Table 56. Peru: Projections of Pension Imbalances
(Excluding special regimes, in percent of GDP)

	2015	2030	2065	2100
Total pension expenditures	1.0	1.3	2.9	4.0
Pension revenues	0.8	0.5	0.5	0.5
Pension deficit	0.2	0.8	2.3	3.4
PDV of pension spending increases relative to 2015	—	3.1	31.0	75.4
PDV of pension deficits ^{1,2}	—	7	27	41
PDV of incremental pension deficit relative to 2015	—	5	23	36

¹The assumed discount rate is 3 percent.

²Assumes that the replacement rate for the private pension is held constant at the 2015 level (at 35 percent).

There are several risks to the fiscal cost projections. Specifically, they include: (1) lower GDP growth (official projections are based on 5 percent growth, while IMF staff estimates potential growth at 3 percent) and pensions are indexed to inflation, (2) lower returns on pension fund assets (which could further lower replacement rates), and (3) a higher number of estimated beneficiaries and a lower number of contributors—partly depending on population growth and migration trends. The fiscal costs of public pensions are relatively low compared with other countries. Because of the low coverage of the public pension system in Peru (24 percent of the labor force) and because the reforms in the 1990s took place before the system had matured. Coverage under current policies would remain very low because only a small fraction of the workforce would be expected to claim 20 full years of contributions in the formal sector. The SPP is a self-financing plan and by design should not pose any fiscal liabilities for the government. However, to complete an assessment of the fiscal costs of the SPP, more information is needed about the age composition of workers and their wages, which is not available in the public domain. The pension accrual from the SPP depends on assumptions about the economic growth rate, the rate of return on assets, and years of service. Since the government guarantees a minimum pension for some workers, there could be a fiscal cost to the government if the real returns on assets are low and the corresponding pension is below the minimum pension threshold. In that case, the government will have to incur fiscal costs to close the gap, but these are expected to be low (and decreasing over time) given that the guarantee was extended only to a limited set of participants (and no new guarantees have been issued since).

Assessment

The public cost of pensions is relatively low, but fiscal sustainability is a key problem. The large unfunded liabilities in the outer years—which reflect the large actuarial imbalances and adverse demographic trends—could likely trigger changes to the current pension system and entail higher fiscal transfers over time. The other dimension is the “social sustainability” due

Table 57. Peru: Pension System Reform Options

Pension Reform Options	No Increase in Deficit by 2030	Less than 3% of GDP Increase in Deficit by 2065
Increase in retirement age (year)	1	0
Reduction in replacement rate (pp)	1	0
Increase in contribution rate (pp)	1	0

to declining replacement rates and low coverage. The private pension plan is self-financing but the minimum pension guarantee could trigger a fiscal cost for the government should the real return on assets of private pension funds fall below the required threshold to generate a minimum pension. However, the main challenge posed by the Peruvian pension system is one of adequacy of benefits in a mostly defined-contribution system. Replacement rates for the average male wage-earner with a 75 percent contribution density are projected to decline from 38 percent in 2030 to less than 26 percent in 2100 (see paragraph 65). Replacement rates for women are expected to be even lower, as women's life expectancy is longer. Even assuming a 100-percent contribution density, replacement rates still fall short of the current average replacement rate in OECD countries. Occupational coverage would need to significantly increase to reduce the cost of the solidarity pillar. So far, the incentives introduced in the 1997 reform to facilitate labor formalization and participation in the defined-contribution system and expand the tax benefits of the SPP seem to have been insufficient at boosting occupational coverage.

Reform Options

Parametric reforms are needed to address the public pension system's actuarial imbalances, although given the accumulated delays their effects would be relatively back-loaded. Still, they could jointly address both fiscal and social sustainability problems. In particular, increases in contribution rates would pay a relatively limited role to avoid excessive pressure on the formal labor market and contribution compliance. Table 57 indicates that if the objective of the pension program is to ensure that the pension deficit does not increase before 2030, then either of the three parametric reforms—increase in retirement age, reduction in replacement rate, or increase in contribution rate—can achieve that objective. If these three reforms are not undertaken, then the pension deficit will increase by 3 percentage points before 2065. Given the authorities' desire to discourage participation in the SNP system for new entrants and the relatively small benefits that keeping it open will provide in terms of smoothing the transition costs to a fully-funded system, the SNP system may be closed to new entrants, even though it may increase the transition costs in the interim period. For the private pension plans, the contribution rate could be increased to improve the replacement rate (currently at about 35 percent). Furthermore, the administrative costs of the AFPs—one

Table 58. Peru: Total Public Health Care Expenditure
(Percent of GDP)

	2015	2030	2065	2100
Total public health care expenditure	3.1	4.1	7.7	10.1
Increases relative to 2015	—	0.9	4.6	7.0
PDV of total public health care expenditure	—	52.9	198.5	361.6
Increases relative to 2015	—	6.3	72.4	179.4

of the highest in the region—should be lowered by consolidating collections and information management of the AFPs.

Health Care System

In Peru, health care costs are projected to increase from 3 percent of GDP in 2015 to 7.7 percent of GDP in 2050, faster than economic growth (Table 58). This is due not only to population aging but to technological improvements in health care that result in better but costlier services. The ratio of health care expenditure to GDP is a product of several factors: the generosity of the health package for the young, the labor force participation rate of the economically active population, the ratio of per capita health spending for the older population to the per capita health spending for the young (α) and the old-age dependency ratio. Assuming α is equal to 3.2 (the average for OECD economies), health care spending to GDP would also grow with the old-age dependency ratio, although at a smaller pace than pensions because both the elderly and the young receive health care benefits. Similar to pensions, an exogenous increase in the number of elderly increases health care spending (more people receive a relatively high per capita health benefit). Assuming that policies are able to keep the growth of health care costs per capita in line with GDP per capita, health care spending will increase at a slower rate, reflecting only demographics.

Uruguay

Demographics

Uruguay has one the highest proportions of elderly citizens in the region. Fourteen percent of the population is currently over age 64 and this share is expected to increase to about 22 percent by 2050 and 31 percent by 2100. The median age is projected to rise from its current 35 to 42 in 2050 and 49 in 2100.

Table 59. Uruguay: Pension System Structure

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administration
Pillar 0 (solidarity pillar)	Transfers from the government.	Adults over 65 and low-income disabled individuals not eligible to the contributory system	Minimum elderly and disability pension	About 7 percent of the population above 65 years old (in 2014)	BPS
Pillar 1 (defined benefit, PAYG)	Employers' contributions (7.5% of earnings – general scheme), workers' contributions (up to 15% of earnings under some ceiling), earmarked taxes (7 percentage points of VAT and Social Security Assistance Tax), and government transfers	Common retirement: 60 years of age and 30 years of contributions Old-age retirement: 70 years of age and 15 years of contributions	Retirement benefits: common retirement, old-age and complete-disability. Pension benefits: survivors' pension, temporary partial-disability benefit, funerary grant	Contributors: 75 percent of the population aged 15–59. Beneficiaries: 90 percent of the population above 65 years old	BPS for most contributors. Special funds for banking sector employees, university professionals, public notaries, the military and the police
Pillar 2 (mandatory, defined contribution, individually funded)	Workers contributions (a variable portion of workers' contributions goes to the PAYG or the individually funded system, depending on the wage level)	Same as for pillar 1 (common retirement)	Common retirement, old-age, complete-disability and temporary partial disability benefit. Survivors' pension	About 53 percent of contributors to pillar 1	AFAPs (Sura, Integration, Republica and Union Capital)

Pension System

History

The Uruguayan pension system has evolved from a “pure” PAYG system to a mixed system. The system is one of the oldest in Latin America. The very first pension system, for veterans of the independence war and widows, was created in 1829. The early, fragmented, pension systems were progressively unified and extended to cover all public and private sector employees. Since 1989, the Constitution provides that pension benefits shall be indexed to the median wage. In 1996, the system was reorganized into a mixed system that includes a PAYG; define-benefit component and an individually-funded, defined-contribution component (Law 16.713). The PAYG pillar is administered by the Banco de Previsión Social (BPS) for most contributors. In addition, five separate systems exist for banking sector employees, university professionals, public notaries, the military and the police. The second pillar is managed by private pension fund administrators (AFAPs) under the supervision of the central bank. Above a certain income threshold, workers can voluntarily contribute additional savings. The system also includes a noncontributory elderly and disability pension program (Table 59).

