

The Social Protection System for the Elderly in Brazil

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Abstract

This article examines the evolution of retirement in Brazil and its old-age support programs (public pension). The key objective is to show that given the current trend in population and size of the programs, their sustainability in the near future may be endangered. The analysis follows previous studies, specially Turra & Queiroz (2009), that projected the ratio of dependence of the public pension in different scenarios and show how the combination of change in the age structure and absence of proper policies make the situation of the Brazilian situation worse than could be expected. In this paper, we also provide a measure of public pension expenditure under different policy scenarios. This paper provides empirical evidence indicating that the absence of appropriate policies can, aggravate adverse effects of population aging. We show that the public pension system works less efficiently than desired and it is already in weaker condition than system in more developed nations. We contribute to the debate on how critical policy areas may reduce the potential economic impact of demographic changes. We do not test for the effects of social security financial conditions to economic growth, but by using counterfactual projections of different measures we shed light on the roles played by demographic, policy and economic changes on the situation of the social protection system for the elderly in Brazil.

Belo Horizonte, September 2010.

1. INTRODUCTION

The world population has been showing signs of major changes in the past few decades. The average age of the population is projected to 45 years by 2050 in developed countries, according to the United Nations. The aging in the developing countries has been found to be slower, and the average age by 2050 will be 36 years old, but given the fast decline in fertility and mortality, the aging process will be faster than observed in the developed countries.

The aging of the population increased the concern in relation to the sustainability of the public social support programs for the elderly (Wise, 2004). If in the past a large part of the support for the elderly was provided by the family, today this support comes from programs created by the public sector and, in some countries, also by the private sector (Costa, 1998). In general, these programs are very important in order to narrow the difference in income between the elderly and people at an active age and to reduce the poverty rates of the elderly population (Gruber & Wise, 2001). However, recently the vast majority of programs have come up against serious fiscal and financial problems. Most of them function on the *Pay-As-You-Go* (PAYGO) basis, namely, the old age pension of the elderly today is financed by today's workers' contributions. The balance of the programs is increasingly difficult with the increase in the ratio of dependence, population aging and a faster process of reducing the average retirement age (Bongaarts, 2004).

Brazil is one of the countries facing such problems. Despite unabated interest among researchers in issues pertaining to the impacts of social security provision to retirement behavior, little is known about these issues in emerging economies. Brazil is one example of an important context for elaborating linkages between pension benefits provision and retirement behavior. The rapidly aging population presents one of the greatest public policy challenges in Brazil. Compared to other emerging economies, Brazil is distinct for combining a relatively large public sector with rapidly aging population and declining labor force participation at older ages. The percentage of individuals age 65 and over is estimated to be 18% in 2050, compared to 3% in 1970 (UN, 2003). These changes in population age structure may impose severe pressures on the public sector (Bongaarts, 2004). At the same time, the length of working life has fallen over time, which results from both increases in educational attainment (younger workers) and changes in retirement behavior (older workers). The fall in economic participation for older workers (65 and older) is striking: 30% of them were in the labor force in 2000 compared to 60% in 1970. In 2002, social security benefits and other forms of elder support represented about 12% of the GDP (Brasil, 2003) and are expected to be the fastest growing

component of public spending (Giambiagi & Além, 1997; Giambiagi & Castro, 2003).

This article examines the evolution of retirement in Brazil and its old-age support programs (public pension). The key objective is to show that given the current trend in population and size of the programs, their sustainability in the near future may be endangered. The analysis follows previous studies, specially Turra & Queiroz (2009), that projected the ratio of dependence of the public pension in different scenarios and show how the combination of change in the age structure and absence of proper policies make the situation of the Brazilian situation worse than could be expected. In this paper, we also provide a measure of public pension expenditure under different policy scenarios.

This paper provides empirical evidence indicating that the absence of appropriate policies can, aggravate adverse effects of population aging. We show that the public pension system works less efficiently than desired and it is already in weaker condition than system in more developed nations. We contribute to the debate on how critical policy areas may reduce the potential economic impact of demographic changes. We do not test for the effects of social security financial conditions to economic growth, but by using counterfactual projections of different measures we shed light on the roles played by demographic, policy and economic changes on the situation of the social protection system for the elderly in Brazil.

2. OVERVIEW OF THE BRAZILIAN ELDERLY SUPPORT SYSTEM

This section presents an overview of the social support system for the elderly in Brazil. The paper presents an overview of the contributory, both for urban and rural workers, and non-contributory programs. Most pension systems are based on the PAYGO schemes, with a means-tested eligibility. The pension system is divided in four segments: general system, civil servants system, state-level civil servants and private fully-funded capitalization system. The general system covers workers employed in the private sector. There is also a large non-contributory welfare program for the elderly and disabled. This paper concentrates on the support system for the elderly.

2.1 Contributory System

The pension system in Brazil might have huge impacts on individual behavior and on the fiscal budget of the federal government. The social security system in Brazil consists of three main segments: the general system (workers in the private sector), the system of public servants, and various systems of

private capitalization. The country also has a widespread non-contributory system, with eligibility determined by people's level of income (means-tested) and either age or disability conditions, which provides benefits for the low-income population.

The social security system for private workers (general system) is an unfunded defined-benefit program. There is still debate regarding when it began. In 1888 some measures were taken to provide pension benefits to postal workers and employees of the national press. In the following years, retirement benefits were extended to railroad workers, employees of the Ministry of Finance, other members of the central government, and army forces. In 1923, the Lei Eloi Chaves (legislation) was approved to regulate social security for both civil servants and private workers. This law decentralized the pension system, as each company was responsible for its own employees. The first reform happened in 1933 when the pension funds became structured by professional category (Leite 1983). The general pension system was centralized only in 1966, when the House of Representatives approved the Social Security Ordinary Law. The National Social Security Administration, INPS, incorporated, in 1966, all the revenues and expenditures from sector-specific programs as well as its assets and liabilities. Another major change during this time was in the scheme of the program, which changed from a fully-funded system to a PAYGO (Leite 1983).

The last major change in regulation happened with the 1988 Constitution, which extended mandatory social security coverage to most of the excluded groups, including rural workers, without requiring equivalent increases in revenues from contributions. Other measures made the system more generous than before: establishing the minimum wage as the lowest benefit paid by the system, indexing all pensions to the minimum wage, and reducing the minimum age of retirement (Stephanes 1998).

The 1988 reform, which was implemented in 1991, had major impacts to the Rural Pension System. The major changes were the reduction in the minimum age of retirement from 65 years to 60 years for males, and from 60 to 55 years for females. The benefits were also extended to all rural workers who were not head of household and the minimum benefit was linked to the minimum wage. Box 1 summarizes the main changes that happened after 1988, the Box does not include changes that happened afterwards.

Box 1 – Characteristics of the Brazilian Public Pension System: before and after 1988 Constitution

Occupation	Type of Benefit	Before 1988	After 1988
Rural Workers	Old Age	Eligibility: 65 years for males and females Need to prove 3 years of rural occupation Benefit: 50% of minimum wage	Eligibility: 60 years for males and 55 for females no limit for number of beneficiaries per household Benefit: Employee: 70% of the average of last 36 months of contribution plus 1% for each additional year. Special: 100% of minimum wage
Rural Workers	Length of Service	It does not exist for rural workers	Same rules as urban sector workers
Urban Workers	Old Age	Voluntary: 65 for males and 60 for females necessary to leave current job to start receiving benefits minimum benefit: 90% of minimum wage. "Renda Mensal Vitalicia": elderly aged 70 and above and disable (any age), 50% of minimum wage.	Same age limits as before workers is allowed to stay in his current job minimum benefit 100% of minimum wage. Mandatory retirement for civil servants at age 70.
Urban Workers	Length of Service	Eligible: 30 years of work for males and 25 for females. For full benefits needed 35 years for males and 30 for females; for some occupation it was necessary less time it does not require minimum age; benefit: depends on length of service and recent wages; need to leave job to receive benefit minimum benefit: 90% of minimum wage	Age requirements for females were reduced by 5 years Benefit: 70% of the average of 36 last contributions, plus 6% per additional year up to 100% of average Minimum benefit: 100% of minimum wage
Rural Workers	Survivor's Benefit	50% of retirement benefit, for those covered plus 10% for family members. Minimum benefit: 60% of	100% of retirement benefit at age of death.

		munimum wage	
Urban Workers	Survivor's Benefit	50% of retirement benefit at the age of death or disability retirement benefit.	100% of retirement benefit at age of death.

Source: Carvalho-Filho (2008) and Ministério da Previdência e Assistência Social (*Note: The box only compares the systems before and after the constitution, it does not include any changes afterwards*)

Until 1998, full pension benefits were granted to all workers who have contributed for 10 years to the system, have reached normal retirement age through the Old-Age Pension Benefit (65 for men and 60 for women), or could prove that they have been working for a certain number of years with the Length of Service Pension Benefit (35 for men and 30 for women, but without requirement of contribution for the same period of time). In addition, special retirement schemes existed that granted proportional retirement benefits for individuals who had worked for 30 and 25 years, for men and women respectively. The benefits were computed based on the last 36 months of activity (Brasil, 2002). The level of benefits is relatively high: old-age benefits recipients receive, on average, 3 times the minimum wage, and length of service benefits is 2.5 times higher than old-age benefits (Queiroz, 2005).

In 1998, after years of political debate, a significant reform was approved in order to help solve the program's fiscal imbalance. The main change was the introduction of a new methodology to calculate pension benefits based on an actuarial rule. The new benefit computation is based on the Swedish Notional Defined Benefit Program and takes into account longer earnings history, the life expectancy at age of retirement, and a coefficient that creates disincentives to early retirement. A minimum retirement age has not yet been approved for workers in the private sector, however (Brasil, 2002).

