



WP/17/99

IMF Working Paper

Fiscal Challenges of Population Aging in Brazil

by Alfredo Cuevas, Izabela Karpowicz, Carlos Mulas Granados, Mauricio Soto

***IMF Working Papers* describe research in progress by the author(s) and are published to elicit comments and to encourage debate.** The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

I N T E R N A T I O N A L M O N E T A R Y F U N D

IMF Working Paper

Western Hemisphere Department

Fiscal Challenges of Population Aging in Brazil

Prepared by Alfredo Cuevas, Izabela Karpowicz, Carlos Mulas Granados, and
Mauricio Soto¹

Authorized for distribution by Alfredo Cuevas

March 2017

IMF Working Papers describe research in progress by the author(s) and are published to elicit comments and to encourage debate. The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

Abstract

In recent decades, population has been aging fast in Brazil while old age pensions and health-related spending have increased. As the population ages, the spending trend threaten to reach unsustainable levels absent reforms. Increasing the retirement age is key, but by itself will not provide sufficient savings to close the pension system financing gap, and reforms reducing replacement rates are necessary. In the area of health, there is scope for improving expenditure efficiency by strengthening outpatient care and regional networks, and developing clinical guidelines for cost-effective treatments and drugs. Reforms are urgent, so that they can be gradual.

JEL Classification Numbers: H51, H55, J11, N36

Keywords: Pensions, health, aging, fiscal consolidation.

Author's E-Mail Address: ACuevas@imf.org, IKarpowicz@imf.org;
CMulasGranados@imf.org; MSoto@imf.org.

¹ We are grateful for helpful comments to Fabian Bornhorst, Kamil Dybczak, Carlos Góes, Troy Matheson, Paulo Tafner, Teresa Ter-Minassian, and the participants of the seminar at the central bank in Brasilia.

Table of Contents

Page

A. Overview	3
B. Brazil's Pension and Health Systems	4
C. Challenges from Aging Population	15
D. Reform Options	20
E. Concluding Comments	25

Boxes

1. Recent Changes in Retirement Incentives	9
2. Realism of Baseline Pension Expenditure Projections	18
3. Pension Reform Proposals Under Discussion	24

Figures

1. Demographic Indicators, 1960–2014	5
2. Pension Expenditure and Share of Elderly	10
3. Health Expenditure, 2013	14
4. Projected Fertility and Mortality Rates	15
5. Population Projections	16
6. Decomposition of Pension Expenditure	17
7. Pension Expenditure Projections, 2015–21	18
8. Pension and Health Spending Under the Baseline Scenario	19
9. Gains from Policies Raising Labor Force Participation	21
10. Reform Options to Stabilize Pension Spending, 2015–30	22
11. Estimated Impact of Various Pension Reform Options	23
12. Impact of Health Reforms	25

Tables

1. Key Parameters of the Brazilian Pension System, 2015	7
2. Benchmarks of Key Indicators	10
3. Determinants of Health Spending	17

References	27
------------	----

A. Overview

Brazil's population is aging. Declining fertility rates and increasing life expectancy are important drivers of demographic changes in Brazil and Latin America, contributing to slowing population growth and a rising share of the elderly in the population. Over the past half a century, the fertility rate in Brazil has halved and is now in line with that of more advanced economies (Figure 1). Annual population growth has declined sharply. Meanwhile, thanks to income growth, redistribution policies, and health reforms, life expectancy has increased in Brazil, increasing the dependency ratio. Those aged 65 and above constitute now about 7½ percent of the total population, two percentage points more than a decade ago.

These demographic trends are set to continue over the long run, raising the old-age dependency ratio. Because of falling fertility, the population will start declining in absolute terms in Brazil by mid-century. According to the UN, by 2050 Brazil's old-age dependency ratio—the ratio of people aged 65 and above to the population aged 15 to 64—will reach close to 37 percent, and surpass that of more advanced economies by 2100. Brazil's statistical institute (IBGE) projects a similar trend, with old age dependency reaching 36 percent by 2050.²

An aging population will soon pose fiscal challenges in Brazil, however—in fact, much earlier than 2050. Unlike in other countries, where demographic disequilibria point to difficult times down the road, the Brazilian pension³ system is already in deficit, which is projected to reach 3.2 percent of GDP in 2016 (Tesouro Nacional, 2015), reflecting structurally high spending that has been exacerbated by the drop in contribution revenues caused by the recession. Public age-related *spending* (on retirement and other pensions and health) is projected to reach levels incompatible with fiscal sustainability already within the next decade. Pension and health expenditures already represent half of total public spending in 2015 (16 percent of GDP) and, in the absence of reforms, are projected to increase to 21 percent of GDP in 2025. Beyond that, these spending needs would continue to rise, reaching 40 percent of GDP by 2050 as the elderly share of population more than triples from today.

Past reforms moderated pension deficits for a time, but urgent attention to aging-related spending is needed once again. The 1998 pension reform had a limited impact on deficits, and in 2003 parametric changes were introduced in the mandatory public sector pension regime. In 2012, a defined contribution pillar for the public regime was established which reduced replacement rates for higher earners and enhanced progressivity and equity with respect to private pensions at a relatively low transition cost. The macroeconomic impact of the reform was expected to be positive for Brazil (IMF, 2012). However, these reforms were insufficient, and will not contain the growth of pension spending ahead. In the area of health, limited

² 2013 estimate.

³ Brazilian usage typically requires calling retirement programs by the term “aposentadorias” while reserving the term “pensões” for other specific benefits, such as a survivor's or a disability benefit. In this paper we will treat the terms “pensions” and “social security” as broadly synonymous, and encompassing all of these various social security programs, unless explicitly indicated otherwise.

consideration was given to efficiency and cost control until recently, although spending had increased massively over the last few decades to fill the gap in coverage and health outcomes with respect to advanced economies.

Several options for reform are explored in this paper.

- **Pensions.** A combination of reforms to revise benefits eligibility are considered and have the potential of containing future deficits in the least distortionary way for labor incentives. In particular, delaying retirement would generate significant fiscal savings, but it is not enough on its own. Changing the benefits indexation formula and removing existing payroll tax exemptions are also potentially useful measures.⁴
- **Health.** Cost-containment in health is an unexplored area in Brazil. The experience of advanced economies provides insights on approaches to contain the growth of health spending. The effects of these reforms are difficult to quantify, however, and trends in longevity, evolving standards of care and the introduction of new technologies create new demands on health systems. This underscores the need to continuously refine approaches to achieve efficiency gains in the provision and utilization use of health services.

Reforms to age-related spending programs should start now so that they can be gradual.

B. Brazil's Pension and Health Systems

The Social Security System

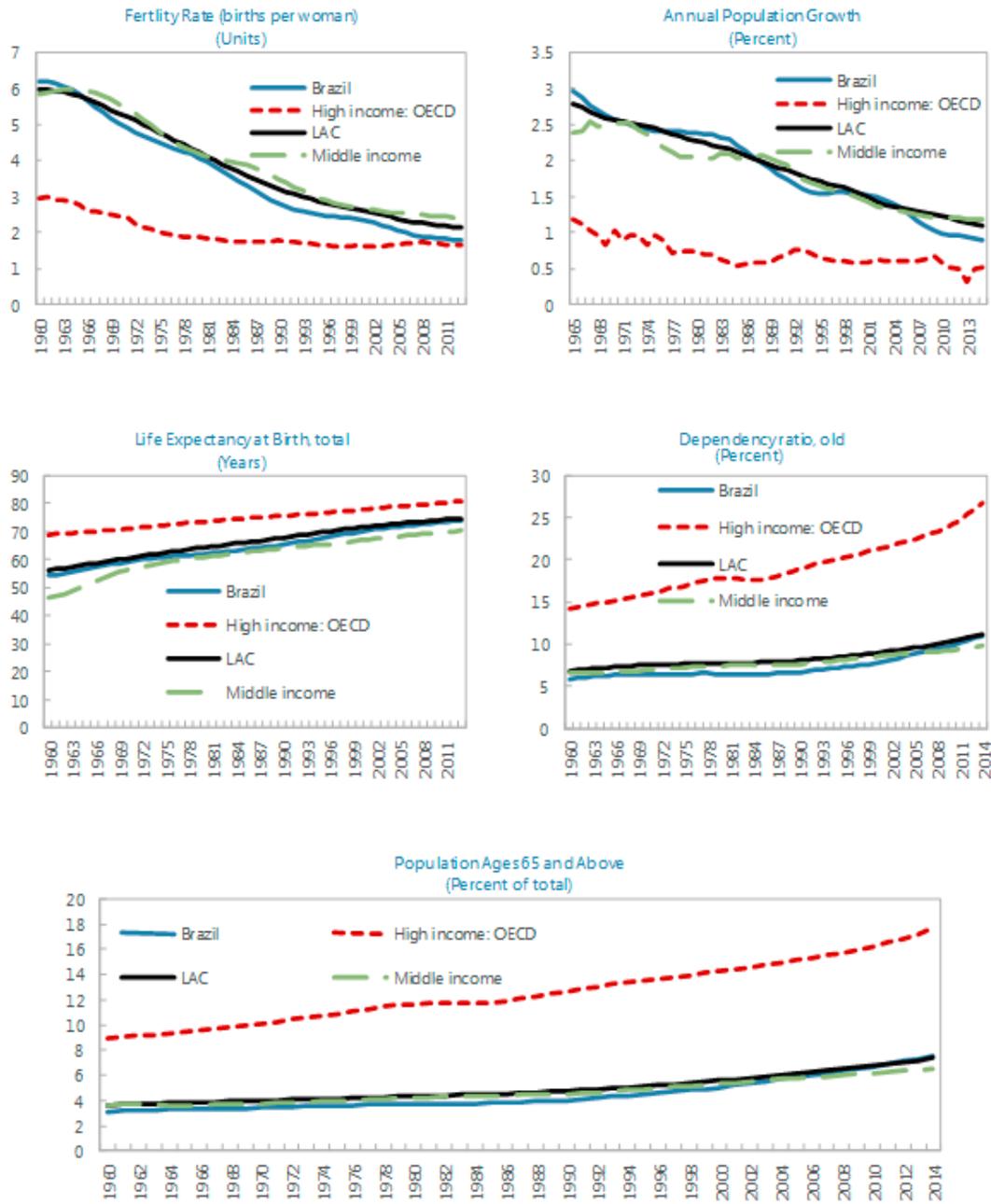
The Brazilian social security system offers a full menu of benefits, including old age, disability, and survivors' insurance, as well as early pensions. The institutions that offer retirement pensions also provide maternity benefits and worker's compensation, without requiring individuals to make separate contributions.