Funding

Workers' contributions only partially finance the system. The first pillar of the system (PAYG) is funded by a combination of employers and workers' contributions, earmarked taxes, and transfers from the government to cover recurring funding gaps. Uruguay's active coverage (measured by the

ratio of contributors to the economically active population) is very high in the region and has been rising over the past 10 years as informal employment has declined.

Contributions are split between the defined-benefit and defined-contribution pillars. Under the general contribution scheme, employers' contributions (7.5 percent of wages) exclusively finance the PAYG pillar. Four alternative contribution schemes exist for the construction sector, rural enterprises, household employees, and "subsidized services" (workers exposed to radiations, asbestos workers, pilots, and so on). Workers' contributions (15 percent of wages) are split between the PAYG and the defined-contribution system, with shares that depend on the wage level. There are four salary brackets.

For monthly wages under 5,000 pesos in 1995 (39,871 pesos in 2015—bracket 1), 100 percent of the workers' contribution goes by default to the BPS, but article 8 of Law 16.713 allows workers to voluntarily choose to direct 50 percent of this contribution to the individually funded system (AFAPs). Workers choosing to do so get a subsidy equivalent to 50 percent of their contributions to the BPS.

- For wages between 5,000 and 7,500 pesos in 1995 (39,871 and 59,806 pesos in 2015—bracket 2), workers contribute to the BPS for the first 5,000 pesos, and to the individually funded system for the remainder. Alternatively, they can also increase their contributions to the individually funded system by directing 50 percent of their contribution on the first 5,000 pesos of wages to the AFAPs and the remainder to the BPS.
- For wages over 7,500 pesos (59,806 pesos in 2015—brackets 3 and 4), contributions are made to the BPS for the first 5,000 pesos, and to the individually funded system for the remainder.
- No pension contributions are required for the portion of compensation exceeding 15,000 pesos (119,612 pesos in 2015—bracket 4), but workers can voluntary contribute to the AFAPs.

Law 19,162—passed in 2014—allows certain BPS affiliates in the first and second bracket to revoke their participation in the individually funded system, in which case the AFAPs have to transfer the accumulated contributions to the BPS. The special regimes for banking sector employees, university professionals, public notaries, the military and the police have their own funding rules.

Benefits

Benefits include contributory benefits and noncontributory solidarity pensions. Pension benefits are paid by the BPS for the PAYG pillar, by the insur-

ance company (Banco de Seguros del Estado) for the defined-contribution pillar (out of the accumulated individual savings transferred by the AFAPs), and by the respective special funds for the five special regimes.

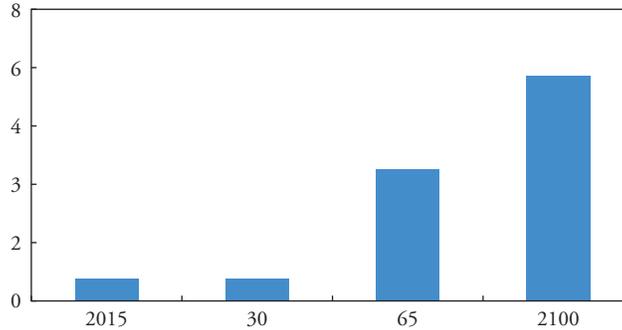
- The common retirement pension is paid to workers ages 60 or older, cumulating at least 30 years of contributions. For the PAYG pillar, the replacement rate is equal to 45 percent plus 1 percent for each year worked above 30 years of employment up to 35 years, 0.5 percent for each year after 35 years with a maximum of 2.5 percent, and 3 percent for each year of work after 60 years old and 35 years of employment with a maximum of 30 percent, or 2 percent for each year of work after 60 until age 70 or until reaching 35 years of work whichever comes first. The base for the calculation is the average wage over the last 10 years of employment or the average wage over the best 20 years of earnings if higher, with a maximum equal to the average of the best 20 years plus 5 percent (basic pensionable salary). Under the mixed system, the monthly pension paid by the BPS was capped at a maximum of 36,143 pesos in 2016.
- The old-age pension can be paid to workers (who do not qualify for the common retirement pension) ages 65 and older, with 25 years of contributions. Its amount under the PAYG pillar is equal to 50 percent of the basic pensionable salary plus 1 percent for each year of employment exceeding the required minimum number of years of service (25 years at age 65, 23 years at age 66, 21 years at age 67, 19 years at age 68, 17 years at age 69, and 15 years at age 70), with a maximum of 14 percent.
- Complete-disability and temporary disability pensions are equal to 65 percent of the basic pensionable salary.
- Individuals above age 65 and disabled individuals whose resources fall below some minimum are entitled to receive a noncontributory pension (the solidarity pillar). The minimum pension guaranteed by the noncontributory system amounted to 8,452 pesos in January 2016.
- There are no guaranteed benefits for the individually funded pillar.

Passive coverage is very high. The proportion of people ages 65 and older who receive a pension exceeds 90 percent (BPS only). About 7 percent of the population above 65 is covered by the noncontributory system (pillar 0).

Projections

Pension expenditures for the solidarity and PAYG pillars as a share of GDP are projected to increase by about 30 percent by 2065. Projections exclude the special regimes. Public pension expenditures for the two solidarity and contributory pillars administered by the BPS amounted to 7.9 percent of GDP in 2015 and are projected to slightly decline until 2030 along with

Figure 62. Uruguay: Pension Deficit
(Excluding special regimes, in percent of GDP)



Sources: BPS; and IMF staff calculations.

Table 60. Uruguay: Projections of Pension Imbalances
(Excluding special regimes, percent of GDP)

	2015	2030	2065	2100
Total pension expenditures	7.9	7.5	10.3	12.9
Noncontributory benefits	0.5	0.5	1.1	—
Contributory benefits	7.4	7.0	9.2	—
Pension revenues ¹	7.6	6.8	6.7	6.7
Pension deficit	0.7	0.7	3.6	6.2
PDV of increases in pension spending relative to 2015	—	24.7	12.3	80.1
PDV of pension deficits/GDP	—	10.1	57.1	146.8
PDV of increases in the pension deficit relative to 2015/GDP	—	0.3	30.6	108.4

¹Includes pension contributions and a portion of BPS-earmarked taxes (authorities' projections until 2065).

the cost of the transition to the mixed system, before increasing again all the way up to 2100 (Table 60).⁵² According to those projections, pension expenditures could reach 12.9 percent of GDP in 2100. Similarly, the fiscal gap stemming from the difference between projected expenditures and revenues is projected to decrease slightly, remaining at about 0.7 percent of GDP by 2030, before resuming a steady ascent and climbing up to 6.2 percent by 2100 (Figure 62; Table 60).

The present discounted value of projected pension deficits until 2030 amounts to 10 percent of GDP. This value increases to 57 percent at the 50-year horizon (2065) and to 147 percent until 2100.

Assessment

The Uruguayan pension system is characterized by its quasi-universal coverage of both active and elderly populations. The PDV of unfunded expenditures is

⁵²Projections for both contributory and noncontributory systems until 2060 are from the authorities. They are extended up to 2100 using the standard pension identity, assuming constant eligibility, employment, and replacement ratios and compensation share of GDP.

Table 61. Uruguay: Public Health Expenditure
(Percent of GDP)

	2015	2030	2065	2100
Total health expenditures	6.2	7.4	12.2	14.9
PDV of health expenditures/GDP	—	100.0	344.7	593.5
PDV of increases in health expenditures relative to 2015/GDP	—	8.5	97.4	236.1

reasonable, but it does not include any deficit that may be generated by the special regimes, for the police and armed forces in particular. While replacement ratios have historically been high, in particular in the context of the old PAYG system (the OECD estimates the median net replacement rate at 66.3 percent in 2010), the adequacy of future pension benefits will increasingly depend on the rate of return on individual pension savings accounts (pillar 2) for workers who choose or are required to contribute to AFAPs. Contribution rates are high compared with other countries in the region and do not leave much scope for an increase. The retirement age, on the contrary, is still low and typically well below that of advanced economies facing similar aging challenges.