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The new methodology (Fator Previdenciário) reduced the system regressivity. Until 1998, workers were eligible for retirement benefits after 25 years of work for females and 30 years for males. Beneficiaries were, on average, 48 years old implying that only those with stable jobs and that could prove the requirements to obtain the benefit. In addition to that, benefits before 1998 were calculated based on the last 36 months of contribution; since the wage curve was ascendent with age workers were able to retire with relatively high pension benefits.

In december 2003, a amendment to the Constitution (EC 41/03) was aproved by the Brazilian Congress. The amendment changed some of the regulations to the civil servant retirement system. The main points were: a) minimum retirement age, 60 for males and 55 for females; b) possibility of establishing a fully-funded complementary system for civil servants; c) contribution to the system by retirees; d) future benefits to be adjusted by other index instead of wages in the public sector.

In relation to the general system, the amendment raised the maximum benefit value and discussed the possibility of creating a program to included low-income workers in the public pension program. In 2005, a new amendment (EC 47/05) was approved by the Congress. This amendment revised the EC41/03, making its terms more flexible to some categories of civil servants. The most important change, was to guarantee that civil servants that joined the central government prior to 1988 to retire with benefits similar to their last wages and using current wages variation as an indexator to pension benefits.

The Brazilian pension system also spends a large amount of its budget on the survivor's benefit. Eligible survivors include the widow(er) or partner and children younger than age 2 ; in the absence of the above (in order of priority), parents and siblings younger than age 21. The pension is split equally among eligible survivors. If one survivor ceases to be eligible, the pensions for the remaining survivors are recalculated. The monthly pension is 100% of the pension the deceased received or would have been entitled to receive; 100% of the minimum wage for rural workers. According to the OECD, public pension system in Brazil spends about 3.5% of GDP with survivor's benefit program, about 45% of beneficiaries are either receiving retirement benefit or still working. The legislation allows individuals to accumula 100% of suvivor's benefit with any other source of income. In addition to that, eligibility rules are not very strict, for example, it requires a very short period of contribution and benefits does not cease with new marriage.

The general system was conceived when rapid population growth and low life expectancy combined to sustain the program. Public expenditure on public pension raised from 4.6% of GDP in 1980 to

almost 7% in 2005. In recent years, however, the system has been facing budget shortfalls, which have gradually increased after the changes implemented in the early 1990s. In 1996, the deficit was equal to 0.1 percent of the GDP, but it increased to 1.7 percent in 2004 (Giambiagi et al., 2004). Public pension debt remained stable at about 1.7% of GDP until 2007, in 2009 the debt decline to 1.3% of GDP. This change is explained by the recent dynamics of the labor market in Brazil in the last few years, mostly a increase in the number of workers in the formal sector, and the rise in the maximum possible retirement benefit (that increased contribution). One of the main reasons for the debt in the system is the recent dynamic in the minimum wage variation. The minimum wage is the lowest benefit in the system and it is adjusted everytime the the minimum wage is changed. From 2003 to 2010, the minimum wage increased 112.5% whereas the INPC (index factor used to adjusted benefits above the minimum wage) increased only 37.9%.

The implicit debt, a long term measure of the system's financial adequacy, is also large and amounts to about two to three times the GDP (Bravo, 2001; Holzman et.al, 2004). Public servants have their own defined-benefit PAYGO pension system. Although it is small in absolute figures compared to the general system, the expenditure of the civil servant program is high, around 4% of GDP (Medici, 2004). In general, the benefits are more generous than in the RGPS with higher replacement rate. Giambiagi (2004) estimated the program's deficit to be around 3,6% of GDP in 2004.

2.2 Non-Contributory – Benefício de Prestação Continuada (BPC)

In Brazil, coexisting with a large contributory system (RGPS and RJU) there is a large non-contributory program. The origin of the Brazilian social assistance pension program dates back to the early 1970s. The Military Regime had created a social assistance pension program in 1974-75, the *Renda Mensal Vitalícia* (RMV – “ Lifelong Monthly Income”). The implementation of the RMV program must be seen as part of the same coverage expansion package, which also included the rural program. The RMV was a basic flat-rate pension owed to those invalid or aged 70 and more, who *were not able to provide for themselves or be provided for by their family*. Individuals were required to document at least 12 months of contribution to social security throughout their working lives, which meant that only persons who had previously worked entered the beneficiary group.

The *Benefício de Prestação Continuada (BPC)* was established by law in 1993 and implemented in January 1996 in substitution to the RMV. BPC is a temporary social benefit for the disabled and the elderly above 65 with family income per capita of less than 25% of minimum wage.

After qualifying for the program, the individual is entitled to receive the minimum wage per month for as long as she qualifies for it. Legislation requires a revision in the list of beneficiaries every two years. The revision verifies whether the elderly are still eligible to receive the benefit.

The BPC is paid out by the INSS at the same dates and using the same payment channels (commercial banks and post offices) as for normal pensions. Including administrative costs incurred at INSS, the social assistance pension program is totally funded by transfers from the Federal Treasury via FNAS (*Fundo Nacional da Assistência Social*). The most important source used since 1996 for the BPC is the “*Contribuição para o Financiamento da Seguridade Social*” (COFINS), one of the taxes earmarked by the 1988 Constitution to finance the social security budget.

Box 2 shows that main changes in the eligibility rules to receive BPC. In 1996, in addition to the family per capita income below 25% of minimum wage, the potential beneficiary should be older than 70 years, does not have any regular labor activity and could not receive benefits from official pension program. It was considered family all individuals living with the elderly in the same household sharing the same budget. In 1998 and 2003, two major changes took place. First, the minimum age requirement was reduced to 67 years in 1998, and to 65 in 2004 following the *Estatuto do Idoso*. In 1998, new legislation defined family as spouse and individual under the age of 21. Another major change took place in 2004 when other family members receiving BPC benefits could not be included in the calculation of familial per capita income (MDS, 2008).

Box 2 – Main Changes in the BPC Eligibility Rules

Período	Minimum Age Requirement	Definition of Family (for estimating income)	Income Eligibility Considers Other Elderly in Family
1996 to 1997	70 years old	Household Unity	yes
1998 to 2003	67 years old	Law 8.213	yes
2004 on	65 years old	Law 8.213	no

Source: Miranda, 2007.

The coverage of the program increase rapidly in the last few years. In 2008 there were three (3) million beneficiaries of those 1.6 million are elderly. The cost of the program was estimated in about 0.23% of GDP in 2008, for comparison the costs of Bolsa-Família were about 0,38% of GDP (IPEA, 2009), reaching about 12 million families (and 40 milion individuals).

2.3. Rural Workers Pension System

In 1972 the Rural Worker Assistance Program (PRORURAL), aimed to support the Rural Worker Assistance Fund was established. The PRORURAL was designed in order to incorporate rural workers to the official social security system. The program provided male rural workers, who were head of household, with a maximum benefit equal to half of the minimum wage (Delgado e Cardoso Jr, 2004). The last major change was proposed during the last Constitutional Reform. The Brazilian Constitution of 1988 stated, among other measures, the implementation of universal social policies and expansion of the current existent ones. Regarding the pension system, it established the guidelines for a reform in the social security system, regulated by Law #8212/8213 (Carvalho 2003; Queiroz 2005). The Law was passed in July 24,1991, bringing about a reduction in the minimum age required for rural workers from 65 to 60 for males and from 65 to 55 for females. Also, the social security benefits has been extended to rural workers who were not heads of households, and the size of benefits has changed from half to one minimum wage.

2.4. Social Security around the World: main reforms and discussion in Brazil

In the last two decades, the debate about public pension reform is central in many countries around the world. It is widely accepted that demographic pressures and fiscal sustainability should be considered in order to maintain such programs. The reforms of public pension programs have followed, basically, three approaches: increased funded portion or total privatization, parametric reform and notional defined benefit (Disney, 2003).

In one extreme of proposed reforms, some countries have moved to a mandatory funded program or to increase the portion of funded pension to their existing public pension system. The most well-known case of privatization, change to a fully-funded system, is the case of Chile. There are strong arguments towards moving to a funded system and/or privatization: increase rates of return, increase saving rates and reduce public deficit. Sinn (2000) argues that those benefits come together with higher risks and the necessity to think on policies to cover individuals who are not able to join a totally funded program. In addition to that, there are huge transition costs to this type of reform, the costs are inherent to the creation of the PAYGO system (Holzman et al, 2004).

In the other end of the reform spectrum, and more common around the world, is the strategy called parametric reform. This type of reform does not change the basic structure of the program, a PAYGO system remains that way, but there are changes in the calculation of benefits, changes in the

age and contribution requirements. Most reforms include one or more of these changes(Disney, 2003; Holzmann et al, 2003): a) raise minimum retirement age; b) change contribution requirements; c) propose new formula to adjust benefits; d) reduce generosity by adjusting benefit calculation.

A recent trend, that have been considered the gold-standard of pension reform, is the establishment of notional defined contribution (NDC) system such as the case of Sweden. NDC programs maintain the structure of unfunded systems in a way that current workers finance the benefits of current retirees, but the retiree benefits are linked to the period and amount of contribution over his working life (Auerbach & Lee, 2009).

Box 3 shows some interesting reforms in Europe and Latin America. Box 3 shows a array of reforms under the three (3) main strategies discussed before.