The core of Brazil's pension system consists of three main defined-benefit public schemes and a number of private, mostly voluntary, defined-contribution schemes.

- The mandatory system, known as *Regime Geral de Previdência Social* (RGPS), is a public system with 53 million contributors and some 30 million beneficiaries in the private sector—two figures that already suggest a serious imbalance, even before any detailed analysis. The RGPS disburses 7.1 percent of GDP in pensions (2015 estimate). Benefits are financed from employee contributions (8–11 percent on wages), employers' contributions (20 percent), the

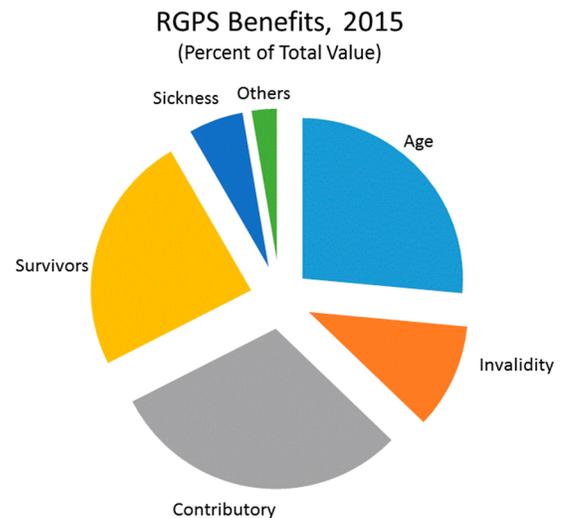
⁴ Some observers would argue that the removal of payroll tax exemptions would make no difference. The reason is that the INSS, which manages the system, receives compensation from the central government for the contribution revenue that is lost through exemptions. For the INSS, therefore, removing exemptions amounts simply to a switch between two revenue sources. But for the general government the economies are obvious.

Figure 1. Demographic Indicators, 1960–2014



Source: World Development Indicators, The World Bank.

COFINS tax and a profit tax—CSLL.⁵ The RGPS receives regular transfers from the budget to cover its deficit. Private sector employees can retire at age 65/60 (men/women) after 15 years of contribution (“Age”), or at any age with a full benefit if a worker has a complete contribution history—35/30 years for men/women (“Contributory,” which is a very common occurrence; in fact, average retirement age is in the mid-50’s, including because choices involving early retirement with a less than full retirement benefit for a less than full contribution history are also possible).⁶ Old-age benefits are the largest expenditure within the RGPS (Age + Contributory in the figure), both by number of beneficiaries and total value of benefits, but survivor’s and disability pensions are also important. There are 13 pension payments per year, which are indexed annually to inflation, except for those equal to one minimum wage (see below). There is another benefit within the RGPS called *Previdência Rural* (rural pension) for males/females aged 60/55 or older, who have completed at least 180 months of work in rural areas. The benefit is equal to the minimum wage (OECD, 2015). In 2015, about 9 million beneficiaries received a rural pension, representing approximately 31 percent of all recipients of pensions. The rural program represented 20 percent of the Government’s pension expenditures or 1.7 percent of GDP in 2014.



- The *Regimes Próprios de Previdência Social* (RPPS) are the schemes for workers in the federal, state, and municipal governments, often differentiated by their function: civil servants, the military, the judiciary, congressional staff, school teachers, and the police. The RPPS as a whole cover 1.5 million of beneficiaries, and disburse about 4 percent of GDP. Municipal, federal and state entities manage their own schemes for their employees, but are jointly coordinated by the Ministry of Pensions and Social Assistance (recently extinguished and incorporated into the Finance Ministry). In general, these pension plans are financed on a pay-as-you-go basis with the employee paying a percentage of their salary.⁷ At least 10 years of work within the government are required to qualify for a pension. The pension benefit formula takes into account the highest salaries from positions the member held for at least five years. To be entitled to a full public-sector pension benefit, the statutory retirement age is 60 for men and 55 for women (this applies to members who joined the system after the 1998 reform, while those who were already employed in the public sector in 1998 are subject to easier eligibility requirements—53 for men and 48 for women). Compared to the

⁵ COFINS and CSLL are not payroll taxes, but are earmarked for the social security, and so legally they are considered “contributions.” There are numerous exceptions to standard contribution rates which lower the effective rates.

⁶ Contributions to pension plans are tax-deductible, up to certain limits, for both the employee and the employer. Pension benefits are taxed as ordinary income.

⁷ The percentage varies depending on the public entity.

private-sector employees enrolled in RGPS, public-sector employees enrolled in RPPS receive higher pensions for lower contribution rates.

Table 1. Key Parameters of the Brazilian Pension System, 2015

Pension Parameter	Mandatory	
	Regime Geral (RGPS)	Regimes Próprios (RPPS) 1/
Coverage	Private sector	Civil servants
Funding	PAYG	MIXED
Pensionable age	65/60	60/55
Beneficiaries		
Millions	29.1	3.6
Benefit formula	Average of 80% of higher salaries	Average of 80% of higher salaries 2/
Average monthly benefit (est.)		
(R\$)	1,249	6,134.3
Expenditure		
Billions	436	265
Percent of GDP	7.4	4.5
Indexation post-retirement	CPI	CPI 2/
Contributions		
Contributors (millions)	53	6.5
Contribution rate	workers 8-11%, employers 20%	Min: workers 11%, employers 11-22%
Contributions (gross, billions)	350	116
Percent of GDP	5.9	2.0
Interest rate on contributions (monthly, Dec. 2015)		6%

Sources: Tesouro, MPS, and IMF staff estimates.

1/ Workers in the federal, state, and municipal governments: civil servants, the military, the judiciary, congressional staff, school teachers, and the police.

2/ For workers joining the civil service after 2004.

- Pension-like assistance benefits are also available to those who do not qualify for a retirement benefit on the basis of the systems mentioned above. The *Benefício de Prestação Continuada* (BPC) was created to assist persons 65 years old and above, male or female, and disabled people whose household income per capita is under one-quarter of the minimum wage. They receive an amount equal to the minimum wage and their conditions are reviewed every two years. The operational side of the scheme is administered by the INSS (medical certification and means-test), but the responsibility for the benefit is given to the Ministry of Social Development (MDS). In 2015, nearly 1.8 million received a BPC, representing approximately 6 percent of all recipients of pensions. The BPC program represented 4 percent of the government's pension expenditures or 0.3 percent of GDP in 2014.

There are also voluntary private schemes. Under the *Regime de Previdência Complementar* (RPC), both occupational and personal pensions are provided on a voluntary basis. Two pension vehicles exist that can be used to finance private pension benefits. Closed private pension entities are non-profit organizations that can be established on a single-employer or multi-employer basis and by labor unions. In addition to the closed approach, which is predominantly chosen by large employers, authorized financial institutions provide complementary pension provision through open private pension systems.

The RGPS has complex redistributive effects. The redistribution is mainly achieved by exemptions from contributions and reduced contribution rates for low-wage earners and certain sectors. Moreover, by law, no pension can be lower than the minimum wage (R\$880 in 2016), which is adjusted annually by the sum of inflation the previous year and real GDP growth two years earlier (if positive). As of 2015, about 67 percent of individual benefits paid by the RGPS corresponded to 1 minimum pension and were thus indexed to minimum pension growth (Credit Suisse, 2016). However, redistribution is not necessarily progressive: the RGPS covers those who have been employed formally and have contributed to the system for at least 15 years, who are typically better off than people who do not meet such criteria. Moreover, as the life expectancy of relatively more affluent individuals tends to be higher, the NPV of benefits that accrue to them is also higher. Other features of the RGPS may also suffer from poor targeting, such as the non-contributory rural pensions for instance, but this area is outside of the scope of this study.

Over the past two decades Brazil has made adjustments in some pension plans to reduce outlays. These adjustments included the 2003 reform of the RPPS for new entrants, the introduction of the *fator previdenciário* for the beneficiaries of the RGPS in 1999, and its subsequent replacement with a progressive 85/95 formula in 2015, and the tightening of the criteria for survivor benefits in 2015 (Box 1). Past reforms have been insufficient to contain pension spending growth, however, and have left unaddressed important challenges. The following challenges are worth highlighting:

- The average retirement age is low by international standards—54 in Brazil compared to 64 on average in the OECD (Queiroz and Figoli, 2010).
- Spending on pensions in percent of GDP is high relative to the share of elderly in the population (Figure 2 and Table 2).
- Benefits are growing faster than revenues, because of aging population, limited incremental gains from labor formalization, and the connection between the value of pensions and the minimum wage formula, which pushes pension spending growth above GDP growth.
- The multiplicity of pension systems increases inequities and puts pressure on overall pension spending due to duplication of benefits.

Box 1. Recent Changes in Retirement Incentives

In 1999, a law introduced into the RGPS an actuarial coefficient called *fator previdenciário* (*fator*) whose use would be optional in the calculation of pensions in case of retirement on the basis of age, and mandatory in the calculation of benefits based on the retirement on the basis of length of contribution. The *fator* increases with the insured's contribution rate, contribution period, and age, and decreases with life expectancy. In the case of retirement on the basis of age, the benefit was equal to the average of the highest 80 percent monthly earnings multiplied by 70 percent plus 1 percentage point for each set of 12 months of contribution (capped at 100 percent) and multiplied by the *fator*—only if this factor was higher than 1.0. For the retirement on the basis of length of contribution, the benefit was the average of the highest 80 percent monthly earnings multiplied by the *fator*.¹

$$f = \frac{Tc * t}{Le} * \frac{[1 + (Age + Tc * t)]}{100}$$

Where: *f*—*fator*; *Tc*—contribution time to retirement; *t*—contribution rate (0.3); *Le*—remaining life expectancy at retirement; and *Age*—age at the time of retirement.