Reform Options

Simulations suggest that an increase in the retirement age to 65, along with the corresponding change in the computation of benefits, would allow to stabilize the public pension deficit by 2065. A similar stabilization could be obtained through a change in the benefit indexation, from indexation to the median wage to indexation to inflation.

Health Care System

The Uruguayan health system was reformed in 2005 to expand coverage, and its fiscal costs are projected to rise substantially in the long term. The reform created the Integrated National Health System which provided a framework for compulsory health coverage. Under this system, health services are provided by public and private health care providers and financed by worker and employer contributions and government subsidies. Individuals who do not contribute to the National Health Fund receive care from the public health system financed directly by the government's budget. As a result of the reform, 95 percent of the Uruguayan population is currently covered by health insurance. Reflecting the government's priority for health following the reform, public health expenditures have doubled in terms of GDP over the past decade, from about 3.1 percent of GDP in 2005 (according to the World Bank) to 6.2 percent today (Table 61). This trend is expected to continue over time as the population ages and health care costs increase.

Venezuela

Demographics

Venezuela faces moderate population growth and ageing. Venezuela's fertility rate is close to the Latin American regional average, (slightly above the replacement rate), implying moderate projected population growth and ageing, with the population expected to stabilize by 2050 at about 41 million, up from the current population of 31 million. Life expectancy is also close to the regional average, at about 72 and 78 years for men and women, respectively. The share of the population over age 60 is expected to increase from less than 10 percent in 2015 to about 20 percent in 2050 and 35 percent in 2100.

Pensions

History

The first pensions law was approved in 1940. The current pensions system is ruled by the minimum pensions, social assistance, social security, and social insurance laws approved in 1995, 2011, and 2012, respectively.

Current Characteristics

Venezuela has a PAYG system and noncontributory schemes. Coverage of contributors is currently about 40 percent. The system has one of the highest replacement rates in the region, above 90 percent on average, and about 140 percent for low earners—the highest in the region. About one-fourth of the population older than 65 receives social pensions, which are above 40 percent per capita income (Table 62).

Projections

Pension expenditures are projected to increase from almost 5 percent of GDP in 2015 to almost 9½ percent by 2065 and more than 15 percent by 2100.⁵³ The PDV of expected expenditure increases up to 2100 is about 275 percent of GDP (Table 63). Key assumptions include: 1) underlying demographic trends from the UN, 2) the current level of contributions' coverage among the working-age population is kept constant, the current coverage of the pensioner-age population is not known, but assumed to be equal to that of

⁵³Latest data available on pension expenditure as of percent of GDP is as of 2010 (OECD/IDB and World Bank, 2014); same share of GDP is assumed for starting point of pension expenditure projections in 2015. No data are available on total revenue from contributions and pension system balance.

Table 62. Venezuela: Pension System Structure

	Sources of Funds	Qualifying Conditions	Benefits	Coverage	Administration
0 pillar	Transfers from the government.	Age 60 for men and 55 for women; total household income must be below the minimum wage.	Minimum wage of 9,648 bolivares (the official exchange rate is 6.3 bolivares per dollar, but the parallel market rate is above 1,000 bolivares per dollar).	About one fourth of the population above 65 years receive social pensions.	Instituto Venezolano de los Seguros Sociales.a
1st pillar (defined benefit, PAYG)	<p>Employees contribute 4 percent of earnings in the private sector and 2 percent in the public sector, with maximum contribution base at 10 times the minimum wage.</p> <p>Employers contribute 9–11 percent of payroll in the private sector and 4 percent in the public sector.</p> <p>Self-employed contribute 13 percent of declared income.</p>	Age 60 for men and 55 for women, with at least 750 weeks of contributions. Lower pensionable ages in unhealthy or arduous job positions.	Basic 3,000 bolivares 1 30 percent of reference salary (20 percent covered earnings in the past 5 years or 10 percent of the past 10 years) 1 1 percent of earnings for each 50-week period of contributions exceeding 750 weeks.	Contributors: About 40 percent of the economically active population. ¹	Instituto Venezolano de los Seguros Sociales.

Sources: OECD, IDB, and the World Bank (2014) and SSA (20176).

¹Data on current passive coverage are not available. This is assumed to be equal to active coverage.

Table 63. Venezuela: Pension Projections
(Percent of GDP)

	2015	2030	2065	2100
Expenditure ¹	4.8	6.7	9.4	15.2
<i>PDV of pension spending increases</i>		15	121	277

Sources: OECD, IDB, World Bank 2014; and IMF staff calculations.

¹Latest data available on pension expenditure is as of 2010; for purposes of the analysis in this note, it is assumed to have remained constant as a share of GDP by 2015.

contributors and also kept constant in the projections, and 3) a constant replacement rate (that is, initial pension grows with average wages).

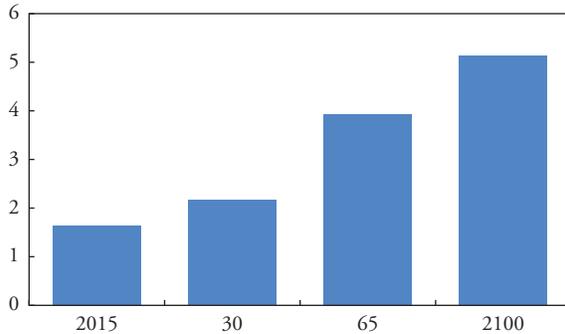
Reform Options⁵⁴

Substantial reforms would be needed to achieve the objectives set in the reform scenarios laid out in this report. Preventing an increase in the pension deficit by 2030 would require increasing the retirement age by 5 years, reducing benefits by about 28 percent, or increasing contribution rates by 5 percentage points to 19 percent of wages. Limiting the increase in the deficit to 3 percent of GDP by 2065 would require increasing the retirement age by 8 years, reducing benefits by about 32 percent, or increasing contribution rates by 10 percentage points to 24 percent of wages.

⁵⁴Since revenues of the pension system are not known, for reform scenarios the starting point is supposed to be a balanced system at present, which is likely to be an optimistic assumption. Hence, reform options presented capture only changes needed to address projected increases in spending, but not any existing initial deficits.

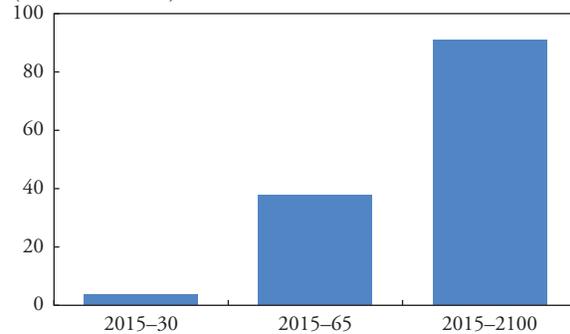
Figure 63. Venezuela: Health Care Spending

1. Health Care Spending
(Percent of GDP)



Source: World Health Organization. Global Health Expenditure

2. Present Discounted Value of Health Care Spending Increases
(Percent of GDP)



Source: IMF staff calculations.

Health Care System

The 1999 Constitution guarantees free universal health care and its cost is expected to more than double as a share of GDP in the long term. In 2003, a state-funded social program called “Barrio Adentro” was introduced to achieve this aim through the construction of clinics in popular neighborhoods. The system was staffed by thousands of Cuban doctors who came into the country through a trade pact with Cuba in exchange for low-cost oil. The clinics began by focusing exclusively on preventative health, with a plan to expand to emergency health services, surgeries and comprehensive health services coverage. However, as the economic crisis intensified, reports emerged of closures of many state-run clinics and shortages of medicines, health supplies, and personnel. Total health care spending amounted to about 2 percent of GDP in 2015 and is projected to increase to 5 percent of GDP by 2100, with a PDV of spending increases equal to almost 100 percent of GDP (Figure 63).