BOX 3 – Pension Reforms Around the World

Country	Original Program	Reform	Impacts
United States	Retirement at age 65 and 62	Increase minimum retirement age to 67	Postpone retirement
Sweden	PAYGO	Notional Defined Benefit	Delay retirement, increased savings
Chile	PAYGO	Fully Funded System	Increase savings, delay retirement, criticisms about coverage
France	PAYGO	Raise minimum contribution, increase period for pension calculation	Retirement age is still one of the lowest in Europe. Still large incentives to retire.
Italy	PAYGO	Notional DC Scheme	Expected rise in retirement age
Mexico	PAYGO	Closed down public mandatory. Individually fully funded	Coverage rates are very low.
Bulgaria	PAYGO	Paygo for flat rate pension. Fully funded tier complementary	
Poland	PAYGO	Notional Defined Benefit	Increase savings and system coverage
Hungary	Paygo	Paygo for flat rate pension. Fully funded tier complementary	Increased Savings

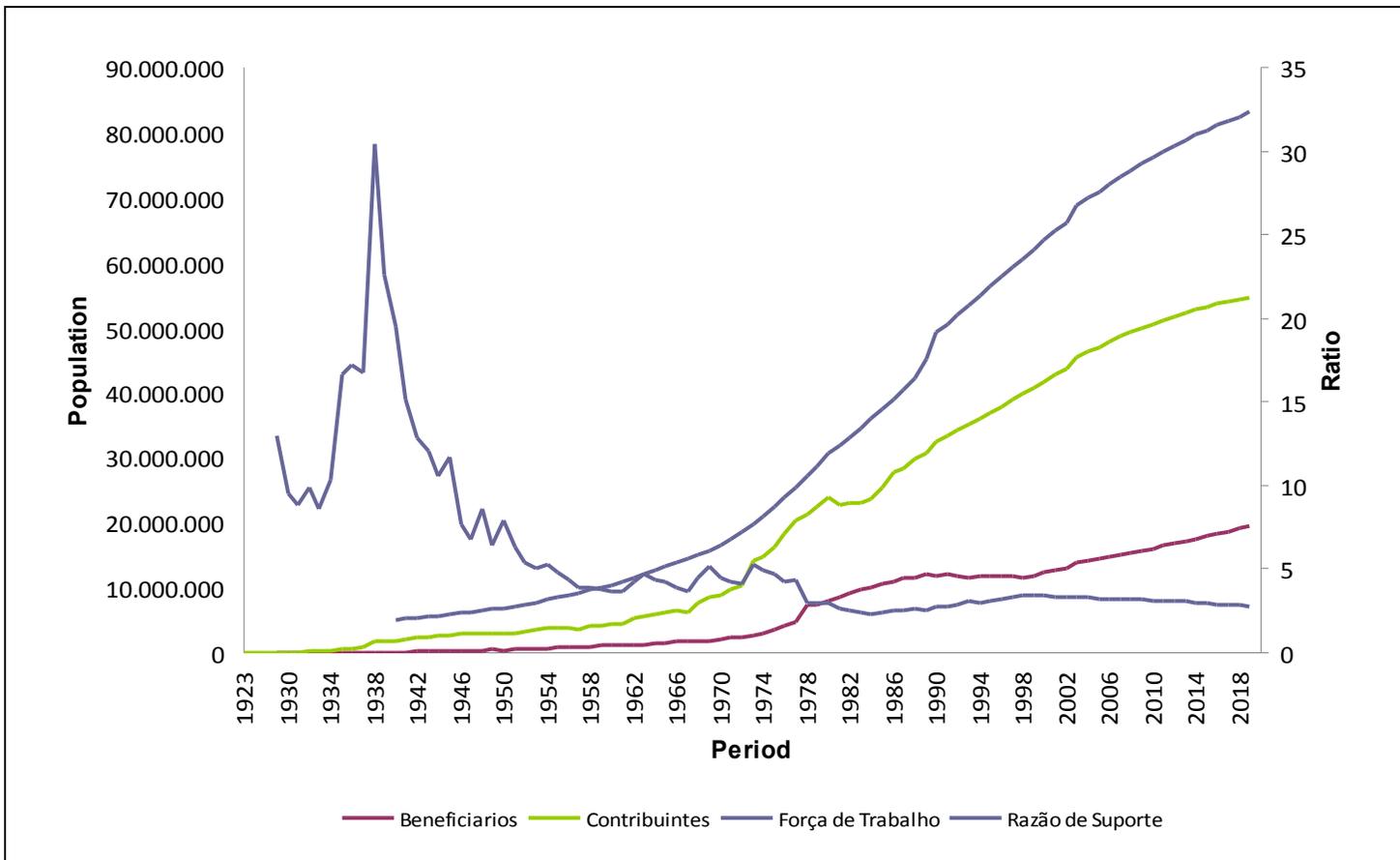
Source: Disney, 2003; Holzman et al, 2004; Social Security Administration, 2010.

3. EVOLUTION OF THE BRAZILIAN SYSTEM: CONTRIBUTION AND BENEFICIARIES

The general system was conceived when rapid population growth and low life expectancy combined to sustain the program. Recent decades, however, observed a decline in the ratio workers/retirees, the ratio was 30:1 in 1940, declined to 5:1 in the sixties, was 1.7:1 in 2000. In 2000, the PAYGO system had 27 million workers contributing and paid benefits to 16 million pensioners. Including all types of programs in 2000 the social security system paid more than 21 million benefits. In 2008, last available figures from the Brazilian Social Security Administration, show that on average there were about 40 million workers contributing to the system and 23 million beneficiaries.

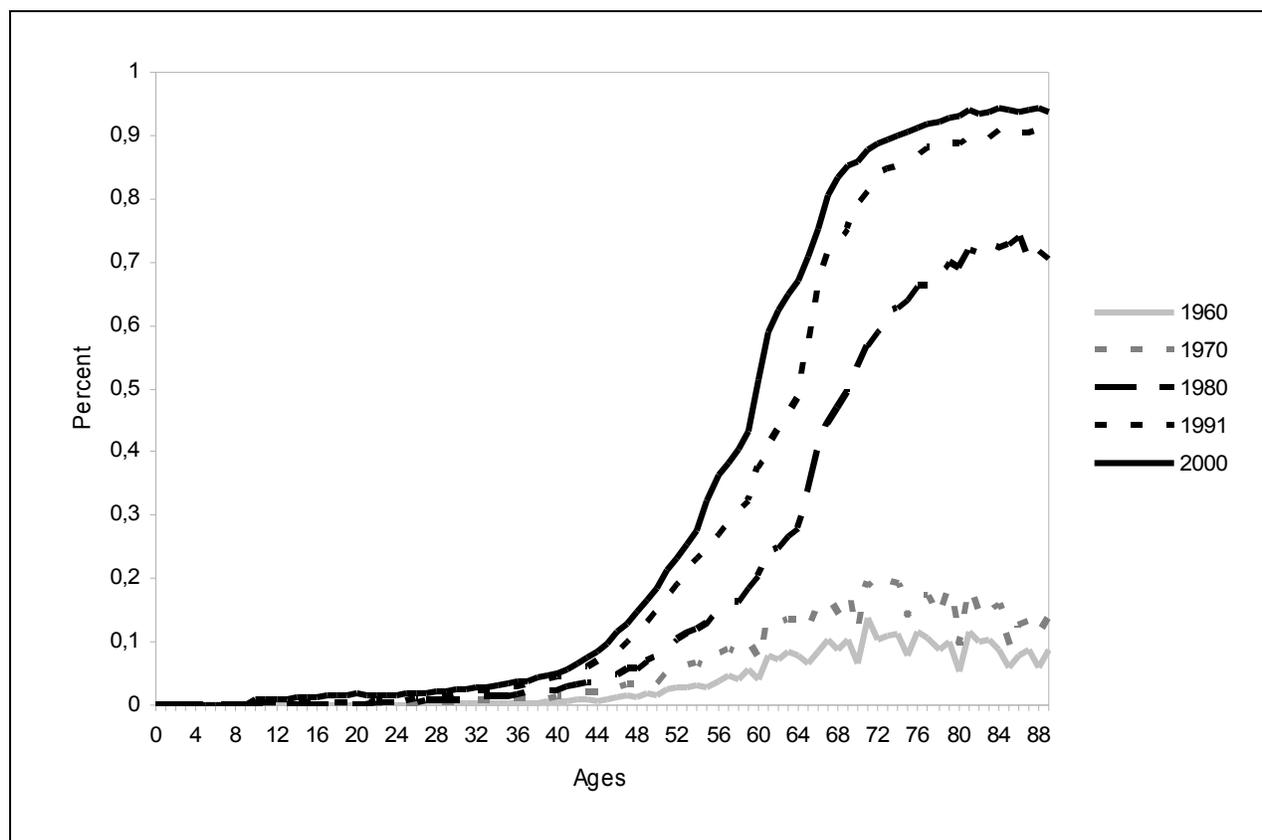
Figure 1 shows a time-series of the number of people paying social security taxes and receiving benefits, based on projections and PNAD data. The fastest increase in the coverage of the social security system occurred after 1970, that is, after the centralization of the program under the supervision of the federal government. From 1970 on, several categories of workers who were not covered by the system became eligible to it, including self-employed and rural workers. The number of total pension doubled since 1990 due to population aging and, mostly, by the extension of coverage and generosity of the system. Turra & Queiroz (2009) simulate the impacts of the rules and regulations of the system in the support ratio of the program. They argued that in addition to population changes, flexible retirement rules rose rapidly the number of beneficiaries. The increase in the coverage of the program is impressive, however part of the labor force is still not covered. **Figure 1** shows that about 45% of the labor force does not contribute social security taxes; however most of them could be eligible to the Benefício de Prestação Continuada (BPC) when they reach age 65.