The objective of this discount factor was to provide disincentives for early retirement and generate savings on pension benefits by offering higher pensions to new entrants with a longer contribution history and shorter residual life expectancy at retirement. Following a transition period in the 2000s, the discount factor contributed to lengthening of the contribution periods and increasing retirement age from 2009 on. It also generated lower pension benefits by about a third of what would have been paid out in the absence of this mechanism (Pereira, 2013).

In mid-2015, a new rule was introduced which would allow workers to retire with full benefits when the sum of age and contribution years was equal to 85/95, with a minimum of contribution of 30/35 years for women/men.² The use of *fator* became optional but workers who decided to retire with 30/35 years of contribution regardless of age would have their benefits curtailed by the application of the *fator*. These changes in rules were expected to postpone retirement but also to increase benefits in the period during which pensions were enjoyed, thus pushing up pension spending over the medium term.

Nine months into the implementation of the 85/95 rule, there have been rapidly increasing retirement applications and widening spread between pension benefits based on length of contribution (mainly those of higher-income workers) and benefits based on age (those of informal and precarious workers with shorter contribution histories). However, an assessment of this change in retirement incentives is not possible because the strike of INSS employees in the second half of 2015 contributed to a backlog in the processing of retirement applications. Also, the start of public discussions about the needed reforms in the pension system—including the introduction of the minimum retirement age—may have contributed to some advancement of retirement decisions, giving rise to confounding effects.

¹ The minimum and maximum monthly earnings for benefit calculation purposes are the same as in retirement based on length of contribution. (OECD, 2015)

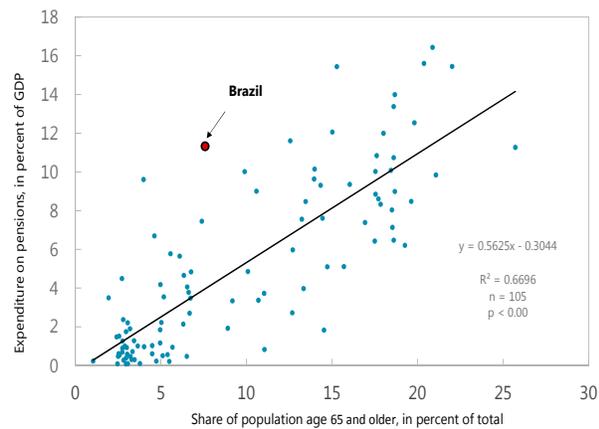
² This formula is to be adjusted every two years until it reaches 90/100 in 2026.

When compared to other countries, the large size of Brazil's pension system is evident. Total pension expenditure (public and private) is higher than in the advanced- and emerging-economy average, both as a share of GDP and per pensioner. When considering the demographic structure of the country, estimated spending on pensions in Brazil in 2015 was among the highest in a sample of about 100 countries (Figure 2 and Table 2).⁸

Gross and net replacement rates are above the OECD average, for male as well as for female pensioners (at 70 and 76 percent of average wage for men respectively).⁹ Pension contribution rates are extremely high and exacerbated by additional payroll levies, and contribute to high informality levels (contributors represent only 46 percent of working age population compared with 86 percent in advanced economies). Pension coverage, expressed as the share of pensioners to population aged 65 and older, is high at 93 percent, and close to advanced economies average, reflecting low effective retirement

age for men and women and non-contributory pensions. The minimum retirement age with full contributory history in the mandatory public regime is 48 for women and 53 for men and the

Figure 2. Pension Expenditure and Share of Elderly



Sources: World Development Indicators; and IMF Staff estimates.

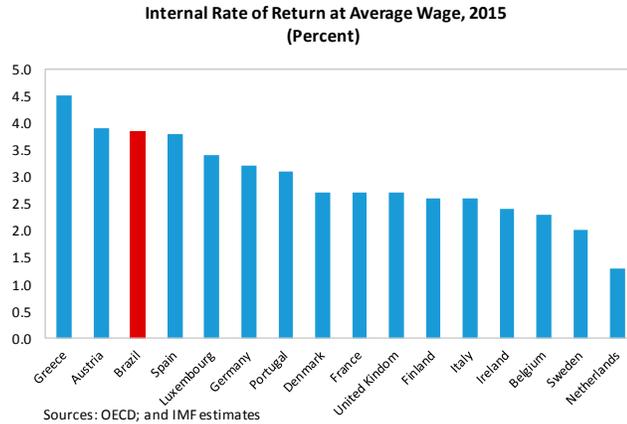
Table 2. Benchmarks of Key Indicators

Pension spending (percent of GDP)			
Brazil	11.3		
Advanced Average	8.7		
Emerging Average	5.0		
Developing Average	1.8		
Statutory retirement age - male		Statutory retirement age - female	
Brazil	65	Brazil	60
Advanced Average	64	Advanced Average	63
Emerging Average	61	Emerging Average	59
Developing Average	59	Developing Average	58
Old age dependency ratio (pop. 65+/pop. 15-64)		Avg. spend. per pensioner (% GDP per pop. 15-64)	
Brazil	12	Brazil	105%
Advanced Average	26	Advanced Average	32%
Emerging Average	11	Emerging Average	57%
Developing Average	6	Developing Average	85%
Contribution Rate, Pensions		Coverage (Pensioners to pop. 65 and older)	
Brazil	28%	Brazil	93%
Advanced Average	20%	Advanced Average	106%
Emerging Average	15%	Emerging Average	77%
Developing Average	13%	Developing Average	34%

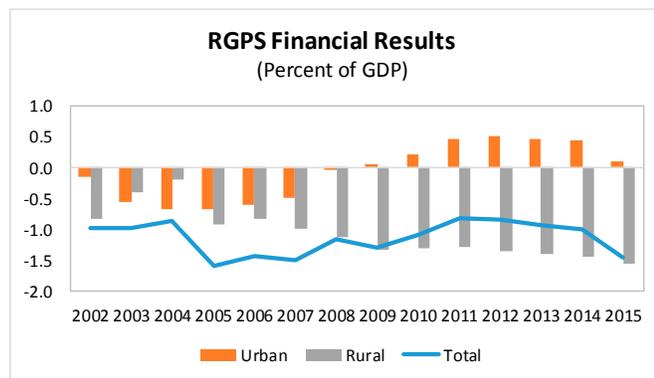
⁸ In Brazil, some of the pension system benefits have social assistance features which complicates the cross-country comparisons. Social benefits in other countries may be included in different expense category.

⁹ The gross replacement rate is defined as gross pension entitlement divided by gross pre-retirement earnings. The net replacement rate is defined as the individual net pension entitlement divided by net pre-retirement earnings, taking into account personal income taxes and social security contributions paid by workers and pensioners. These indicators are measured in percentage of pre-retirement earnings by gender.

average retirement age in the RGPS is 58 for the “age” pensions and 55 for the “contributory” pensions against 64 for the OECD countries. The internal rate of return, the difference between what an average retiree obtains (a person who enters the labor market at 25 years and retires at 65) from the pension system and what it contributes while working, is also high in international perspective.



The RGPS has been running deficits, mainly driven by the rural pensions. Revenues of the RPGS pension system increased from 4.7 percent of GDP in 2003 to 6.1 percent in 2014. During the same period, expenditures increased from 6.2 to 7.5 percent of GDP as the number of pension recipients increased by 40 percent (Caetano, 2015).



However, “urban” pension balances have been in positive territory in recent years and overall deficits were driven by limited contributions in the rural areas. In 2015, reflecting declining revenues due to the rising unemployment, the overall deficit in the RGPS reached 1.5 percent of GDP.¹⁰ Growing deficits in the pension system require growing subsidies by the Treasury to finance the gap. According to authorities’ projections, this imbalance will amount to 3.2 percent of GDP in 2016 (Tesouro Nacional, 2015).

The Health System

Brazil’s Unified Health System (SUS) was established by the 1988 Constitution with the objective of providing universal health care in an equitable way and with continuity. The subsequent reforms revolutionized the health system by expanding hospital capacity, as well as enhancing primary care offered through outpatient structures. Moreover, the funding framework was also unified and health spending was financed through general revenues, social contributions and, for some time, the Contribuição Provisória sobre Movimentações Financeiras (CPMF).¹¹ Service provision was decentralized to municipalities, and physical access was

¹⁰ A similar deficit was recorded in 2015 in the RPPS, where the number of beneficiaries is substantially lower, as contribution rates are extremely low.

¹¹ The federal health fund contributes to state and municipal funds which are also financed by subnational revenues (Couttolenc and Dmytraczenko, 2013).

equalized across regions. However, the administration of such a complex, decentralized public-health system, in which a large share of services is contracted out to the private sector, together with many private insurance providers, has caused conflicts and coordination issues.

Over time, the financing of health spending has evolved. While states and municipalities must dedicate 15 and 12 percent of their budgets respectively to health since 2000, federal government contributes 6–7 percent of its gross revenue, and finances half of the total public spending on health. The share has, however, declined significantly reflecting decentralization of health provision over the past two decades. Financing of private provision shifted from more expensive fee-for-service arrangements to prospective payment mechanisms and results-based mechanisms for transfers from the federal government to municipalities.