Technical Annex

Projection Approach for the Estimation of Pension Adequacy

This analysis used a harmonized cohort model to estimate future pension adequacy for the set of 10 Latin American countries with defined-contribution components, namely Bolivia (BOL), Chile (CHL), Colombia (COL), Costa Rica (CRI), Dominican Republic (DOM), Mexico (MEX), Panama (PAN), Peru (PER), El Salvador (SLV) and Uruguay (URY). The projection covers all relevant (semi-)contributory benefits of the first and second pillar (defined benefit and defined-contribution).¹ The analysis aimed to consider all legal changes enacted until the end of 2015. The model provides a flexible framework to assess the impact of 1) pension reforms, 2) macro-economic parameters (such as defined-contribution rates of return), and 3) individual characteristics (for example, earnings levels and contribution densities) on future pension adequacy.

This technical annex describes the calculation procedures of the applied projection model step by step, including the main data inputs, assumptions and indicators, and provides a sensitivity analysis of selected core assumptions. Projections start with a simulation of contribution careers over the time horizon of 1995–2100,² with calculation differentiated by one-year age cohorts. This allows us to estimate initial defined-contribution, defined-benefit and minimum pensions (and therewith pension adequacy) in any future year t ($t \leq 2100$) at a given retirement age r ($50 \leq r \leq 75$). Since the adequacy projections are sensitive to the assumptions chosen, in particular in the very long term, Annex Table 1 provides a summary of the key assumptions, also discussed in the following section.

¹For an overview see the respective Country Cases in Chapter 5 of this report.

²In countries that introduced defined-contribution systems before 1995, namely Chile, Colombia and Peru, the simulation goes further back in time.

Annex Table 1. Core Assumptions of the Baseline Scenario

Inflation	3%
Real rate of return	3.50%
Real wage growth	2%
Mortality assumptions	UN world population prospects 2015
Entry age contribution career	20
Retirement age	Country-specific legal retirement age
Contribution density	75%

Simulation of Contribution Careers

The starting point for the simulation of contribution careers is given by wages of pension scheme members. They serve as the monthly contribution basis (CB) for defined-contribution schemes and as reference earnings for defined benefit schemes. In the baseline scenario, pension scheme members earn the average wage in the economy over their entire contribution career.³ Alternative scenarios assess pension adequacy for lower wage earners (50 percent of average wages) and higher wage earners (150 percent of average wages). For past years (1995–2015), actual data of average wages in the economy (outlined in Annex Table 2 for the year 2015). For future years (2016–2100), we consider a harmonized and fixed wage growth of 5 percent per annum in nominal terms (= 3 percent inflation + 2 percent real wage growth) is considered. Deviations from this assumption are presented in the sensitivity analysis. It is important to note that the choice of the initial wage level in 2015 (see Annex Table 2) can have a significant impact on the results as it determines to which degree individuals can benefit from minimum pension arrangements and from other earnings-specific top-ups (such as the cuota social in Mexico or the solidarity pensions in Chile and Bolivia).⁴ With the application of fixed wages over the contribution career, age-specific earnings profiles are disregarded.

The amount of pension entitlements accrued in defined-contribution schemes varies by country and depends on the proportion of wages channeled to defined-contribution accounts. As outlined in Annex Table 3, the lowest contribution rate (τ^{DC}) applies in Costa Rica (4.25 percent), the highest in Colombia (11.50 percent). These rates are measured net of contribution fees as we aim to consider only those contributions that increase defined-contribution pension entitlements. Additionally, they reflect only old-age pension contributions (disability or survivor contributions are disregarded). In general, contribution rates are assumed to remain constant over time (see Annex Table 3; year 2015 versus. 2065)⁵ with the only exception

³Empirically, average earnings of pension scheme members are sometimes higher than the average wage in the economy.

⁴For comparisons with similar (cross-country) studies, therefore, the choice of the wage level should be carefully inspected.

⁵For past years, actual contribution rates are applied which differ in some countries to 2015 values.

Annex Table 2. Average Wages in the Economy, 2015

	BOL*	CHL	COL	CRI	DOM*	MEX	PAN**	PER	SLV	URY
Average monthly wage in the economy, in 2015, in local currency	3,922	800,889	1,072,130	461,968	17,717	11,761	929	1,598	434	24,441

Source: OECD and national statistics.

Notes: * Weighted average of public and private sector workers. ** For PAN data reflects the average earnings of pension scheme members in 2014 indexed with wage growth to 2015.

Annex Table 3. DC Contribution Rate, 2015 versus 2065 (After contribution fees)

Year	BOL	CHL	COL	CRI	DOM	MEX	PAN*	PER	SLV	URY*
2015	10.00%	10.00%	11.50%	4.25%	8.00%	6.50%	5.73%	10.00%	10.80%	5.71%
2065	10.00%	10.00%	11.50%	4.25%	8.00%	6.50%	12.30%	10.00%	10.80%	5.71%

Source: OECD, IDB, and the World Bank (2014), SSA 2016, and AIOS.

Notes: *For Panama and Uruguay the figures reflect own calculations of the effective DC contribution rates of an average wage earner.

being Panama where average wage earners contribute an increasing share of their wages to the defined-contribution scheme.⁶ Furthermore, the analysis considered that in Panama and Uruguay, higher-wage groups effectively transfer a larger proportion of their earnings to the defined-contribution scheme than lower-earnings groups.

Contribution densities (CDs) are a further key parameter that determine the level of defined-contribution and defined-benefit pension entitlements. They are defined as the average number of contribution months accrued per year over the contribution career divided by 12 months.⁷ A contribution density of 50 percent, for instance, reflects that a scheme member contributes six months on average, 6 months to the pension scheme per contribution year. A number of defined benefit pension schemes in Latin America feature non-linear accrual schedules, in that a certain amount of minimum contribution years has to be earned to be eligible to any pension benefit or to receive the minimum pension top-up. Additionally, some schemes guarantee higher accrual rates per contribution year for affiliates with short and/or fragmented contribution careers (for example, in Colombia, Panama, or Costa Rica). To reflect the impact of these non-linearities, three contribution density scenarios are considered: 75 percent (= standard scenario), 50 percent, and 100 percent.

⁶In Panama, monthly earnings below a threshold of 500 balboas are used as the defined-benefit contribution basis, while earnings above this value serve as the contribution basis for the defined contribution scheme. Since the introduction of the defined-contribution scheme—with the pension law of 2005—the 500 Balboa threshold has not been increased. Consequently, average earners have contributed an increasing share of their wages to the defined-contribution system over the past decade. There are no plans or legal rules that envisage an adjustment of the 500 balboa limit. Therefore, the model prolongs the past trend and considers increasing effective contribution rates for Panama for the defined contribution scheme. How the results change if the 500 balboa limit is indexed with wages over time is presented in the sensitivity analysis below (see Annex Table 11).

⁷The calculations assume that pension scheme members can contribute a maximum of 12 months per year. In some schemes more monthly payments may be possible. This should not affect the results of replacement rates (= monthly starting pension/monthly earnings) as long as the maximum number of contribution months corresponds to the number of pension payments per year.

Annex Table 4. Starting and Ending Points of Contribution Careers

	BOL	CHL	COL	CRI	DOM	MEX	PAN	PER	SLV	URY
Entry age	20	20	20	20	20	20	20	20	20	20
Legal retirement age	58	65 (60)	62 (57)	65	60	65	62 (57)	65	60 (55)	60

Sources: OECD, IDB, and the World Bank (2014), SSA 2016. Own assumptions on entry age.

Notes: Values in brackets reflect female legal retirement ages in case retirement ages differ by gender.

Given the contribution basis (CB), the effective contribution rate (τ^{DC}) and the contribution density (CD), it is relatively straightforward to estimate annual defined-contribution contribution levels C^{DC} at a given age x ($20 \leq x < r$) and year t ($p \leq t \leq 2100$) as outlined in equation 1:⁸

$$C_{t,x}^{DC} = CB_{t,x} * 12 * \tau_t^{DC} * CD_{t,x}$$

We project these annual values over the contribution career for each cohort, assuming that careers start uniformly at age of 20 and end at the country-specific legal retirement age r (see Annex Table 4).