Figure 1 – Pension Support Ratio, Beneficiaries, Tax Payers and Labor Force, Brazil, 1920-2020



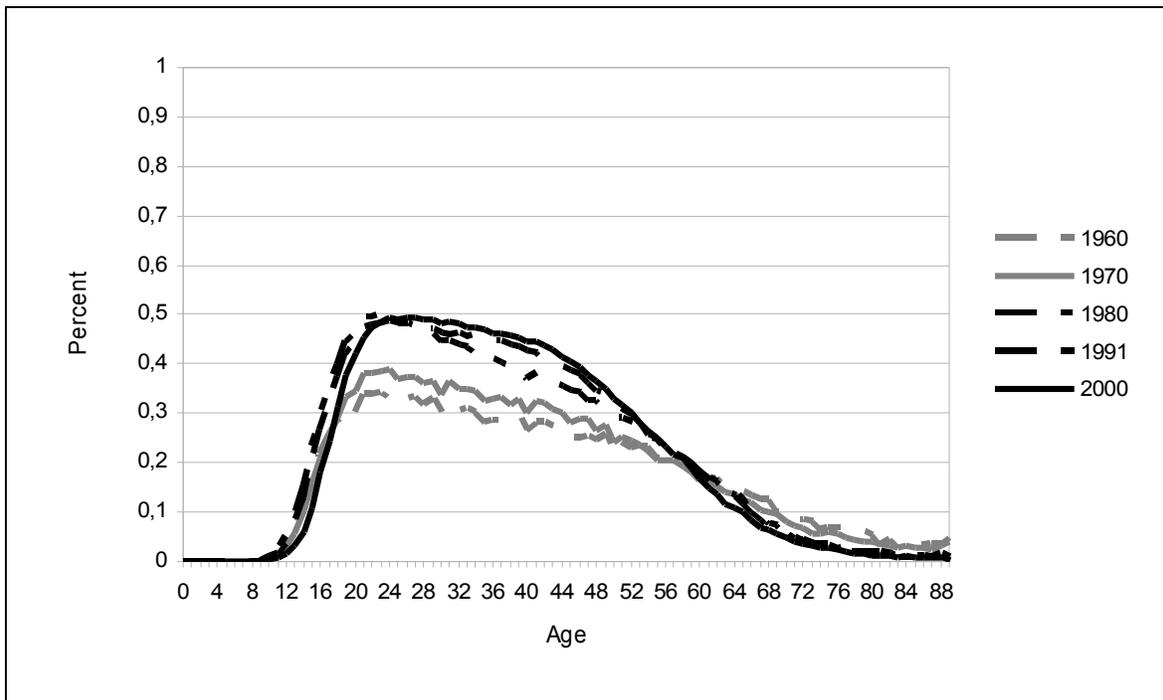
The system has been expanding fast since 1970, the ratio of pensions per population aged 60 and over from 19% in 1970 to 77% in 1999, according to the Social Security Administration. Figure 2 displays the percentage of population receiving any sort of social security benefit, as reported by the population census. It is possible to identify only those receiving retirement benefit and survivor's pension benefit. It is not possible to identify any other sort of benefit received by the individuals using census data. Two points are worth mentioning from Figure 2. First, the early age at which benefits are being received, about 10% of the population aged 45 years is already receiving some sort of benefit. Second, although the coverage has improved over time the system is not yet universal, and about 20% of the population aged 70 and over are not receiving any sort of social security benefit. Figure 3 shows the percentage of the labor force that contributes to social security, based on census data, for both sexes. The results indicate that about half of the labor force contributes to the system across all age groups. The coverage has been showing some signs of improvement in recent years, we discuss that better below, but there is still a large fraction of the labor force that is not covered by the social programs in Brazil while they are working, but could qualify for non-contributory programs as they reach older ages.

Figure 2 – Percentage of Individuals Receiving any Type of Public Pension, Brazil, 1960-2000



Source: Census Data, IPUMS (2010).

Figure 3 – Percentage of Individuals Paying Social Security Contribution, Brazil, 1960-2000



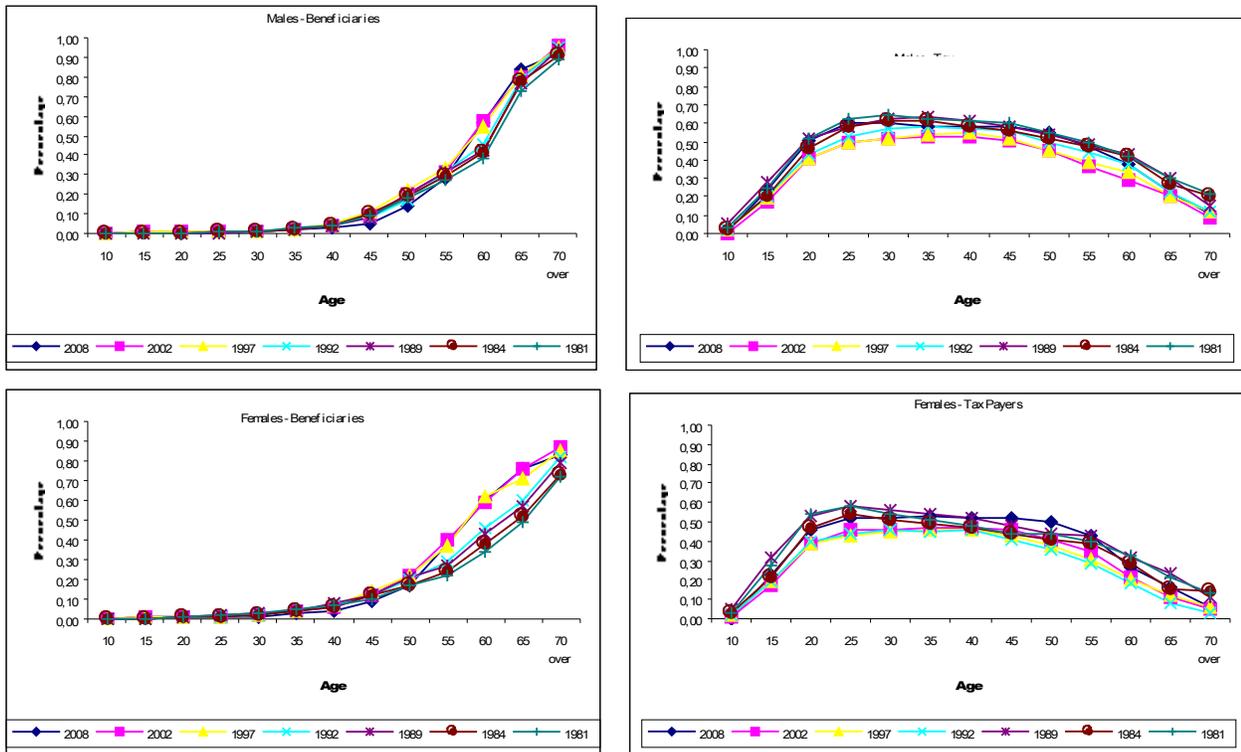
Source: Census Data, IPUMS (2010).

Ansileiro & Paiva (2008) show that the percentage of registered private sector workers, those who contribute to the public pension system, is very low in Brazil. They estimated that in the 1990s the rate was around 29% of the employed population, reaching a 32% in 2006. There are also important differences in the contribution rates between males and females. The rates for females are lower, although showing an upward trend, at about 25% of total employed workers, whereas male contribution rates is about 35% of total employed male workers.

Queiroz (2008) and Turra & Queiroz (2009) estimated the contribution and beneficiary rates for males and females, by age, from the PNAD household survey. The results, depicted in Figure 4, shows the differences in male and female rates, and how the rates vary by age. Interesting to note, that they are very similar in shape but very different in level. Also, it should be noted that a large percentage of females receive survival benefit pension. The system has been characterized by generous benefits and low contribution rates. About 77 per cent of the population aged 60 and older received some sort of pension benefits by 2002. On one hand, beneficiary rates have increased for all age groups. At age 50, for example, about 20 per cent of the population received benefits in 2002 compared to 17 per cent in the early 1980s. At the same time, contribution rates have declined for both men and women. Among

men, only 50 per cent of those in the labour market had made contributions in 2002 compared to 65 per cent twenty years earlier. These results also generally hold true for women, even though their labour force participation has increased.

Figure 4 – Social Security Tax Payers and Beneficiaries, by age, Brazil, 2008



3.2 Rural Pension Program

In 1988, the new constitution reduced the minimum retirement age for rural workers in 5 years, raised the minimum benefit to one (1) minimum wage from ½ minimum wage, and allowed more than one member of the household to receive the benefit. It is important to clarify that even though the reform took place in 1988, the new law was only set in place in 1993. The changes were also different for males and females. For male workers, the main difference was the reduction of minimum retirement age while for females it was the possibility of non household heads to receive benefits and the increase in the minimum benefit (see box 1 for details).

Figure 5 shows the evolution of rural male's pension beneficiaries, by type of benefit, from 1980 to 2003. It is clear the impressive increase in the number of beneficiaries in 1993 and 1994, after that the flow of retirees goes back to the levels observed before the reform. Most of the changes

observed in that period are restricted to rural workers, the number and the flow of urban beneficiaries are not different during the period studied. Figure 5 shows that the main change is for workers who retire under the minimum age programs, there are very few retirements under length of contribution and/or disability for rural workers.