Public spending on health increased in Brazil since the mid-nineties and is set to rise further in the near future. Since 1995, real growth of public outlays on health was 5 percent on average (against 4 percent in LAC) and reached 4.6 percent of GDP in 2013 (from 2.9 percent of GDP). Public health spending remained constant as a share of total government expenditure, and below that of LACs and OECD countries whose share in total reaches 30 percent (Figure 3). In 2012, a complementary law established that federal government spending on health should grow at least in line with previous year's nominal GDP. A constitutional amendment approved in 2015 set the minimum spending on health to at least 13.2 percent of net current revenues. This ratio was to increase until it reached 15 percent of net current revenue in 2019.¹² Tax expenditures, arising from the uncapped deductibility of health expenditures from personal and corporate taxes, was estimated at R\$31.5 billion in 2015 (Receita Federal, 2016). Tax incentives have also stimulated acquisition of private health insurance plans whose incidence grew from 18 to 26 percent of population since 2000. (OECD, 2015b)

Private spending on health continued growing in parallel. One of the beliefs underlying the SUS reforms was that the role of private health care would decrease as a result of increased government spending and expansion of services. Contrary to expectations, private health care coverage continued to grow in real terms, but stabilized as a share of total health spending in recent years. The share of out-of-pocket expenditure constitutes over 30 percent of total expenditure, significantly higher than in OECD countries although in line with the LACs average (Figure 3).¹³ At about 5 percent of GDP in 2013, private spending on health is almost proportional to government spending on health in Brazil, and represents a greater share of total

¹² This provision was modified by the recently approved constitutional amendment establishing a cap on federal noninterest spending. This amendment says, among other things, that for 20 years federal health and education spending cannot be less in real terms than their budgeted amount in 2017, itself the amount relative to revenue that was projected to be reached in 2018 under the pre-amendment rules.

¹³ Out of pocket expenditure is any direct outlay by households, including gratuities and in-kind payments, to health practitioners and suppliers of pharmaceuticals, therapeutic appliances, and other goods and services whose primary intent is to contribute to the restoration or enhancement of the health status of individuals or population groups. Private health expenditure includes direct household (out-of-pocket) spending, private insurance, charitable donations, and direct service payments by private corporations.

spending compared to the average share in LACs.¹⁴ Reflecting relatively high spending on private programs, total health expenditure in Brazil, at 9.7 percent of GDP, was above the LAC average, and more in line with the average share of spending in GDP in OECD countries.

Health outcomes of Brazilians have improved markedly over the past two and a half decades, contributing to higher life expectancy and lower child mortality. Brazil has near universal coverage of immunization and pre-natal care, as well as hospital deliveries. Studies have shown that mortality from avoidable diseases has declined over time thanks to improved health service delivery. Geographical disparities in health interventions of this type are limited (Gragnotati et al., 2013). Infant and under-five mortality rates have decreased to 20 and 23 per 1,000 births respectively, and maternal mortality is in line with upper middle-income country average. Life expectancy has improved overall, and has equalized across states over time, also reflecting increased income and control of tobacco use.

Basic health coverage in Brazil is universal and the pattern of diseases affecting the population in Brazil increasingly resembles problems of mature economies. Worsening demographic trends are rapidly complicating health spending sustainability. Specific healthcare challenges in Brazil are the following:

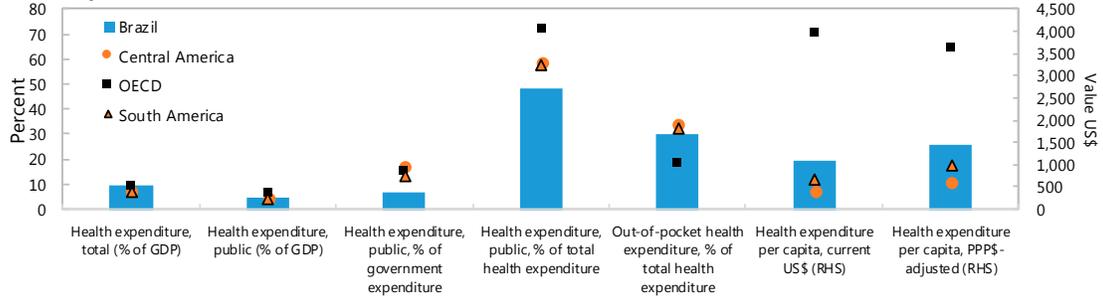
- Progress is still needed to improve the health status of large population segments and reduce regional disparities. To address these challenges, the government has introduced a program in 2013 (*Mais Médicos*) to hire doctors to work in poor areas plagued with medical staffing shortages.
- Old health problems are lingering while new ones are manifesting as a result of urbanization and social and environmental change. For instance, diabetes prevalence in population ages 20 to 79, at 8.7 percent in 2014, is close to the OECD average, and above that of middle-income countries and LAC.¹⁵ Meanwhile, some old health issues persist, such as malaria and dengue fever.

¹⁴ According to surveys, Brazilians rely on private provision for dental services.

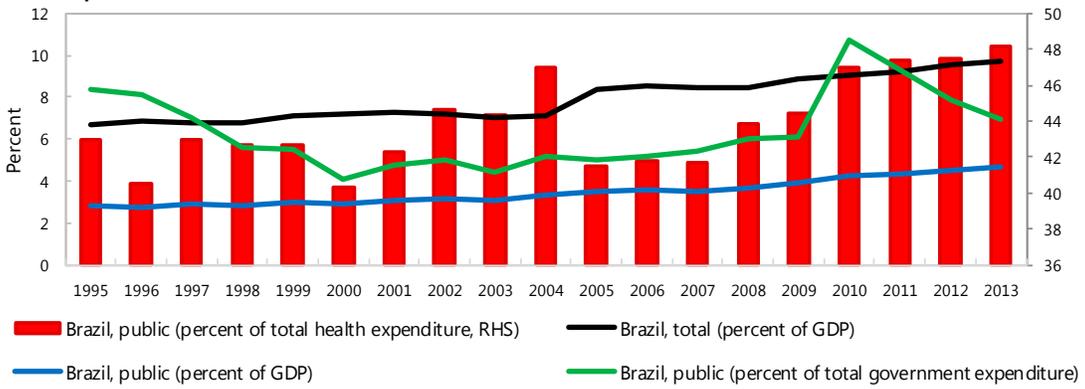
¹⁵ Other non-communicable diseases, such as cardiovascular diseases, hypertension, obesity, and neuropsychiatric disorders account for the overwhelming majority of causes of death and their trend is worrisome. (Victoria et al., 2011 and Schmidt et al., 2011).

Figure 3. Health Expenditure, 2013

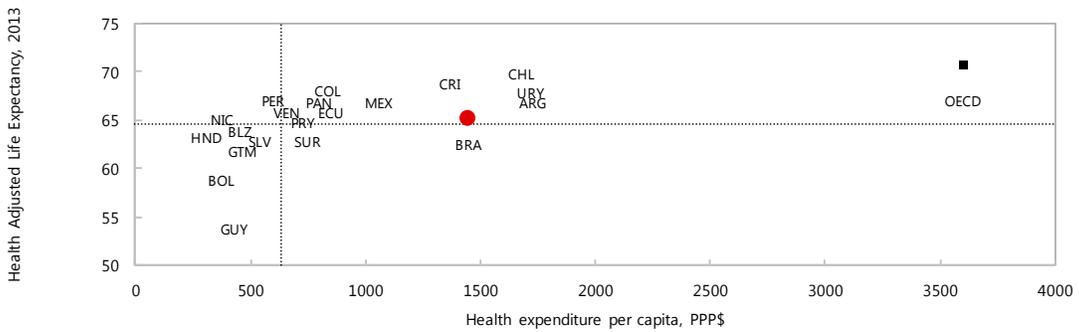
Health Expenditure Metrics



Health Expenditure Trends



Health Expenditure per Capita and Outcomes 1/



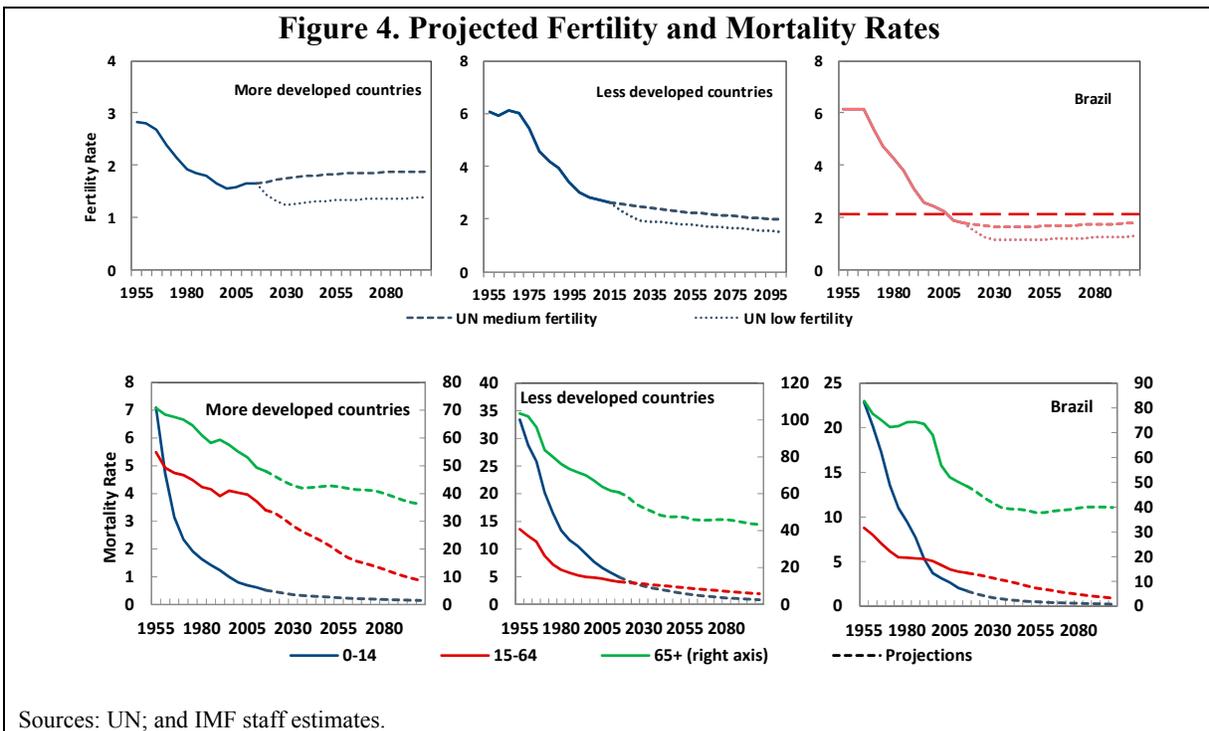
Sources: World Bank.

1/ The dashline is the average for Central America.