Defined-contribution pension entitlements are recorded in individual accounts. The value of these accounts ($V_{t,x}^{DC}$) at the end of a given year t and at age x reflects the individual account value of the previous year, revaluated with rates of return rr_t^{DC} minus account/return fees f_p , plus annual defined-contribution scheme contributions ($C_{t,x}^{DC}$) (see equation 2).⁹ For the past, actual rates of return recorded in annual AIOS (International Association of Bodies Supervision of Pension Funds) bulletins, as well as statistics from national pension supervisors are applied. For years after 2015, rates of return are set to a constant level of 3.5 percent in real and gross terms for all countries. This value comes close to the average geometric mean observed in the country sample over the period 2006–2015.¹⁰ Clearly, defined-contribution rates of return represent one of the most decisive—and controversially debated—assumptions of this exercise. Against this backdrop, various alternative scenarios for defined-contribution rates of returns are applied in the sensitivity analysis below.

⁸The variable p denotes the year in which the defined-contribution pension scheme has been introduced.

⁹The model considers that, in some schemes, account fees or rates of return fees are applied. In the Dominican Republic, for instance, return fees amount to about 25 percent of nominal rates of return (in theory they can be as high as 30 percent). In Mexico, account fees added up to 1.09 percent in 2015 (based on CONSAR data), while in Uruguay they amount to about 0.15 percent (based on AIOS data).

¹⁰The average geometric mean of real rates of return for the set of 10 countries in the period 2006–15 (in gross terms) amounts to roughly 4 percent per year. The lowest value has been observed in Bolivia (with about 1 percent), and the highest in Peru, Dominican Republic and Uruguay (with about 6 percent). If a longer period is assessed (2001–15) the average geometric mean for the country sample (without Panama and the Dominican Republic, which introduced defined-contribution pensions after 2001) rises to nearly 6 percent. For a shorter time span (2011–15), the average geometric mean decreases to about 3 percent. The data source for this estimation, the AIOS database, does not always perfectly match, in which case national data are applied, as far as possible.

$$V_{t,x}^{DC} = V_{t-1,x-1}^{DC} * (1 + rr_t^{DC} - f_t) + C_{t,x}^{DC}$$

Defined-Contribution Pensions

Then monthly defined-contribution pension annuities P^{DC} are calculated at retirement age r .¹¹ This estimation follows a single life annuity formula outlined in equation 3,¹² where P^{DC} in year t depends on the value of individual defined-contribution accounts ($V_{t-1,r-1}$) in the previous year. The latter is multiplied with an annuity cost factor ($1-c$), as well as a factor that reflects the future expected rates of return rr_t and the indexation regime $index_t$ over the retirement period. Hence, the parameter c comprises annuity costs that arise once at the time of retirement (for example, for the annuity administration and longevity risk reserves) and are set to a level of 5 percent for all countries.¹³ With respect to the indexation, the model applies a price indexation (except for Uruguay, where the constitution prescribes a wage indexation of benefits).¹⁴

$$P_{t,r}^{DC} = V_{t-1,r-1}^{DC} \cdot (1 - c) \cdot \frac{(rr_t - index_t)}{\left(1 - \frac{(1 + index_t)^{le_{t,r}}}{(1 + rr_t)}\right)} * \frac{1}{12}$$

The annuity formula takes into account gender-specific life expectancy at the point of retirement $le_{t,r}$ based on UN population projections. As shown in Annex Table 5, life expectancy for males at age 60 differs greatly by country and over time. It should be noted that the mortality of pension scheme participants may be lower than indicated by the average UN population data; in fact, pension scheme affiliates working in the formal sector tend to have higher life expectancies than persons working in the informal sector.

¹¹Projection exercise assumes that the development of annuity markets will improve over the coming decades. Currently, these markets are still lagging behind in Latin American countries. In El Salvador, for instance, affiliates can choose only programmed withdrawal of their pension accounts, despite regulations that foresee the option of life annuities. See FIAP (2015, p. 4).

¹²Insurance of survivors' benefits (for example, applied in Mexico), is disregarded in the calculations. It would lower defined-contribution annuities even further.

¹³Information on annuity costs across Latin America is limited. For instance, in Chile, the most developed annuity market in Latin America, annuity costs have amounted up to 6 percent. Recent legal changes limit these costs to 2 percent of the accrued capital, see FIAP (2015). This study follows the assumptions of Duran and Pena (2011) and apply a harmonized value of 5 percent for the set of 10 countries.

¹⁴In some countries defined-contribution pension annuities are only granted if sufficient contribution years have been accrued (for example, 25 years in El Salvador). If this criterion is not fulfilled new retirees can receive a lump-sum reimbursement of the accumulated contributions with interest only. In such cases, the resulting defined-contribution pension is approximated by mimicking a private annuity purchase under the same conditions as applied in the public defined-contribution pension scheme. This approach plays only a role in the low contribution density scenario.

Annex Table 5. Male Life Expectancy at Age 60

Year	BOL	CHL	COL	CRI	DOM	MEX	PAN	PER	SLV	URY
2010–2015	20.0	23.1	20.1	22.2	20.1	21.6	22.5	19.8	19.0	20.4
2065	23.1	29.2	25.0	27.9	24.7	27.4	27.1	26.7	25.1	24.3

Source: Own calculations based on UN world population prospects.

Annex Table 6. Overview DB Pension Rules in Mixed and Selected Transition Schemes

	COL	CRI	DOM	MEX	PAN	PER	URY
Accrual schedule	65 percent for first 1,300 weeks 1 1.5 percent for each additional 50 weeks	43–52.5 percent for first 20 years 1 1 percent for each additional year	60–80 percent	Generous and complex rules depending on earnings position	q	30–45 replace for first 20 years 1 2 percent (4 percent) for each additional year	45 percent for first 30 years 1 0.5–3.0 percent for each additional year
Reference earnings	Average earnings of last 10 years indexed with CPI	Average earnings of last 240 months indexed with CPI	Average earnings last 3 years, not indexed	Average wage of last 250 weeks, not indexed	Average earnings of best 10 years, not indexed	Average earnings last 3–5 years, not indexed	Average earnings last 10 years (cap: best 20 years 1 5 percent) indexed with wage growth
Participation	Public pension scheme members have a choice until ten years prior to retirement	All public pension scheme members	Very small group of scheme members who contributed to the system before 2003	Only scheme members who contributed to the system before 1997	All public pension scheme members (up to certain earnings level)	Public pension scheme members who opted for DB, new labour market entrants have a choice	All public pension scheme members (up to certain earnings level)

Sources: National pension laws, OECD, IDB, and the World Bank (2014) and SSA (2016).

Notes: The Bolivian solidarity pension is disregarded as it is classified here as a top-up and not as a classical DB pension. Chile and El Salvador are neglected because their DB schemes are in a late stage of phase-out.

Defined-Benefit Pensions

Pension schemes with defined-benefit components model the accrual of benefits in addition to defined-contribution pensions, based on the respective benefit formula defined in the pension law. The latter, generally comprises an accrual schedule as well as certain reference earnings. Annex Table 6 summarizes how these rules differ in the sample with mixed¹⁵ and transition pension schemes¹⁶ thereby outlining how reference earnings are indexed in the model up to the point of retirement. As shown in Annex Table 6, participation in the defined-benefit system is not always feasible for all public pension scheme members as they are closed for younger cohorts in those countries that are transitioning to a pure defined-contribution scheme, such as Mexico and the Dominican Republic. These systems are referred to as transition schemes. In mixed systems like Colombia and Peru, where pension members have a choice between defined-benefit and defined-contribution,

¹⁵Mixed pension schemes are schemes in which members contribute to both pillars (cumulatively or alternatively), as opposed to transition systems in which the defined-benefit pillar is being phased out.

¹⁶The Bolivian solidarity pension is disregarded and will be further outlined below when discussing minimum pension arrangements.