Figure 5 – Flow of Rural Pension Beneficiaries, by type of Benefit, Brazil, 1980-2005

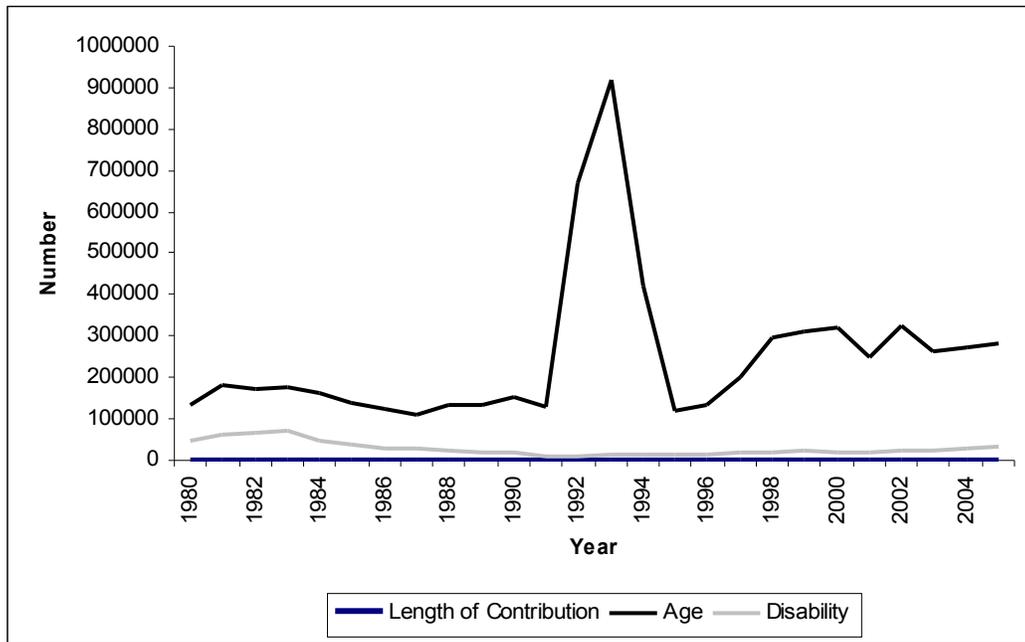


Table 4 and Figure 6 show the evolution of the stock of retirees since the late 1980s. Table 4 shows average values of benefits by type of benefit (minimum age, length of contribution and disability). The average benefit for rural workers was around $\frac{1}{2}$ minimum wage until 1991, after that the average benefit increases to 1 minimum wage. Overall, rural benefits are lower than urban worker benefits for all types of retirement programs, this is explained by different levels of labor income over the life cycle.

Table 4 – Rural Social Security: stock of beneficiaries and average benefit, Brazil.

Year	Stock				Average Benefit			
	Total	Lenght of Cont.	Age	Disability	Total	Lenght of Cont.	Age	Disability
1988	2413869	0	1933745	480124	233,85	0,00	235,54	227,05
1989	2456103	0	1977720	478383	287,21	0,00	290,33	274,30
1990	2542240	0	2052339	489901	158,76	0,00	160,39	151,93
1991	2371737	0	1916038	455699	254,96	0,00	255,27	253,63
1992	3051005	83	2548282	502640	255,35	675,88	255,65	253,74
1993	3989298	280	3491626	497392	367,18	759,47	358,21	356,17
1994	4307202	547	3817606	489049	228,32	456,33	228,41	227,36
1995	4263917	1128	3787195	475594	283,51	622,57	283,54	282,46
1996	4237401	2026	3769648	465727	292,97	726,39	292,85	292,04
1997	4274747	3113	3810846	460788	291,86	763,16	291,52	291,55
1998	4416224	4229	3954100	457895	311,28	813,22	310,69	311,79
1999	4590973	5026	4126872	459075	272,24	705,95	271,50	274,08
2000	4769911	5625	4305040	459246	273,15	679,51	272,30	276,14
2001	4871103	6031	4408080	456992	291,36	657,35	290,50	294,81
2002	5043993	6528	4578678	458787	262,48	580,66	261,61	266,69
2003	4825517	6881	4399563	419073	286,76	632,71	285,60	293,19
2004	4936019	7535	4506460	422024	260,08	555,94	259,03	265,99
2005	5076742	8914	4633569	434259	298,97	564,73	297,96	304,23
2006	5246229	10502	4799901	435826	347,25	576,37	346,44	350,59
2007	5401099	11413	4960623	429063	376,51	588,98	375,83	378,76
2008	5584328	12697	5141644	429987	410,91	607,62	410,32	412,18

Figure 6 – Stock of Rural Pension Beneficiaries, Brazil, 1980-2003

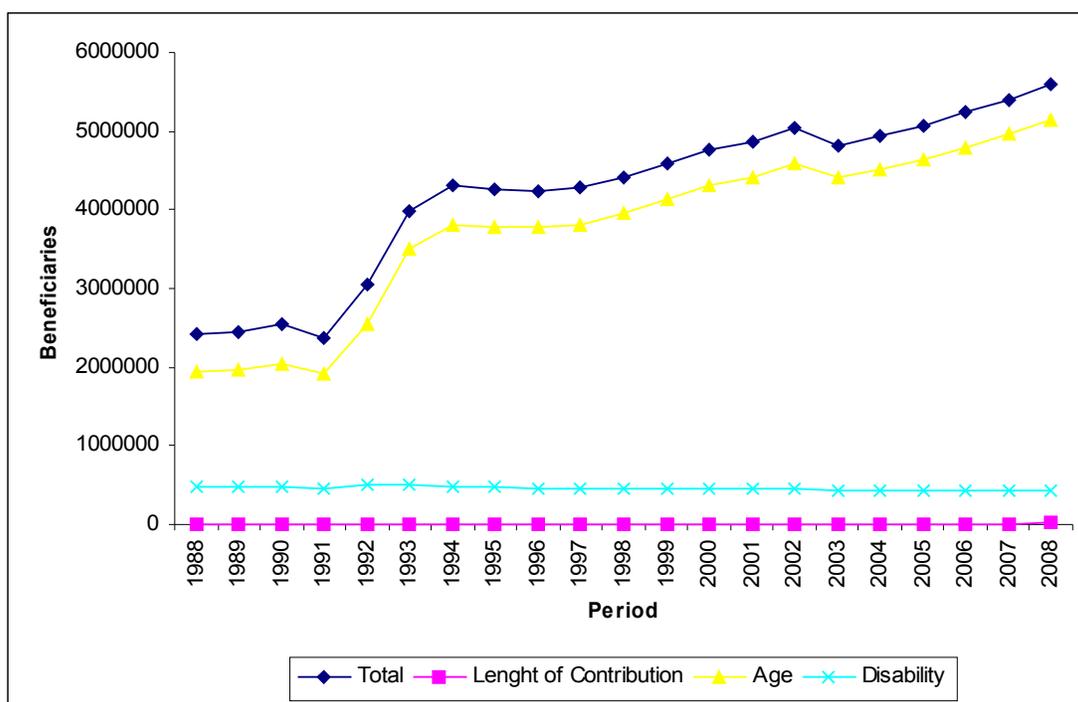


Table 4 shows a big jump in the number of rural benefits by age, the emergence of length of

contribution benefits and a reduction in the number of disability benefits. The number of benefits obtained by length of contribution relative to minimum age is small because rural workers are not always able to produce proper documents necessary to obtain this type of benefit. The rapid raise in age benefits and reduction in disability benefits might indicate that these benefits are substitutes for the rural workers affect by the 1988 reform (Carvalho-Filho, 2008).

3.3. Benefício de Prestação Continuada

The BPC had significant growth in the past ten years. At the end of 2004, the number of beneficiaries was six times higher than the number of people receiving the benefit in 1996 when the program was introduced. The increase in the number of beneficiaries is due mainly to lowering the minimum age for eligibility. At the start of the program the minimum age was 70 years old, dropping to 67 in 1998 and to 65 in 2004 with the approval of the Statute of the Elderly. Another major change occurred in 2004: the Statute of the Elderly now permitted that, when calculating the per capita family income, the value of the benefit already granted to another elderly member of the same family is not considered.