C. Challenges from an Aging Population

Demographic outlook

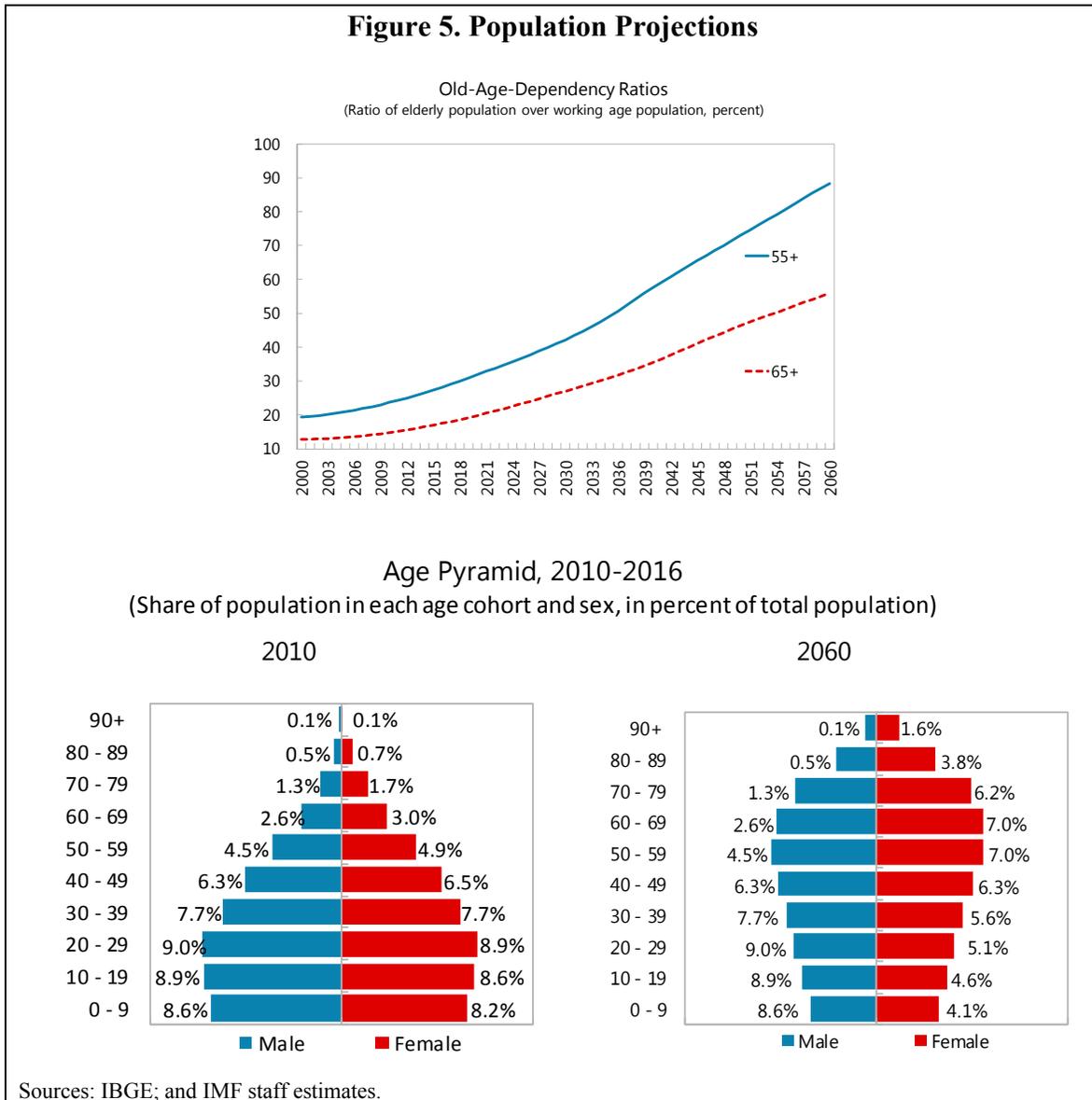
Brazil has one of the fastest aging populations in the world.¹⁶ A continued but gradual decline in fertility rates is projected to take place in less developed countries, including in Brazil (Figure 4). Because these estimates are surrounded by considerable uncertainty, the UN illustrates two scenarios: the “medium fertility” projection for LDCs assumes a continuous decline to about 2 children per woman by 2100 from 2.6 in 2015, while the “low fertility” scenario implies an immediate drop by about 0.5 children per women.



The decreasing trend in fertility rates is coupled with increasing longevity. Whereas longevity improvement is expected to slow down in the more developed economies, for the less developed economies and Brazil the projections suggest continued increases in life expectancy, as under-5 as well as old age mortality decrease reflecting increasing health care coverage. As the share of youth and working age population declines, the ratio of those aged 65 and older to those aged 15 to 64 is expected to reach 40 percent by 2100 in Brazil. Using these population projections, Figure 5 plots the old-age-dependency ratio for population 65 (alternatively, 55) and older. These ratios will increase from about 17 (28) in 2016 to 56 (88) in 2060 according to IBGE.

¹⁶ Based on demographic projections by UN (*2015 Revision of the UN World Population Prospects*). The assumptions behind the projections of fertility and mortality rates, and migration are described in Clements et al (2015). In Figures 4 and 5, “more developed economies” are Australia, Canada, European countries Japan, New Zealand, and the United States, while “less developed countries” include the rest of the world.

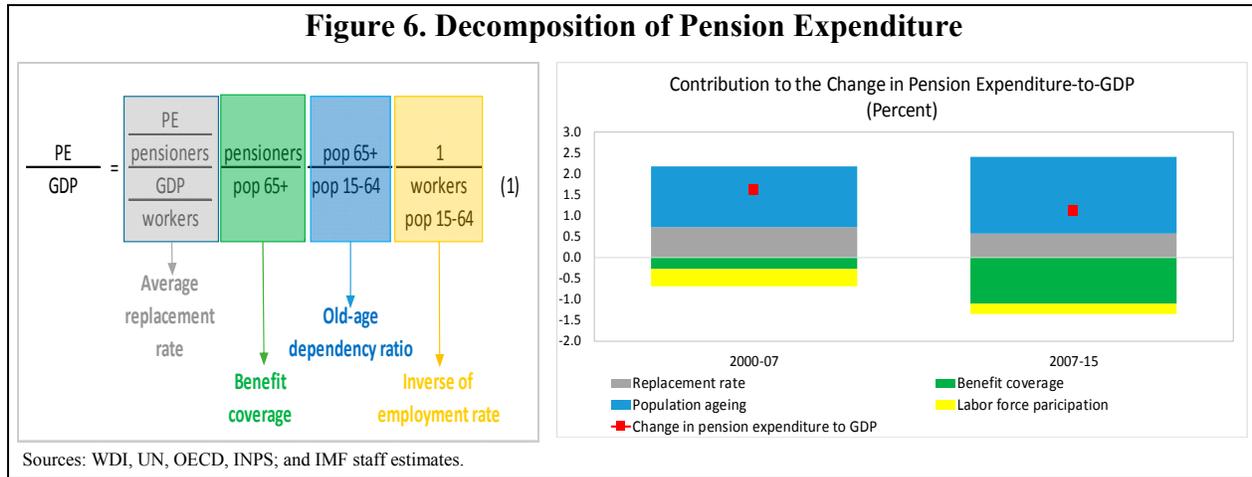
This picture shows that, under the young retirement age prevalent under the current system, not only does the system exhibit a larger dependency ratio today, but it also shows a faster rate of aging over time (measured by the increase in the dependency ratio). In other words, the financial imbalances arising from population aging are disproportionately larger when the retirement age is relatively low.



Fiscal impact

Population aging has been an important driver of pensions spending in Brazil. The growth in pension expenditure as a share of GDP can be decomposed into four distinct contributions: the growth of average replacement rates, the increase in benefit coverage, the impact of demographic changes on the old-age dependency ratio, and the change of the inverse of

employment rate. In Figure 6, the worsening age profile in Brazil and increasing replacement rates have affected pension expenditure growth over the past one and a half decade strongly. Higher replacement rates were the main driver of increasing pension spending in other emerging economies since the 1990s, but declining labor force and population aging have also played a role in emerging Europe (Clements et al., 2013). The *fator previdenciário (fator)*, in effect since 1999, may have helped reduce the ratio of pensioners to the elderly population (i.e. the “benefit coverage”, see Box 1).



Health care expenditure also grows with the old-age dependency ratio, albeit at a slower pace. On the demand side, the literature has identified raising income and aging population as the main drivers of public spending on health in advanced economies. Because elderly people consume more health care services than young people, increases in the share of the elderly population boosts health spending as a share of GDP. Other, non-demographic factors including technological change, and the lower productivity of services relative to other sectors (the so-called Baumol effect) account for the remaining share.