Annex Table 7. Overview of Minimum Pension Arrangements

Country	BOL	CHL	COL	CRI	DOM
Minimum pension/Top-ups Level	Solidarity pension Target replacement rate 56–70 percent	Basic Solidarity Pension Top up if pension below 36 percent of average earnings in 2015	MP 1 Top-ups for low-wage earners at age 651 MP 5 60 percent of average wages in 2015	MP 1 Minimum contribution basis (MCB) MP 5 28 percent of average wages in 2015, MCB 5 38 percent of minimum wage	MP, granted at ages 651 About 40 percent of average wages in 2015
Indexation	Minimum and maximum solidarity limits indexed with CPI	with CPI	MP indexed with wages	MP indexed with CPI, Min contribution basis indexed with wages	with wages
Country	MEX	PAN	PER	SLV	URY
Minimum pension/Top-ups Level	Social quota top-up 1 MP Social quota tops up contributions of average earners by about 20 percent in 2015, MP 5 about 23 percent of average wages in 2015	MP About 25 percent of average wages in 2015	MP 1 Maximum pension MP 5 about 30 percent of average wages in 2015, Maxpen 5 about 55 percent of average wages in 2015	MP About 45 percent of average wages in 2016	MP 1 Top-up for mixed pillar low wage earners MP 5 between 20–44 percent of average wages in 2015, depending on retirement age
Indexation	both with CPI	with CPI	both with CPI	with wages	MP indexed with wages

Sources: National pension laws, OECD, IDB, and the World Bank (2014), and SSA (2016).

both schemes are modeled. The baseline results show only one replacement rate figure, namely the one that reflects the scheme (either defined-benefit or defined-contribution) chosen by the majority of public pension members. In Peru, for instance, most affiliates opt for the defined-contribution scheme, hence the model shows defined-contribution replacement rates. In the Dominican Republic as well only a very small fraction of pension scheme members participates in the defined-benefit system across all cohorts; therefore, the more widespread defined-contribution benefits are considered. For individuals who still have a choice to participate in the defined-benefit or defined-contribution system—for instance younger contributors in Colombia—the model reflects whatever pension scheme will provide the higher benefits in the future (which is defined-benefit in the case of Colombia). Cohorts who participate only in the defined-contribution system may, to some extent, have earned defined-benefit pension rights before the introduction of defined-contribution systems. These pension entitlements are calculated separately in the model, considering recognition bonds that have been granted to honor past defined-benefit pension rights.

Minimum Pensions and Top-ups

Adequacy minimum pensions (MPs) and other top-ups play a key role in determining future pension benefits. Each of the countries assessed features at least one such distributional pension element—as shown in Annex Table 7. The model reflects these different pension rules. For pension adequacy calculations the initial level of MP and other top ups in the base year 2015 is important. A glance at Annex Table 7 outlines that relatively high MP mea-

sured in terms of average earnings are granted in Colombia (60 percent), and in Bolivia, where the solidarity pension ensures that most scheme participants can achieve relatively high replacement rates of about 56–70 percent. In contrast, Panama, Mexico and Uruguay provided comparably low MP in 2015 (see Annex Table 7). The latter two countries, however, grant further top-ups, which raise pension entitlements of low-wage earners (for example, the social quota in Mexico). Besides the relative generosity in the starting year, future annual adjustments of MP and other top-ups are equally important¹⁷ for long-term projection of pension adequacy. Annex Table 7 reflects indexation rules used in the model as set by each country's pension law. In those countries where no indexation rules are defined and MP and other top-ups are adjusted on an ad-hoc basis, indexation practices observed over the past years are applied.¹⁸ Over the long term, it can make a great difference if a wage or a price indexation is applied. In fact, in case of a price adjustment, MP and other top-ups gradually decouple from general earnings if a positive, non-zero real wage growth is assumed. Consequently, these distributional elements indexed with prices may play a decreasing role in the future pension portfolio. Against this backdrop, the impact of alternative indexation rules is evaluated in the sensitivity analysis below (see Annex Table 11).

Most countries provide additionally social assistance benefits for the elderly population, the so-called zero pillar. These benefits—which are paid irrespective of any contribution having been made—are disregarded in the projection.

Pension Adequacy Indicators

Based on the above calculations of defined-contribution, defined-benefit, and minimum pensions, the adequacy of pension benefits in any future year t ($t \leq 2100$) can be estimated at a given retirement age r ($50 \leq r \leq 75$). The base scenario evaluates starting pensions at the country-specific legal retirement age and apply the following two kinds of theoretical adequacy indicators:

The *replacement rate* relates the starting pension of new retirees to their last earnings before retirement.¹⁹ It is measured in gross terms, before taxes and social contributions. This classical indicator can assess to which extent retirees can substitute pre-retirement earnings. In other words, this indicator provides information about the income smoothening function of the pension system.

¹⁷As a further important factor, one could mention minimum contribution years required to receive a MP—which also differ across our country sample.

¹⁸Thus considering at least a price indexation of MP and other top-ups.

¹⁹With the assumption that pension members earn a constant fraction of the average earnings in the economy over their career, the replacement rate reflects also the starting pension relative to average (indexed) life-cycle wages.

Annex Table 8. Sensitivity of Replacement Rates to Rates of Return (Males)

	BOL	CHL	COL	CRI	SLV	MEX	PAN	PER	URY	DOM
	base scenario (rate of return 5 3.5 % in real terms)									
2030	50%	35%	68%	61%	46%	62%	57%	38%	45%	12%
2065	26%	26%	68%	66%	46%	20%	29%	28%	45%	18%
2100	19%	25%	68%	65%	46%	18%	28%	26%	45%	17%
	<i>Deviation to base scenario, in percentage points</i>									
	lower rate of return (2.5 % in real terms)									
2030	0%	27%	0%	21%	0%	0%	0%	27%	0%	22%
2065	0%	27%	0%	23%	0%	26%	26%	28%	0%	25%
2100	25%	27%	0%	23%	0%	25%	27%	27%	0%	25%
	higher rate of return (4.5 % in real terms)									
2030	0%	8%	0%	2%	0%	0%	0%	8%	3%	2%
2065	3%	11%	0%	5%	0%	8%	9%	11%	3%	7%
2100	7%	10%	0%	4%	0%	7%	10%	11%	2%	6%

Source: IMF staff estimates.

The *adequacy ratio* compares the starting pension of a new retiree directly to average earnings of the working population (both measured in gross terms). This indicator provides an intergenerational or societal perspective: a low level of the adequacy ratio may point to the risk of future poverty if current pension policies are assumed. Such conclusions should, however, be taken with caution as the estimations focus only on first and second-pillar pension income. Other economic retirement resources such as capital income, imputed rents, family support, or public in-kind benefits are neglected.

Sensitivity Analysis

A key assumption of the calculations is the defined-contribution rate of return. The base scenario applies a real rate of return equal to 3.5%. As expected, a deviation from this assumption has the strongest effects on those countries with a pure defined-contribution pension scheme, such as Chile or Mexico (see Annex Table 8). In Panama, future pension adequacy is highly dependent on the defined-contribution rate of return, too, as over the long term the overwhelming share of public pension contributions will be channelled to the defined-contribution scheme. Also in Peru, replacement rates are driven by interest rates because the majority of scheme members is expected to participate in the funded defined-contribution scheme only.²⁰ On the other hand, in El Salvador the relatively generous minimum pension (see Annex Table 7) cushions the impact of changes in rates of return. Interestingly, in Uruguay and Colombia, changes in rates of return do not affect pension adequacy because the standard contributor (=average-wage earner) is not expected to participate in the defined-contribution system.

²⁰It is expected that not only current contributors but also the majority of new labor market entrants in Peru will opt for the defined-contribution scheme because the defined-benefit alternative will become less generous over time (given the low indexation of the defined-benefit maximum pension with prices).

Annex Table 9. Sensitivity of Replacement Rates to Wage Growth (Males)

	BOL	CHL	COL	CRI	SLV	MEX	PAN	PER	URY	DOM
base scenario (wage growth 5.2 % in real terms)										
2030	50%	35%	68%	61%	46%	62%	57%	38%	45%	12%
2065	26%	26%	68%	66%	46%	20%	29%	28%	45%	18%
2100	19%	25%	68%	65%	46%	18%	28%	26%	45%	17%
<i>Deviation to base scenario, in percentage points</i>										
lower wage growth (1 % in real terms)										
2030	8%	5%	4%	6%	0%	2%	3%	5%	3%	1%
2065	16%	8%	4%	9%	0%	6%	7%	8%	3%	4%
2100	10%	7%	4%	9%	0%	6%	7%	7%	2%	4%
higher wage growth (3 % in real terms)										
2030	27%	24%	23%	25%	0%	22%	23%	25%	0%	21%
2065	28%	25%	23%	27%	0%	25%	26%	26%	0%	23%
2100	23%	25%	23%	27%	0%	24%	25%	25%	0%	23%

Source: IMF staff estimates.