Figure 7 – Stock of BPC Beneficiaries and Ratio Beneficiaries and Population 65+

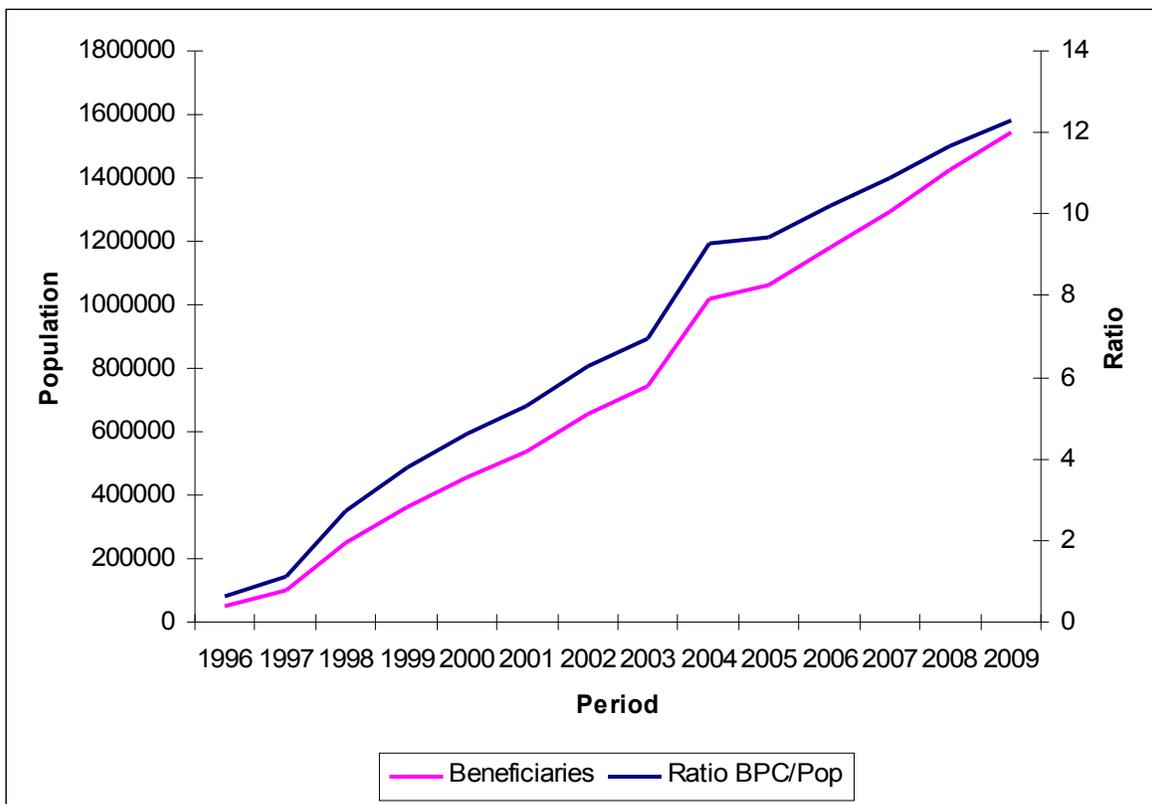
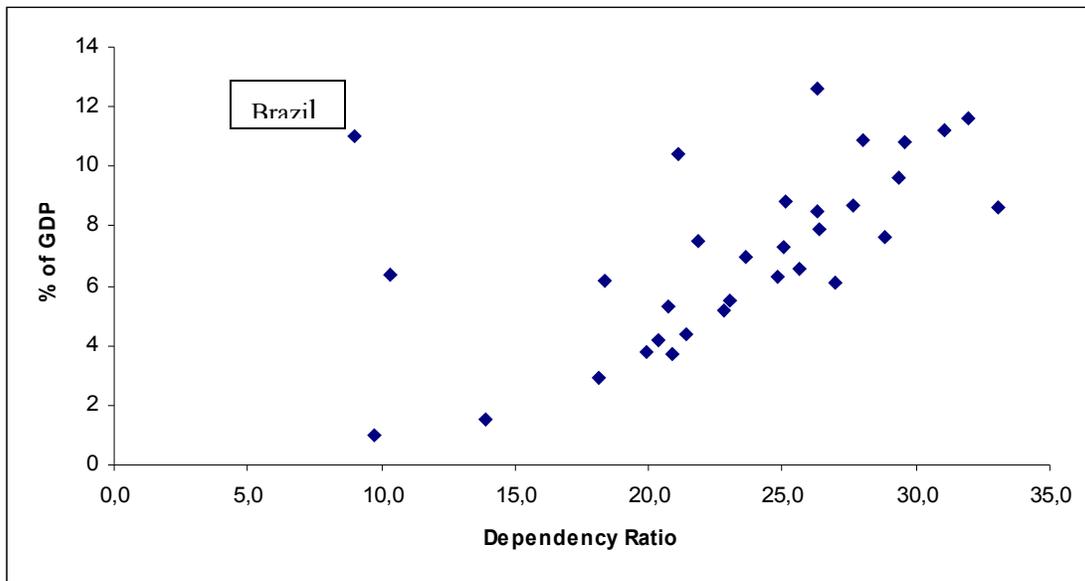


Figure 7 shows the progress of BPC beneficiaries from 1996 to 2009 and the ratio of beneficiaries to the total population 65 and above. The percentage of elderly receiving BPC increases from around 2 per 100 in 1996 to about 12 to 100 in 2009. It is clear from the results that the program has increased since its creation because of increase in population aged 65 and above and, mostly, because change in the rules affecting eligibility to the program. There are two clear discontinuities in the stock (and flow of beneficiaries, results not shown) in the data: a) in 1998, the minimum age to qualify for the benefits was reduced to 67 and there was a change in the definition of family, and b) in 2003-2004 when the minimum age was reduced to 65 and the income of other BPC beneficiary could not be included in the calculation of family per capita income. Freitas et al (2008) estimated that the new family definition increased the eligible elderly population in about 20% compared to the old definition.

Figure 8 – Social Security Expenditures (% of GDP) and Demographic Dependency Ratio



The combination of elements discussed before lead to a high public expenditure in Brazil in comparison to more developed economies. Figure 8 shows the relation between social security expenditures (as % of GDP) and traditional demographic dependency ratio. Public expenditure in Brazil

is as high as expenditures observed in some OECD countries, but in Brazil dependency ratio is much lower. For example, compare to countries with the same old-age dependency ratio, social security expenditures in Brazil are from 8 to 2 times greater. In several regions of the world, populations with older age structures have lower labor force participation rates for older persons. Clark et al (1999) and Profeta (2002) argued that older populations have already create an universal system of old-age security and are, in general, more developed and wealthier. The combination of these elements lead to early retirement and lower labor force participation at older ages. The relation between these variables is less known in Latin America and Brazil (Carvalho-Filho, 2008; Queiroz, 2008). The following section tries to shed some light on this matter for Brazil.

4. EVOLUTION OF RETIREMENT IN BRAZIL

There is widespread concern about how demographic changes, especially population aging, affect macroeconomic variables and public sector fiscal balance. A second related question is how the provision of social security benefits affects retirement decisions of older workers (Wise, 2004). The literature on this topic in developed countries is extensive (Costa, 1998; Burtless & Quinn, 2001; Gruber & Wise, 1999). Despite unabated interest among researchers in issues pertaining to the impacts of social security provision to retirement behavior, little is known about these issues in emerging economies. Brazil is one example of an important context for elaborating linkages between pension benefits provision and retirement behavior.

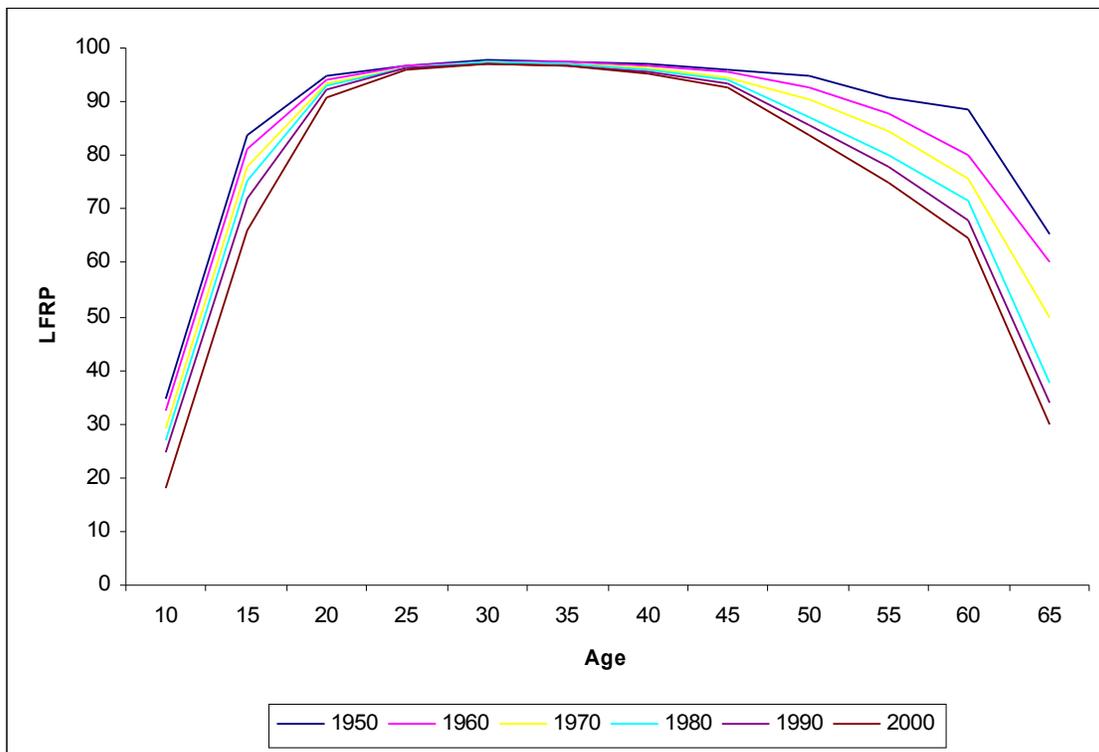
Despite the growing interest in this area, the literature does not have many studies aiming to examine trends in labor force participation of older workers and the evolution of retirement in Brazil. LeGrand (1995) demonstrates that in 1980 the social security system influenced retirement in the expected ways. Self-employed workers and those in the informal sector had lower retirement probabilities than workers in the formal sector. Carvalho-Filho (2008) shows that the social security reform of 1991 reduced retirement age of rural workers affected by the reform. Leme & Malaga (2001) show that the Brazilian pension system creates incentives to early entry into the labor market as well as early retirement, a clear waste of productive resources in the country. In this section, the paper tries to contribute to the debate by investigating labor force participation and retirement in Brazil.