Table 3. Determinants of Health Spending

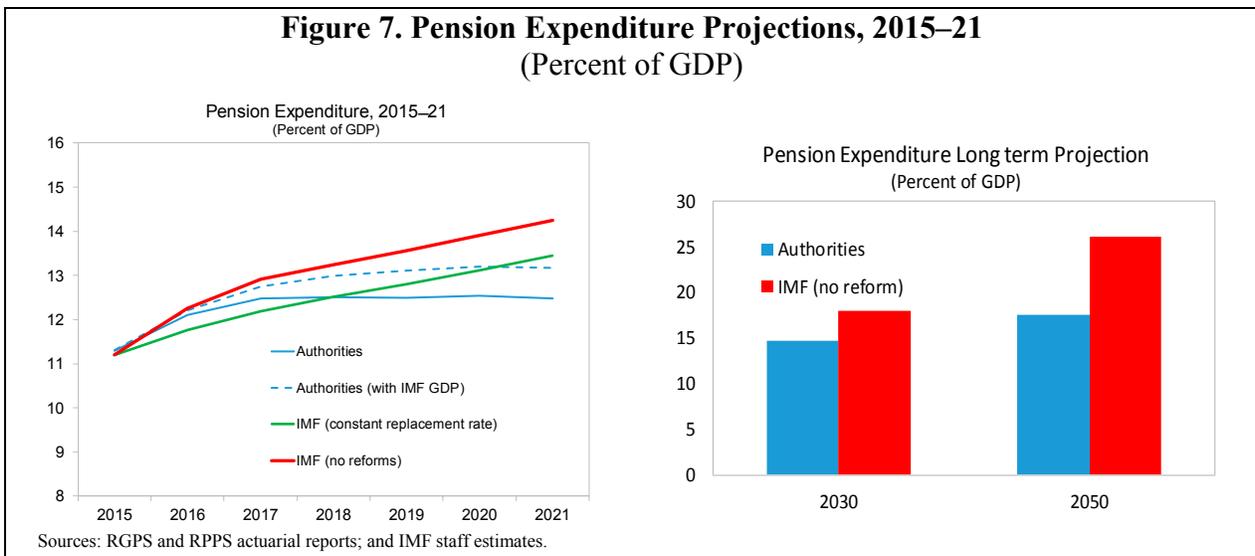
	(1) OLS Random Effects	(2) OLS Fixed Effects
Dependent Variable: Health Care Expenditure to GDP		
Population over 65 years old as a share of total	0.329*** (0.037)	0.320*** (0.061)
Natural log of GDP per Capita, PPP (Constant 2011 \$)	0.200** (0.084)	0.577** (0.223)
Constant	-1.242 (2.045)	-10.711** (5.426)
R-squared	0.116	0.123
Observations	3,909	3,909
Number of countries	210	210

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Reflecting rapidly aging population, Brazil’s spending on pension and health is projected to reach unsustainable levels already in the next decade. In an inertial baseline projection without reforms, pension spending rises to almost 14 percent of GDP by 2021 (Figure 7), 17 percent of GDP by 2030, and 29 percent of GDP by 2050. This projection reflects the decline in real GDP over 2015–16, the rise in the real value of the minimum wage (affecting some 70 percent of pensioners), and uses the Treasury’s projections of growth in the population of retirees, which is subject to larger-than-usual uncertainty because the new 85/95 rule introduced in mid-2015.¹⁷ We also calculate a more optimistic forecast with average pensions growing with average wages (an underestimate by construction); the result is only slightly less worrisome (green line), and still well above official actuarial projections. Official projections (blue line) show very slow growth in pension spending over the next several years, which would be possible only if benefits are reduced significantly or if benefit coverage declines.

Figure 7. Pension Expenditure Projections, 2015–21
(Percent of GDP)



Box 2. Realism of Baseline Pension Expenditure Projections

Some characteristics of the Brazilian demographic profile and pension system are not fully captured in our baseline projections. We are projecting pension expenditures for the overall private and public systems aggregate. The growth in benefits is slightly overestimated because in the RPPS system virtually all pensions are above the minimum wage and are therefore adjusted upward in line with average wage—not in line with the growth of the minimum wage. On the other hand, however, civil servants tend to retire earlier, particularly in the states where employment is disproportionately more concentrated in education and security services.

A force not factored into our projections that may push expenditures up compared to the baseline is the higher participation of women in the labor force. Except for the very recent period, which witnessed a

¹⁷ The population of retirees is growing at about 3.6 percent a year. Given the rule for updating the minimum wage and its link to pension benefits, most retirees’ benefits grow about as fast as nominal GDP; thus, the nominal growth in contribution revenue is barely enough to pay for the annual rise in the benefits of existing pensioners: little money is left over to finance the increase in the number of retirees.

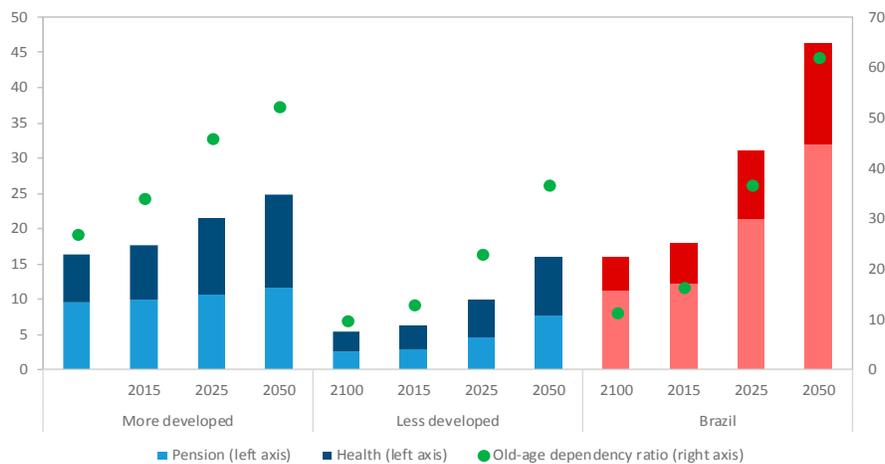
Box 2. Realism of Baseline Pension Expenditure Projections (Concluded)

generalized decline in labor participation, female labor force participation has increased to over 60 percent of the working age female population in 2014 from 45 percent in the 1990. The share of female retirees in total has also increased to 56 percent (Informe de Previdência Social, 2014).

Reflecting the current retirement rules which allow women to retire earlier, and given higher female longevity, pension expenditure can be expected to grow faster than in the baseline. This may be partly mitigated by lower wages, and therefore also pensions, that women typically enjoy. (If we think about social security deficits rather than social security expenditures, higher contributions owing to higher female labor force participation would be a mitigating factor.) Also, the incidence of duplication of benefits (combining one's own pension and a survivor's pension after the death of a spouse) is likely to increase as a result of increasing female labor force participation, an effect that may not be fully captured in our simulations. Finally, our projections exclude possible effects of past reforms whose influence on spending may be delayed. The net effect of all these factors is not clear.

The pension and health spending long term trends are substantially worse in Brazil than in advanced and in other less developed economies.¹⁸ Under unchanged policies (the “no reform” scenario), spending on pensions alone would reach 21.5 percent of GDP by 2050 in Brazil. Public spending on health would increase to 5.6 percent of GDP in 2025 (9.5 percent of GDP by 2050) from 4.6 percent of GDP in 2015 (Figure 8). The NPV of the funding gap of the social security system was estimated at 25 percent of GDP over the following two decades (IMF, 2012). However, since then, Brazil's potential growth was revised downward. This affects revenues adversely and contributes to an even larger funding gap.

Figure 8. Pension and Health Spending Under the Baseline Scenario
(Percent of GDP)



Sources: IMF Staff estimates.

¹⁸ The demographic estimation uses baseline population projections by the UN under the “medium variant” scenario which employs probabilistic models to extract projectors of fertility and mortality rates for individual countries. Beyond 2065, pensions are projected to grow in line with demographic developments.

A sensitivity analysis is applied to study the effect of different aging scenarios on long-term pension and health spending and the effect of reforms. Health care spending is expressed as a product of the size of spending on the young population, the inverse of the labor force participation rate for the young, and a function that depends on the old-age dependency ratio and the ratio of per capita health spending on the old to the per capita health spending on the young.

$$\frac{HE}{GDP} = \frac{\frac{HE_{0-64}}{pop\ 0-64}}{\frac{GDP}{workers}} \left(1 + \alpha \frac{pop\ 65+}{pop\ 0-64} \right), \text{ where } \alpha = \frac{\frac{HE_{65+}}{pop\ 65+}}{\frac{HE_{0-64}}{pop\ 0-64}} \quad (2)$$

Holding everything else constant in (1) and (2), an increase in the share of population aged 65 and above translates in an increase in pension and health spending to GDP. In the short run, effects of different assumptions on growth should be small reflecting the fact that current pensions are determined by past growth/wage realizations. However, pension spending can diverge from the model outcome if pensions are indexed to minimum wage growth and minimum wages grow above productivity, as is the case in the “no reform” scenario in Brazil.¹⁹

The impact of lower fertility and higher longevity on spending on age-related programs could be significant. Compared to the baseline presented above, we also estimate two risk scenarios, to take into account potential shocks on fertility and longevity assumptions. For example, spending on pensions and health in Brazil would increase by 3 percentage points of GDP by 2050 (25 p.p. by 2100) under the “low fertility” scenario. Under the “longevity risk” scenario, assuming that mortality rates for age 65 and older decline 50 percent faster than in baseline, pension and health spending would be 1.6 p.p. of GDP higher by 2050 (4.8 p.p. higher by 2100).

D. Reform Options

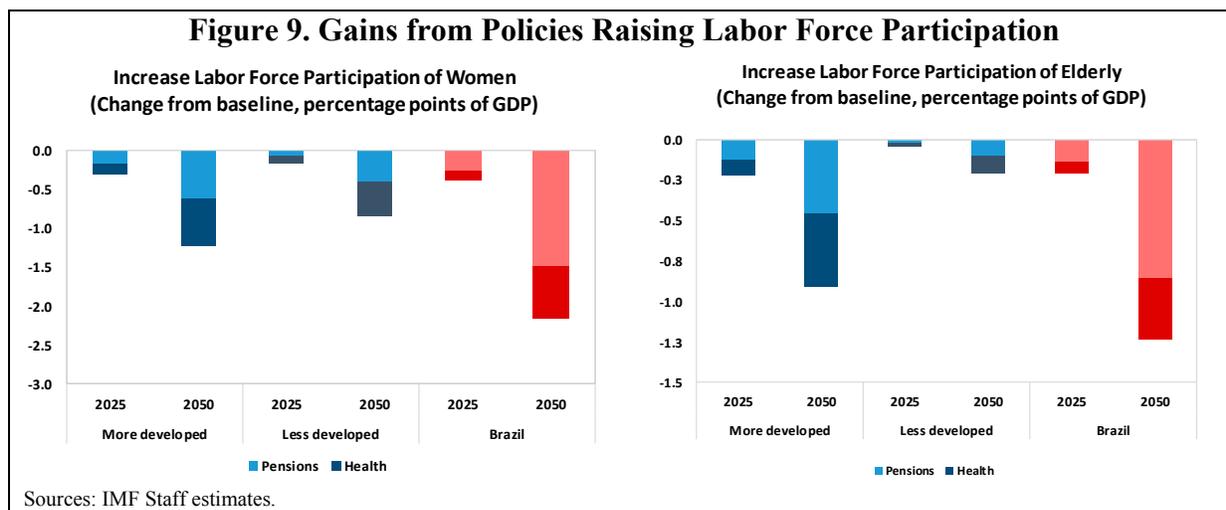
Policies available to address fiscal pressures from pensions and health belong to two broad groups: policies affecting labor force participation, and policies directly affecting features of these spending programs. Broadly speaking, policies directed at pension and health programs aim at increasing financing of these programs and/or lowering generosity of benefits.