Deviations from the assumed future wage growth also affect replacement rates, although with the same pattern in nearly all countries assessed: a lower wage growth leads to higher pension adequacy (see Annex Table 9). Three reasons explain this result. First, in a lower wage growth scenario the relative performance of defined-contribution pensions (reflected in the nominator of the replacement rate) compared with wages (considered in the denominator) improves. This aspect plays a role, in particular, in pure defined-contribution pension schemes, such as Mexico or Chile. Second, earnings in the years before retirement are more similar to earnings at retirement in the lower wage growth scenario. This aspect can affect reference earnings calculated in defined-benefit schemes where reference earnings reflect past earnings revaluated to the point of retirement with price changes (or not at all) as in Costa Rica and Colombia. In these scheme a lower wage growth increases the ratio of reference earnings to earnings at retirement. Consequently, defined-benefit benefits (considered in the nominator of the replacement rate) rise relative to earnings (reflected in the denominator) and overall replacement rates increase. Third, minimum (maximum) pensions and other top ups are in some countries (see Annex Table 7) only indexed with the general price development and not with the (usually) higher nominal wage growth. As a consequence, these additional benefits shrink relative to wages in the economy. A lower wage growth limits this decoupling of minimum benefits to earnings. As a result, pension benefits reflected in the nominator of the replacement rate increase relative to wages (considered in the denominator). An outlier is again El Salvador where the minimum pension is indexed with wage growth, hence a lower/higher wage growth affects the nominator and denominator of the replacement rate equally and pension adequacy does not change in alternative wage growth scenarios.

Over the past decades, life expectancy has risen rapidly in Latin American countries (see Chapter 3 Section A) and has almost caught up with that of high-income countries. For the decades to come the UN assumes a fur-

Annex Table 10. Sensitivity of Replacement Rates to Life Expectancy (Males)

	BOL	CHL	COL	CRI	SLV	MEX	PAN	PER	URY	DOM
base scenario (UN demographic assumptions)										
2030	50%	35%	68%	61%	46%	62%	57%	38%	45%	12%
2065	26%	26%	68%	66%	46%	20%	29%	28%	45%	18%
2100	19%	25%	68%	65%	46%	18%	28%	26%	45%	17%
<i>Deviation to base scenario, in percentage points</i>										
lower rise in life expectancy										
2030	0%	1%	0%	0%	0%	0%	0%	2%	0%	0%
2065	0%	2%	0%	1%	0%	2%	1%	3%	0%	1%
2100	2%	3%	0%	1%	0%	2%	2%	4%	0%	2%
higher rise in life expectancy										
2030	0%	21%	0%	0%	0%	0%	0%	21%	0%	0%
2065	0%	22%	0%	21%	0%	21%	21%	22%	0%	21%
2100	21%	22%	0%	21%	0%	21%	22%	22%	0%	21%

Source: IMF staff estimates.

ther increase in life expectancy (see, for example, Annex Table 5), albeit at a slower pace than in the past. A natural question to ask is how pension adequacy results change if one deviates from UN mortality assumptions. Annex Table 10 presents two demographic sensitivity scenarios. The “lower rise in life expectancy scenario” assumes that the growth in life expectancy (at a given age and year) is only half of that assumed by the UN. Thus, for instance, for Chile it is assumed that male life expectancy at age 60 rises from currently about 23 years to 26 years in 2065, compared with the UN base scenario of 29 years in 2065. The “higher rise in life expectancy scenario”, on the contrary, assumes that the growth in life expectancy is 50 percent higher than assumed by the UN. In the example of Chile this implies that male life expectancy rises to 32 years in 2065 (instead of 29 years). This sensitivity analysis shows that a change in life expectancy assumptions has the largest impact in countries with pure defined-contribution pension schemes, such as Chile or Mexico. Moreover, a variation in life expectancy assumptions has a smaller impact on pension adequacy than changes in the rate of return and wage growth parameters (considered above).

Indexation rules can be crucial for long-term pension projections as annual indexation effects cumulate over time. This also holds for the pension adequacy outlook. The base scenario demonstrates future expected replacement rates under current pension law. In other words, it follows the indexation rules of minimum pensions and other benefits/thresholds defined in legal acts. If the pension law does not provide any indexation rule, past indexation practices are extended. Annex Table 11 shows how results change if policy-makers enact alternative indexation regimes mainly of the minimum pension (see Annex Table 12). In six out of the 10 countries assessed, this policy scenario shows no substantial impact on replacement rates, mainly because minimum pensions are too low in any indexation scenario to affect the pension levels of standard scheme members (average wage earners). In four of the 10 countries, however, replacement rates differ significantly if alternative indexation rules are applied.

Annex Table 11. Sensitivity of Replacement Rates to Alternative Indexation (Males)

	BOL	CHL	COL	CRI	SLV	MEX	PAN	PER	URY	DOM
base scenario										
2030	50%	35%	68%	61%	46%	62%	57%	38%	45%	12%
2065	26%	26%	68%	66%	46%	20%	29%	28%	45%	18%
2100	19%	25%	68%	65%	46%	18%	28%	26%	45%	17%
<i>Deviation to base scenario, in percentage points</i>										
Alternative Indexation scenario										
2030	14%	0%	0%	0%	211%	0%	0%	0%	0%	0%
2065	39%	3%	0%	0%	221%	1%	15%	24%	0%	0%
2100	45%	3%	0%	0%	223%	5%	15%	26%	0%	0%

Source: IMF staff estimates.

Annex Table 12. Overview of the Alternative Indexation Scenario

Country	BOL	CHL	COL	CRI	DOM
Minimum pension/Top-ups	Solidarity pension	Basic Solidarity Pension	MP + Top-ups for low wage earners at age 651	MP + Minimum contribution basis (MCB)	MP, granted at ages 65+
Indexation in base scenario	Minimum and maximum solidarity limits indexed with CPI	with CPI	MP indexed with wages	MP indexed with CPI, Min contrib basis indexed with wages	with wages
Alternative Indexation	Wage indexation	Wage indexation	CPI indexation	CPI indexation of MP	CPI indexation
Country	MEX	PAN	PER	SLV	URY
Minimum pension/Top-ups	Social quota top up + MP	MP	MP + Maximum pension	MP	MP + Top up for mixed pillar low wage earners
Minimum pension/Top-ups	both with CPI	with CPI	both with CPI	with wages	MP indexed with wages
Alternative Indexation	Wage indexation	Wage indexation of MP + 500 Balboa Limit	Wage indexation	CPI indexation	CPI indexation

Sources: National pension laws, OECD/IDB/The World Bank (2014), SSA 2016.

In particular, Bolivia’s replacement rates would be much higher if the solidarity pension limits were annually adjusted with the economy-wide wage growth. The same applies to Peru if the defined-benefit maximum pension was indexed to wages instead of prices. The opposite happens in El Salvador, where a deviation from the currently high wage indexation of minimum pensions to a price adjustment would lower expected replacement rates. In Panama, only monthly wages above the threshold of 500 balboa serve as a contribution basis for contributions in the defined-contribution scheme and individuals with lower earnings contribute only to the more generous defined-benefit scheme. Since the introduction of this system in 2005, the 500 balboa limit has not been adjusted, and according to the law no increases are foreseen. Consequently, the defined-benefit system will gradually “disappear” in the retirement basket of future Panamanian retirees who will channel (nearly) all their contributions to the defined-contribution system. However, if Panamanian policy-makers opted for an annual indexation of the 500 balboa limit with general wage growth, future replacement rates would increase by roughly 50 percent compared to the base scenario over the very long term (as shown in Annex Table 11). Overall, these results underline that pension adequacy may change if new indexation rules or practices are introduced. Of course, such policy changes would be accompanied by fiscal costs, which are not covered in this exercise.

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Glossary

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Active coverage rate: The share of the labor force that contributes to a pension system.

Active member: A pension plan member who is making contributions (and/or on behalf of whom contributions are being made) to a pension fund.

Actuarial balance: The difference between the summarized income rate and the summarized cost rate of a pension fund over a given valuation period.

Adequacy ratio: Pension indicator that compares the starting pension of a new retiree to average earnings of the working population. It provides an intergenerational or societal perspective: a low level of the adequacy ratio may point to the risk of future poverty if current pension policies are assumed.