4.1. Age Profiles of Labor Force Participation

The trend in labor force participation for Brazilian male workers shows significant changes in

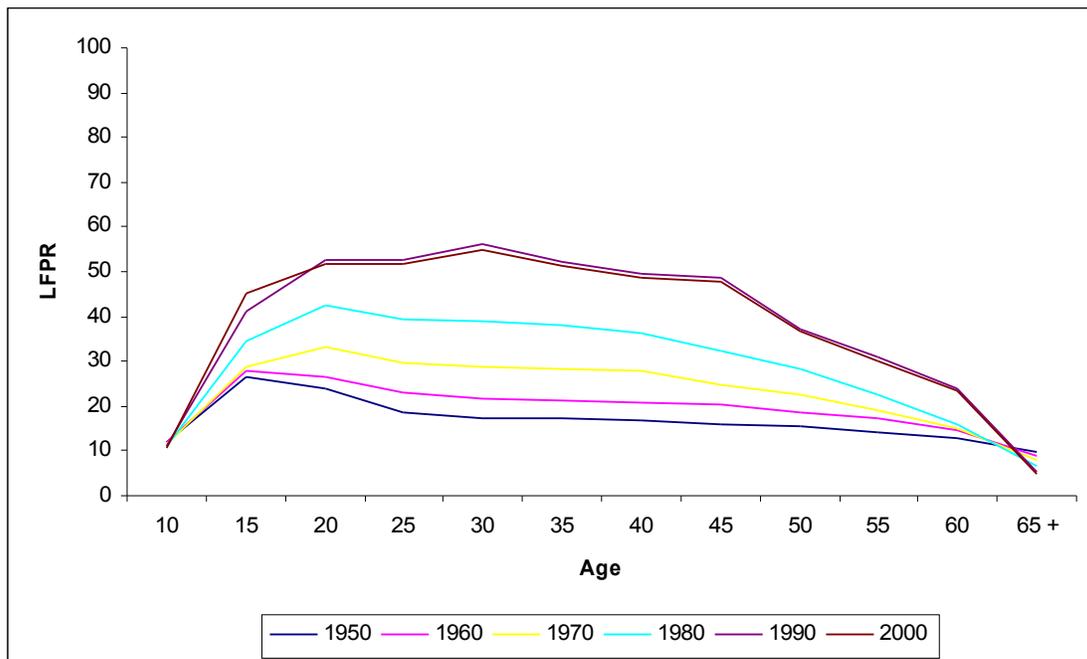
the last decades (**Figure 9**). It is clear that the length of working life shrank over time. Labor force participation rates of young individuals have declined because of the increase in educational attainment. Based on census data it is calculated that 95% of the population aged 10-14 years was in school in 2000 compared to 54% in 1960. The rates have also declined for older workers. In 1950 almost 90% of the population aged sixty to sixty-four years was in the labor force, and this number has declined to 65% in 2000. The same rate of decline is observed for younger old workers. The fall in economic participation is even greater for older workers, those above sixty-five years of age: 30% of them were in the labor force in 2000 compared to over 60% in 1950.

Figure 9 – Male Labor Force Participation Rates, Brazil, 1960-2000



The female labor force participation rate shows a completely different trend in the same period (**Figure 10**). The main change in female labor force participation is the rapid increase in the economic activity of females in their prime-age; those aged 20 to 60 years. Durand (1975) suggested a U-shaped pattern between female labor force participation and economic development, and the Brazilian case seems to fit this pattern. Durand (1975) and Mammem & Paxson (2000) studied this pattern in several countries, finding a similar relation between economic development and female labor force participation. At youngest and oldest ages, female labor force stays stable over the fifty years of analysis. For women aged fifty to sixty year labor force participation is much higher in 1990 and 2000 than it was in any preceding years.

Figure 10 – Female Labor Force Participation Rates, Brazil, 1960-2000



It is also interesting to investigate whether labor force participation varies for different socioeconomic groups in Brazil. The previous section showed that some groups of the population ahead earlier access to pension benefits what could affect that working decisions. However, it is observed that labor force participation rates fell for workers of different socioeconomic backgrounds. It is possible to use years of schooling as a proxy for socioeconomic status (SES) and estimate participation rates using census data from 1960 to 2000 by four different levels of education: 0 to 4, 5 to 8, 9 to 11 and 12 and more years of schooling. This measure is highly correlated with the general socioeconomic status of the individual and is preferred to other measures of SES (e.g. wealth or income) in this study since it offers better comparability among age groups.

The trend reflects the increase in the coverage of the social security system in the country, a move away from agriculture work and increase levels of income of the older population in the past half-century. In 2000, participation rates for workers aged 60 to 64 and 65 to 69, for all SES groups, intercept at the same levels around 50% and 40%, respectively. For older workers, those above age 70, the rates converge at lower levels around 20%. There is also a decline in the participation rates for all SES groups, but steeper for the oldest age group (65-69). The decline is also steeper for low SES, which might be explained by the universalization of social security benefits in the 1990s. High SES workers have lower participation rates at all times, but their decline over time is slower than that of low SES. From 1960 to 2000, the participation rates of workers age 65-69 years declined 33 percentage points for low SES workers, and 20 percentage points for high SES workers. These trends seem to reflect the increase in coverage of social security system in the country, a move away from agriculture work and increase levels of income of older population in the past half-century.

4.2. Median Retirement Age

The long term information on labor force participation can be used to study trends in retirement. I estimate median retirement age for males from 1960 to 2000. The median retirement age is the youngest age at which less than 50% of the population is in the labor force (Burtless & Quinn, 2001). Following this definition, the retirement age for Brazilian males declined from 69 years in 1960 to 63 years in 2000, an average decline of 1.5 year per decade.

Table 1
Median Retirement Ages, Males, 1960-2000

Year	Brazil	USA	Italy	Germany	Japan	Netherlands
1960	69	66	65	65	67	66
1970	65	65	63	65	68	64
1980	65	64	62	62	67	61
1990	65	63	61	60	67	59
2000	63	63	61	61	67	59

Source: Burtless & Quinn (2001) for US, Sveinbjorn & Scarpetta (1998) for European Countries, Brazilian Censuses for Brazil.

Table 1 shows median retirement ages for a series of countries. The retirement age in the United States fell from 74 years in 1910 to 63 years in 2000, a drop of 1.2 years per decade (Burtless & Quinn, 2001). In the same period covered by the Brazilian data, the decline in the average retirement age in the U.S.A has slowed down or even reversed. During this period the average age declined 0.75 years per decade, from 66 years in 1960 to 63 years in 2000 (Burtless & Quinn, 2001). The trend toward early retirement is a common feature of the labor market in developed nations. Sveinbjorn & Scarpetta (1998) estimate average retirement ages for a series of OECD countries based on survey data on determinants of retirement. They estimate retirement ages from 1950 to 1995 and observed a steady decline in retirement ages over time. The average retirement age for men dropped from about 65 years in 1950 to around 60 years in 1995. I estimate average retirement ages for Brazil using Sveinbjorn & Scarpetta (1998) methods. The average retirement age in 1950 was 60.17 and fell to 57.83 in 2000.

4.3 Unused Labor Capacity

Gruber & Wise (1999) propose the Unused Productive Capacity as a summary measure of the labor force participation of older workers. The measure is calculated by summing up the proportions of individuals out of the labor force between ages 50 and 69 and dividing it by 19 (Similar calculation is made for those between ages 55 and 65, but dividing by 11). The measure is interpreted as follows. Suppose the unused capacity measure between ages 50 and 69 in a particular year is 50%. It means that a cohort experiencing the labor force participation rates in that year for their whole life would work only 50% of their potential life time person-working-years (Gruber & Wise, 1999).

Table 2 shows this measure for Brazil from 1960 to 2000 using census data. The unused labor capacity for the age group 55-65 increases from 28% in 1960 to 40% in 2000. This means that, in 2000, workers living under those labor force participation rates would work only 60% (57%) of the potential working years between ages 55 and 65 (50 and 69). The increase in unused labor capacity occurs as the

pension system reaches more population sub-groups and as it becomes more generous. Table 2 also shows the percentage of males out of the labor force at age 59, which is another simple measure of early retirement proposed by Gruber & Wise (1999). This measure gives a similar picture to that of the unused labor capacity. These are relative measures, they do not imply that all men out of the labor force should be working or could work. That is, the measure assumed that individuals are capable of working full-time at all ages, it does not considered those who could not work for health reasons or related issue.

Table 2
Unused Labor Capacity and Men out of the Labor Force
at age 59 (in %), Brazil, Males, 1960-2000

Year	Ages 55-65	Ages 50-69	% out L.F. age 59
1960	28	30	24
1970	36	38	33
1980	38	40	34
1991	38	41	35
2000	40	43	36

Source: Brazilian Censuses (IPUMS), 1960-2000

These measures to compare Brazil to the countries in the international study edited by Gruber and Wise (1999). The authors coordinated an international research project to investigate the impacts of social security rules and regulations on retirement behavior. Although it is not possible to compare the levels of social security wealth across countries because of differences in currencies and standards of living, some of the estimated measures are comparable across different scenarios and are important to show the relation between social security financial incentives and retirement.

Table 3 presents the main results of the study and contains information on labor force participation, replacement rate, unused labor capacity and % of males out of the labor force at age 59. The social security replacement rate for sixty-year old in Brazil is about 40%. The replacement rate was estimated by Queiroz (2008) considering the median brazilian worker under different retirement rules. The replacement rate is estimated as the relation between the pension benefit at age X to the wage the same worker could be gaining at the same age X. Brazil replacement rates situates in the bottom level of the countries studied by Gruber and Wise (1999) yet is more generous than the Canadian, American and British systems and as generous as the Swedish and Japanese ones. The accrual rate and implicit tax on work are also similar to the bottom distribution of the developed countries.