Labor force participation

Policies that increase labor market participation for women and the elderly can partially offset the impact of aging. As in other Latin American developing countries, female labor market participation in Brazil is substantially lower than male participation: 65 as opposed to 85 percent of population age 15–64 in 2014. Absent a decline in average productivity per worker, halving that gap would boost GDP and increase financing for age-related (i.e., pension plus health) spending, so that the ratio of such spending to GDP would fall by 2.2 percentage points by 2050.

¹⁹ Second order interactions are not taken into account in the model.

Brazil has low labor participation rates for population between 55 and 64 years old (56 percent in 2014 compared to the 81 percent for the age group between 25 and 54 years old).²⁰ While this gap is common in other Latin American countries, halving it would contribute to reduce the ratio of age-related spending to GDP by 1.3 percentage points by 2050 (Figure 9 shows these potential gains in an international perspective).



Pension system reforms

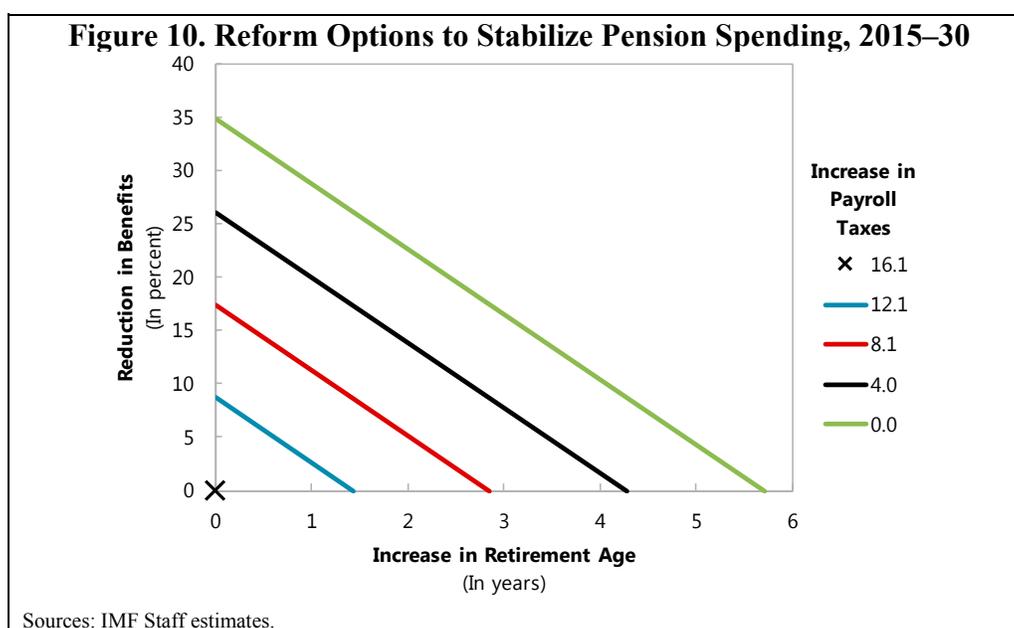
While countries may opt for a variety of policies to reform their pension systems, generally efforts aim at containing eligibility, lowering replacement rates and increasing revenues. The combination of policies will depend on the country's objectives and reflect different social, political and economic preferences.

- **Containing eligibility:** raising retirement ages is an especially attractive option and helps complement efforts to boost the labor force participation of older workers. To be effective over time, it needs to be accompanied by reforms that reduce actuarial imbalances. In other words, if retirement age is delayed, but retirees earn substantial additional benefits owing to that delay, then one might end up simply pushing back the deficits for some years, without eliminating them. Delaying retirement age while simultaneously adjusting the rate of accrual of benefits will reduce actuarial imbalances, which is paramount, and smooth the trajectory of spending over time. (See the third bullet under this paragraph.)
- **Increasing revenues:** increasing taxes on pensions for upper income groups and/or increasing payroll contributions.
- **Reducing replacement rates:** the growth in the average ratio of pensions to wages in the system can be reduced by abandoning indexation of benefits to the minimum wage for instance; also, replacement rates at the moment of retirement can be moderated by lengthening the period over which the pensionable wage is estimated, and/or modifying benefit formulas (accrual rates).

²⁰ ILO; based on Pesquisa Mensal de Emprego.

Brazil faces several policy alternatives to stabilize, and eventually reduce, pension deficits. With a deficit in the pension system equivalent to 1.5 percent of GDP in 2015 (and projected to reach 4.2 percent in 2025 in the authorities' scenario)²¹, the minimum objective of any pension reform should be to stabilize the financing gap. By introducing reforms that prevent pension imbalances from growing, the government can stabilize the amount of the subsidy that needs to be transferred every year from the federal budget to the social security system. This would be a major step forward in addressing fiscal sustainability problems in Brazil.²²

Options to contain spending include some combinations of the three main policy instruments mentioned above (i.e. raising retirement age, increasing contributions and/or managing the size of benefits). These trade-offs are illustrated in Figure 11. In Brazil's case, pension contributions are already high and need to be reduced over time to reduce market disincentives, so increasing them is especially difficult. To stabilize pension spending over 2015–30 without increasing payroll taxes it would be necessary, for instance, to reduce average benefits by almost 35 percent or increase the retirement age (without raising individual pensions as a result of the postponement of retirement) by almost 6 years. Any combination of options along the green line in Figure 10 would achieve the same result.²³



²¹ Tesouro Nacional, 2015; includes RGPS and RPPS of the federal government.

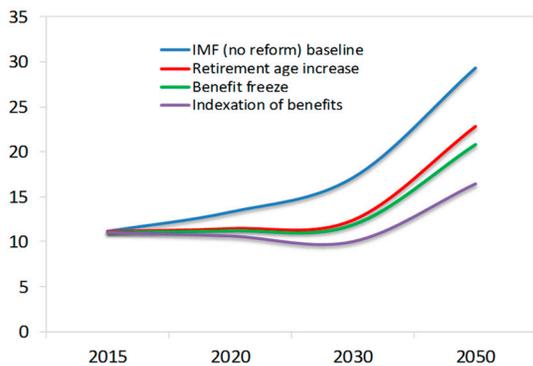
²² Under the proposed constitutional amendment, capping nominal expenditures to GDP over the next 20 years, the objective is even tougher as it implies that federal social security spending must fit under the cap.

²³ The calculations are straight forward. There is a 6.5 percentage point increase in spending on pensions between 2015 and 2030 (from 12.2 to 18.7 percent of GDP). An across the board reduction in benefits of 35 percent (6.5/18.7), would bring spending down to 12.2 percent of GDP in 2030. To achieve the same result, retirement age would have to be increased by about 6 years: we estimate that in 2013, about 28 percent of the population age 60+ is aged 60–64. This means that an increase in the retirement age by 5 years would cut beneficiaries by about 28 percent. To achieve a 35 percent cut, pensionable age would have to increase by 5.7 instead of by 5 years. The third option is increasing revenue from contributions. We assume that in Brazil it is possible to raise about 0.4 percent of GDP per each contribution point (this is based on the wage-to-GDP ratio and might be optimistic). To achieve 6.5 percent of GDP in savings, it would be necessary to raise pension contributions by 16.2 (6.5/0.4) percentage points.

Gradually raising retirement ages is an attractive policy option for Brazil, but it is not enough. Increasing retirement age would also boost labor participation and growth, and avoid the need for larger cuts in benefits. It would also be desirable as retirement age in Brazil is comparatively low. Increasing the retirement age by 5 years over the next 5 years would generate savings in pension spending equivalent to 4.7 percentage points of GDP by 2030 compared to the “no reform” baseline. However, this overestimates the true contribution of the retirement age increase to savings inasmuch as the model assumes that pension payments remain unchanged (i.e. the replacement rate at retirement does not rise despite the retirement date being postponed), which is not the typical case when contributory history is longer. In the model, pension spending would be above the level in 2015 by about 1 percentage point of GDP (Figure 11).

Another source of pressure is the growth in the real benefits to existing pensioners. To address this, it would be useful to remove the automatic link between pensions and the minimum wage (or to change the minimum wage formula). This would reduce pension expenditure by about 2.6 percentage point in 2030 (6.1 percentage points of GDP in 2050). But to frontload the rescue of the pension system by removing existing payroll tax exemptions would be advisable. A levy of 10 percent on nominal benefits could be considered as well as part of a package aimed at creating space for gradually lowering the currently high payroll contributions. After 2050, the system would stabilize by linking the increase in the retirement age to gains in life expectancy.

Figure 11. Estimated Impact of Various Pension Reform Options
(Percent of GDP)



Sources: IMF staff estimates.