Administration: The operation and oversight of a pension fund.

Annuity: A form of financial contract that guarantees a fixed or variable payment of income benefit (monthly, quarterly, half-yearly, or yearly) for the life of a person(s) or for a specified period of time. An annuity may be bought through installments or as a single lump sum. Benefits may start immediately, at a predefined time in the future, or at a specific age.

Beneficiary: An individual who is entitled to a benefit (including the plan member and dependents).

Benefit: A payment made to a pension fund member (or dependents) after retirement.

Contribution: A payment made to a pension plan by a plan sponsor or a plan member.

Contribution base: The reference salary used to calculate the contribution.

Contribution rate: The amount (typically expressed as a percentage of the contribution base) that is needed to be paid into the pension fund.

Contributor: See “active member” and “covered employment.”

Contributory pension scheme: A pension scheme where the employer and/or the members have to pay into the scheme.

Deferred member: A pension plan member who no longer contributes to or accrues benefits from the plan but has not yet begun to receive retirement benefits from that plan.

Deferred retirement: A situation when an individual decides to retire later and draw the pension benefits later than the normal retirement age.

Defined-benefit (DB) occupational pension plans: Occupational pension plans other than defined-contributions plans. In “traditional” DB plans, benefits are linked through a formula to the members’ wages or salaries, length of employment, or other factors. In “hybrid” DB plans, benefits depend on a rate of return credited to contributions, where this rate of return is either specified in the plan rules—independently of the actual return on any supporting assets (for example, fixed, indexed to a market benchmark, tied to salary or profit growth)—or calculated with reference to the actual return of any supporting assets and a minimum return guarantee specified in the plan rules.

Defined-contribution (DC) occupational pension plans: Occupational pension plans under which the plan sponsor pays fixed contributions and has no legal or constructive obligation to pay further contributions to an ongoing plan in the event of an unfavorable plan experience.

Dependency ratio: Typically defined as the ratio of those of nonactive age to those of active age in a given population. In the UN population prospects, the total dependency ratio is the ratio of the sum of the population ages 0–14 and ages 65+ to the population ages 15–64. The child dependency ratio is the ratio of the population ages 0–14 to the population ages 15–64. The old-age dependency ratio is the ratio of the population ages 65 years or older to the population ages 15–64. All ratios are presented as number of dependents per 100 persons of working age (15–64).

Dependent: An individual who is financially dependent on a (passive or active) member of a pension scheme.

Early retirement: A situation when an individual decides to retire earlier and draw the pension benefits earlier than the normal retirement age.

Elderly coverage ratio: The share of pension beneficiaries over the total population ages 65 and older or over the total population above the normal retirement age.

Final average earnings: The fund member's earnings that are used to calculate the pension benefit in a defined-benefit plan; it is typically the earnings of the last few years prior to retirement.

Fund member: An individual who is either an active (working or contributing, and hence actively accumulating assets), passive (retired, and hence receiving benefits), or deferred (holding deferred benefits) participant in a pension plan.

Funded pension plans: Occupational or personal pension plans that accumulate dedicated assets to cover the plan's liabilities.

Gross rate of return: The rate of return of an asset or portfolio over a specified time period, prior to discounting any fees or commissions.

Indexation: The method with which pension benefits are adjusted to take into account changes in the cost of living (for example, prices and/or earnings).

Individual pension funds: A pension fund that comprises the assets of a single member and his or her beneficiaries, usually in the form of an individual account.

Life expectancy: The average number of years of life expected by a hypothetical cohort of individuals who would be subject during all their lives to the mortality rates of a given period. It is expressed as years.

Mandatory occupational plans: Participation in these plans is mandatory for employers. Employers are obliged by law to participate in a pension plan. Employers must set up (and make contributions to) occupational pension plans, which employees will normally be required to join. Where employers are obliged to offer an occupational pension plan, but the employees' membership is on a voluntary basis, these plans are also considered mandatory.

Minimum pension: The minimum level of pension benefits the plan pays out in all circumstances.

Mixed pension plans: Pension plans that have two separate DB and DC components but that are treated as part of the same plan.

Noncontributory pension scheme: A pension scheme where the members do not have to pay into the scheme.

Normal retirement age: The age from which the individual is eligible for pension benefits.

Occupational pension plans: Access to such plans is linked to an employment or professional relationship between the plan member and the entity that establishes the plan (the plan sponsor). Occupational plans may be established by employers or groups thereof (for example, industry associations) and labor or professional associations, jointly or separately. The plan may be administered directly by the plan sponsor or by an independent entity (a pension fund or a financial institution acting as pension provider). In the latter case, the plan sponsor may still have oversight responsibilities over the operation of the plan.

Passive coverage rate: The share of the population above the normal retirement age that receives a pension.

Pay-as-you-go (PAYG) plan: See “unfunded pension plans.”

Pension funds: The pool of assets forming an independent legal entity that are bought with the contributions to a pension plan for the exclusive purpose of financing pension plan benefits. The plan/fund members have a legal or beneficial right or some other contractual claim against the assets of the pension fund. Pension funds take the form of either a special purpose entity with legal personality (such as a trust, foundation, or corporate entity) or a legally separated fund without legal personality managed by a dedicated provider (pension fund management company) or other financial institution on behalf of the plan/fund members.

Pension plan: A legally binding contract having an explicit retirement objective (or—in order to satisfy tax-related conditions or contract provisions—the benefits cannot be paid at all or without a significant penalty unless the beneficiary is older than a legally defined retirement age). This contract may be part of a broader employment contract, it may be set forth in the plan rules or documents, or it may be required by law. In addition to having an explicit retirement objective, pension plans may offer additional benefits, such as disability, sickness, and survivors’ benefits.

Personal pension plans: Access to these plans does not have to be linked to an employment relationship. The plans are established and administered

directly by a pension fund or a financial institution acting as pension provider without any intervention from employers. Individuals independently purchase and select material aspects of the arrangements. The employer may nonetheless make contributions to personal pension plans. Some personal plans may have restricted membership.

Phased retirement: A situation when an individual is allowed to retire and receive retirement benefits while continuing to work (usually part time) and contributing toward the retirement scheme.

Private pension funds: A pension fund that is regulated under private sector law.

Private pension plans: A pension plan administered by an institution other than general government. Private pension plans may be administered directly by a private sector employer acting as the plan sponsor, a private pension fund, or a private sector provider. Private pension plans may complement or substitute for public pension plans. In some countries, these may include plans for public sector workers.

Public pension funds: Pension funds that are regulated under public sector law.

Public pension plans: Social security and similar statutory programs administered by the general government (that is central, state, and local governments, as well as other public sector bodies such as social security institutions). Public pension plans have been traditionally PAYG financed, but some OECD countries have partial funding of public pension liabilities or have replaced these plans with private pension plans.

Rate of return: The income earned by holding an asset over a specified period. The net rate of return is calculated as the rate of return after discounting any fees of commissions.

Replacement rate: The ratio of an individual's (or a given population's average) pension in a given time period divided by (gross or net) preretirement earnings. It measures how effectively a pension system provides a retirement income to replace earnings, the main source of income before retirement. This indicator is measured in percentage of preretirement earnings.

Social security funds: Social security funds are social insurance programs covering the community as a whole or large sections of the community, which are imposed and controlled by a government unit. They generally involve compulsory contributions by employees or employers or both, and

the terms on which benefits are paid to recipients are determined by a government unit.

Support ratio: One over the dependency ratio (see “dependency ratio”).

Total fertility: The average number of children a hypothetical cohort of women would have at the end of their reproductive period if they were subject during their whole lives to the fertility rates of a given period and if they were not subject to mortality. It is expressed as children per woman.

Unfunded pension plans: Plans that are financed directly from contributions from the plan sponsor or provider and/or the plan participant. Unfunded pension plans are said to be paid on a current disbursement method (also known as the pay-as-you-go, PAYG, method). Unfunded plans may still have associated reserves to cover immediate expenses or smooth contributions within given time periods.

Voluntary contribution: An extra contribution paid in addition to the mandatory contribution a member can pay to the pension fund in order to increase future pension benefits.