Expenditure Increase (2015–30)
(Ppt. of GDP)

Projected Spending Increase	5.9
Impact of Reforms	-7.1
Retirement Age Increase	-4.7
Indexation of Benefits	-2.6
Benefit Freeze	-0.8
Decrease in Social Contributions	1.0
Net Change	-1.2

Box 3. Pension Reform Proposals Under Discussion

The government recently submitted to Congress a proposal for addressing the pressure from growing social security outlays which contains the following elements:

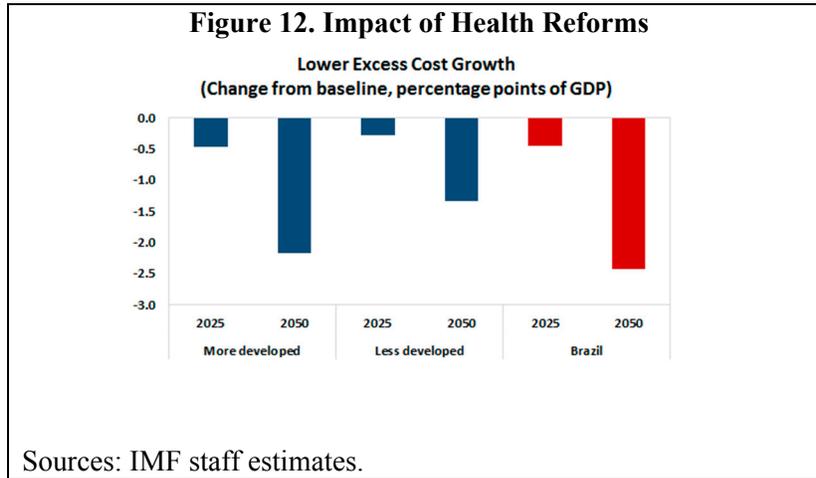
- **A minimum retirement age** of 65 for women and men, with some transitional arrangement for men age 50 and above and women age 45 and above (an increase of 50 percent of the remaining required contribution time under current rules).
- **Contribution time.** The minimum contribution period will be extended from the current 15 years to 25 years.
- **Equalization of RPPS and RGPS.** In the RPPS, for men under the age of 50 and for women under 45 years of age who entered public service before 2003, retirement will no longer be based on the contributor's full salary. In addition, the adjustment of benefits will no longer follow the increases of active workers' wages. Those who entered public service before 2003 and have not yet retired would be entitled only to adjustment of retirement benefits for inflation. The contribution rate will also increase to 14 percent from 11 percent currently.
- **Survivors' benefits.** In the current proposal, the sum payable to the widow or widower would amount to 50 percent of the value of the benefit payable to the main beneficiary (the deceased) in life, with an additional 10 percent for each (minor) dependent of the couple (up to 100 percent for a family with 5 children). The pensions will be de-linked from the minimum wage. It will also not be possible to combine this benefit with a survivor's own retirement benefit going forward (but as a transitory arrangement, persons currently combining the two benefits will not be affected).
- **BPC.** The minimum age for beneficiaries of the BPC will increase from 65 years to 70 years over the next 10 years. The value of the benefit will also be defined in law whereas currently it is based on the minimum wage.
- **Rural pensions.** One of the options discussed is to eliminate the exemption on contributions for export companies in the agricultural sector (where revenue forgone was estimated at R\$ 6 billion in 2016). In addition, a contribution of 5 percent of the minimum wage of rural worker's income will be applied.
- The pension reform also foresees termination of exemptions from social security contributions on export revenues - which represent annual revenue forgone of about R\$ 6 billion.

This is an ambitious proposal, which addresses many of the main sources of financial imbalance under the present system as discussed in this paper. A detailed evaluation of this proposal is beyond the scope of this paper, however, as the models we have used are not designed to simulate some of the detailed aspects of the proposed reforms. Moreover, the reform could undergo modification as it is discussed in Congress, and a full analysis needs to wait for the approved version of the reform.

Health system reforms

Health-adjusted life expectancy of 65 years for Brazil is associated with higher public spending on health, both as a share of GDP and in per capita terms, than in several comparative country groupings (Figure 3). This suggests that there are opportunities for achieving better outcomes without necessarily needing a larger pool of resources, or to generate substantial savings without reducing service delivery, by better aligning capacities to needs and increasing efficiency. Evidence of oversupply of technology in certain areas and underutilization of medical infrastructure have been documented in the literature (La

Forgia and Couttolenc, 2008) and it is known that adoption of new technologies has not been subject to opportunity cost scrutiny.



Going forward, options for cost-containment for Brazil can draw from the vast experience of advanced economies over the past few decades. A number of micro level reforms can improve health outcomes without increasing spending. Health technology assessment could support selection of new health care programs, drugs, and diagnostic equipment and tests. Moreover, focus will shift to avoiding and curing chronic non-communicable diseases that become prevalent as population ages, and efforts will have to include education programs that induce healthy life style and prevention (Schmidt et al., 2011). Savings could be achieved in the future by abolishing tax-deductibility of private insurance contributions which have undermined funding for the SUS and on which patients still rely for expensive treatments not covered by private plans. Other areas for action could include: elaboration of clinical guidelines, reducing dependency on imported technologies, and renegotiating deals with pharmaceutical companies. Linking of health expenditure to government revenue and backward-looking line-item budgeting could be replaced with global budgets and activity-based payment mechanisms that improve transparency and efficiency. Figure 12 offers some highly tentative assessment of potential efficiency gains in a comparative perspective; however, the financial impact of these reforms is difficult to quantify.

E. Concluding Comments

Brazil's population is aging rapidly and fiscal pressures are set to rise over time under the current framework of benefits and contributions. The demographic profile of the country and the already extensive benefits system will put the finances under considerable strain over the next decades. As the dependency ratio climbs up, spending on pensions and health could surpass 31 percent of GDP by 2050 if the existing system is not reformed. Although labor market interventions to boost labor force participation can provide some temporary respite, reforms directly addressing high replacement rates and early retirement ages cannot be avoided.

The growth of the publicly provided health care system will be difficult to sustain. Health care reform will have to contain growth of budgets without adversely effecting health outcomes by ensuring marginal expenditure is closely linked to incremental health benefits. While this is easier said than done, experience of advanced economies in health care cost containment offers important lessons for Brazil. To promote the efficient utilization of resources in this area, more remains to be done to reduce reliance on more expensive hospital treatments, by strengthening outpatient care and regional networks, and to reduce spending on pharmaceuticals, by promoting use of generic drug and developing clinical guidelines for the choice of cost-effective drugs and treatments. (OECD, 2015b)

This paper has discussed some possible pensions reform options at a very high level of generality, and without detailing transitional arrangements. But several of these ideas have been under discussion in Brazil for a long time, and in fact, some are consistent with specific aspects of the ambitious social security reform proposal sent to Congress by the government in December 2016. That said, we leave for future work a detailed study of the reform as it eventually emerges from the legislative process. What is useful to repeat is that it is the combination of an adverse demographic trend and the characteristics of the current benefits system that are driving pension spending up. Since demographic trends in Brazil are unlikely to change (as they follow patterns which are broadly common to the vast majority of nations), social security reform is therefore of utmost importance. To preserve the social security's system ability to carry out its functions in the future, reforms should start as soon as possible.

References

- Fazenda, 2015, “Cenário Macroeconomico 2016–19,” Ministerio de Fazenda, October 27.
- Gragmolati, M., Jorgensen, O.H., Rocha, R., and A. Fruttero, 2011, “Growing Old and Older in Brazil,” The World Bank.
- Gragmolati, M., Lindelow, M. and B. Couttolenc, 2013, “Twenty Years of Health System reform in Brazil: An Assessment of the Sistema Unico de Saude,” The World Bank.
- Caetano, M., 2015, “Previdencia Social,” manuscript.
- Clements, B., Coady, D., Eich, F., Gupta, S., Kangur, A., Shang, B., and M. Soto, 2013, “The Challenge of Public Pension Reform in Advanced and Emerging Economies,” Occasional Paper No. 275, International Monetary Fund.
- Clements, B., Dybczak, K., Gaspar, V., Gupta, S. and M. Soto, 2015, “The Fiscal Consequences of Shrinking Populations,” IMF Staff Discussion Note, SDN/15/21, International Monetary Fund.
- Clements, B., Coady, D. and S. Gupta, S., “The Economics of Public Health Care Reform in Advanced and Emerging Economies,” International Monetary Fund.
- Couttolenc, B. and T. Dmytraczenko, 2013, “Brazil’s Primary Health Care Strategy,” Universal Health Coverage Studies Series, No. 2, The World Bank.
- Credit Suisse, 2016, *Brazil Economic Digest*, June 21.
- IMF, 2012, Selected Issues Paper for the 2012 Article IV Consultation, International Monetary Fund.
- Informe de Previdência Social, 2014, Vol. 26, No. 2, February.
- La Forgia, G. and B. Couttolenc, 2008, *Hospital Performance in Brazil: The Search for Excellence*, The World Bank.
- Ocké-Reis, C.O., 2013, “Mensuração dos gastos tributários: o caso dos planos de saúde—2003–11, Nota Técnica N. 5, IPEA.
- OECD, 2015, *Pensions at a Glance*, OECD.
- _____, 2015b, *Economic Survey—Brazil*, OECD.
- Pereira, E.S., 2013, “Evolução das idades médias de concessão e dos tempos médios de contribuição das aposentadorias por tempo de contribuição concedidas entre 1999 e 2012,” Informe de Previdência Social, Ministério da Previdência Social, Brazil.

Queiroz, B.L. and M.G.B. Figoli, 2010, “The Social Protection System for the Elderly in Brazil,” Background paper prepared for the Workshop on Aging in Brazil, The World Bank, Brasília, April 6–7.

Receita Federal, 2016, Demonstrativo dos gastos tributários, estimativas bases efetivas—2013, Ministério da Fazenda.

Schmidt, M.I., Duncan, B.B., Azevedo e Silva, G., Menezes, A.M., Monteiro, C.A., Schmidt, M.I., Barreto S.M., Chor, D., and P.R. Menezes, 2011, “Chronic, non-Communicable Diseases in Brazil: Burden and Current Challenges,” *The Lancet Series*, No. 9781, Vol. 377.

Tafner, P., Botelho, C. and R. Erbisti, 2015, “Reforma da previdência—a visita da velha senhora, a gestão pública.”

Tesouro Nacional, 2015, “Relatório resumido da execução orçamentária e outros demonstrativos,” December.

Valdés-Prieto, S., 2007, “Pension Reform and the Development of Pension Systems: An Evaluation of World Bank Assistance,” *The World Bank Country Study*, No. 56343.

Victoria, C.G, Barreto, M.L., do Carmo Leal, M, Monteiro, C.A., Schmidt, M.I., Paim, J., Bastos, F.I., Almeida, C., Bahia, L., Travassos, C., Reichenheim, M., and F.C. Barros, “Health Conditions and Health-Policy Innovations in Brazil: The Way Forward,” *The Lancet Series*, No. 9782, Vol. 377.