The comparison shows that the social security system is as generous as pension systems from countries with much greater levels of income. The replacement rate measures the generosity of the

pension systems in the developed world. The rate at which pension benefits replace net earnings can be as high as 91%, the case of France and the Netherlands, at early retirement ages. On average, the eleven countries studied by Gruber and Wise (1999) have a replacement rate of 61.45%. A high replacement rate has significant impacts on the individual's decision whether to remain in the labor force. The more dramatic point, however, is that most of the countries have a statutory minimum retirement age that does not exist in the Brazilian case. In Brazil, it is possible to retire at younger ages compared to other countries. In the length of contribution schemes, workers need to prove a number of years making social security contributions. The most recent figures from the Brazilian Social Security Administration showed that average retirement age was about 54 years for males and 51 for females.

Unused Labor Capacity and % of males out of the labor force at age 59 vary substantially across the eleven countries, as pointed by Gruber & Wise (1999). Unused labor capacity for ages 55-65 ranges from 67% to 22% and the percentage of men out of the labor force at age 59 ranges from 58% to 13%, for Belgium and Japan respectively. Brazil compares to the countries on the lower end of the distribution. The unused labor capacity in Brazil is similar to those observed in the United States and Sweden, 37% and 35% respectively (Table 3). The percentage of males out of the labor force at age 59 in Brazil is higher than that of the US (26%) and very similar to the levels in the United Kingdom (38%), Germany (34%), Spain (36%), and Canada (37%). Despite the limitations of these two measures, I present this comparison to illustrate the patterns of retirement in Brazil and how they fare with those of more developed economies.

Table 3 – Unused Labor Capacity, Incentive Measures, Retirement Rate at Early Retirement, by country (circa 2000).

Country	Unused LF 55-65	Men not in LF at age 59	Early Ret. Age	Replacement Rate ER	Hazard Rate ER %
Belgium	67	58	60	77	33
France	60	53	60	91	65
Italy	59	53	55	75	10
Netherlands	58	47	60	91	70
United Kingdom	55	38	60	48	22
Germany	48	34	60	62	55
Spain	47	36	60	63	20
Canada	45	37	60	20	32
United States	37	26	62	41	25
Sweden	35	26	60	54	5
Japan	22	13	60	54	12
Brazil	40	36	"60"	37	10

Source: Gruber and Wise (1999) and Author's Calculations For Brazilian Median Education Worker

6. SIMULATING THE COSTS OF PUBLIC PENSION SYSTEM IN BRAZIL

6.1. Estimating the Costs of Public Pension in Brazil

This section follows the methodology proposed by Bongaarts (2004) to investigate the the welfare system in Brazil. In a previous work, Turra & Queiroz (2009) use counterfactual projections of the social security support ratios to shed light on the roles played by demographic, policy and economic changes on social security problems and, in turn, on potential limits for the demographic dividends. The authors projected the ratio of dependence of the Brazilian system in different scenarios and show how the combination of change in the age structure and absence of proper policies make the situation of the Brazilian situation worse than could be expected. This paper follows this analysis and included the financial dimension by projecting pension expenditures in relation to total earnings under different scenarios. In addition to that, this paper uses updated demographic projections revised by the IBGE in 2008 that showed a faster pace of population aging in Brazil and a larger percentage of elderly population in 2050 compared to the projection used by Turra & Queiroz (2009). The IBGE revision in 2008 projected a lower fertility rate from 2010 to 2050 compared to the projection released in 2004. The following section explains the measures developed by Bongaarts (2004) and show descriptive results comparing the Brazilian situation in 2005 to the OECD countries studied by Bongaarts.

6.1.1. Social Security Expenditure Measures

Bongaarts (2004) and Rocha & Caetano (2007) argued that the old-age dependency ratio (the ratio between population aged 65 and above to the population age 15 to 64 - ODR) is not a good measure of the burden of public pension systems. There are two main reasons for that: a) first, people retire before they reach age 65, as we discussed for the Brazilian case; and b) the number of individuals contributing to the pension system is much smaller than the labor force in several countries, especially in Brazil where we observed a large informal labor market.

The first measure of interest, proposed by Bongaarts (2004) is the ratio of pensioners per population aged 65 and above. This measure is called pensioner ratio (PR). This ratio can be greater than 1 because individuals retire before age 65. As we show before, this is very common in the Brazilian case. The second measure is the Employment Ratio (ER) which relates number of employees making pension contributions to the population aged 15-64 (in the labor force). ER is normally higher

for males than for females, as it was shown in previous sections.

Bongaarts (2004) proposed the use of a more accurate measure to relate the weight of pensioners in an economy: the ratio of pensioners to workers (PWR). The PWR is directly related to the old-age dependency ratio and the pensioner ratio (number of pensioners to the population aged 65 and above), and it is indirectly related to the employment ratio (ratio of workers making contributions to the population aged 15 to 64). The data for population in Brazil were obtained from the National Statistics Office (IBGE). The data from pensioners and contributors were obtained from the Ministério da Previdência Social (MPAS). We considered only the benefits that were considered active by MPAS and contributions made by individuals.

The public pension level of benefit (replacement rate) is given by the relation of pension benefit to labor income. Benefit Ratio (BR) is calculated as the ratio of average public pension by the average earnings. In a PAYGO system, like the Brazilian one, the contribution rate should be close to the relation between total spending and total earnings, which will be discussed in the following paragraph.

Bongaarts (2004) suggested that the level of public expenditure on public pension should be calculated as the total annual spending on public pension divided by the total earnings of workers (PER). The annual spending included old-age public pensions, length of contribution retirement pensions, survivor and disability benefits. In section 6.3, the proposed a similar, but simpler exercise with Benefício de Prestação Continuada (BPC). Current total earnings were obtained from the MPAS database and included total wages received over the year (pre-tax) for workers making contributions to the system.

Table 4 presents the calculated measures for Brazil and the results produced by Bongaarts (2004) for the most developed economies in the world. The estimates show that old age dependency ratio (ODR) in Brazil is much lower than for G-7 economies. ODR, in developed economies, range from 0.19 in the United States to 0.27 in Italy. The ratio in Italy means that there are 27 elderly for 100 people between ages 15 and 64. The ratio in Brazil is much lower (0.11) because the country is in an earlier stage of the demographic transition.

Employment Ratio (ER) in Brazil sits at the bottom of the distribution. There are 34 workers making contributions to the pension system for every 100 people in the labor force. The measure indicates the high level of informality in the Brazilian labor market, which is directly related to poor labor conditions. The ER ranges from 0.55 in Italy to 0.76 in the United States. It is interesting to note, however, that the Pensioner Ratio (PR) is the highest when compared to the mode developed

economies. For the G-7 countries, the PR ranges from 1.10 in the US to 1.47 in Italy. In Brazil, a country with much lower ODR, the number of pensioners per elderly is 1.67.

The three measures presented before lead to the estimation of the Pensioner per Worker Ratio (PWR). This measure is a much better and more accurate indicator of public pension systems sustainability and it is a better measure of the demographic burden to the system. The main objective of the paper is to show the impact of population changes to the social security system in Brazil. If one compares the Old-Age Dependency Ratio in Brazil it would be reasonable to consider that the situation of the public pension system in Brazil is relatively stable, since there is a large number of working-age population to elderly population. However, the actual situation of the system could be considered worse since a large number of working age population are not making contributions to the system, and people retire at earlier ages. PWR is much larger than the usual old-age dependency ratio for all countries, ranging from 0.27 in the United States to 0.71 in Italy. PWR in Brazil is affected by the high level of informality in the labor market, early retirement ages, and generosity of the public pension system.

Lastly, the paper compares the level of pension expenditures (PER) and benefit levels (BR) in Brazil to more developed economies. Table 4 shows that average benefits in Brazil are more generous, in relation to wages, than in any other country studied by Bongaarts (2004). The average benefit in Brazil is about 70% of the average labor income. This measure is different from the measure shown in section 4.3. The measure presented here considers the ration between average benefits of all retirees to average wage for all workers, the previous measure considers benefits and wages for the same work following the methodology in Queiroz (2008). It should be noted that there is a lot of variation depending on the type of benefit. For example, benefit replacement level for old-age retirement (obtained for males aged 65 and females age 60) is about 46% of current wages, whereas replacement rates for length of contribution retirement is 1.46 times the average labor income of contributors. Public Expenditure Ratios (PER) gives the level of expenditure to current wages. PER ranges from as low as 8% of current wages in Canada to 35% in Italy, the ratio for Brazil is the second highest (31%). Public expenditure ratio is directly affected by old-age dependency, benefit ratio, employment and pensioner ratio. Brazil benefits from having a low ODR, but high levels of BR and PR, and low levels of ER drive public pension expenditure to the second highest level when compared to more developed economies.

Table 4 – Estimates of Public Pension Expenditures, Benefit Ratio, Old-Age Dependency Ratio, Pensioner Ratio, Employment Ratio and Pensioner per Worker Ratio (2000-2005)

Country	PER	BR	ODR	PR	ER	PWR
United Kingdom	0.08	0.20	0.24	1.19	0.73	0.44
United States	0.08	0.31	0.19	1.10	0.76	0.27
Canada	0.10	0.33	0.18	1.21	0.72	0.31
Japan	0.14	0.36	0.25	1.16	0.74	0.39
Germany	0.24	0.51	0.24	1.33	0.68	0.48
France	0.29	0.58	0.24	1.25	0.61	0.50
Italy	0.35	0.49	0.27	1.47	0.55	0.71
Brazil	0.31	0.70	0.09	1.67	0.34	0.44

Source: Bongaarts (2004), MPAS (2010) and IBGE (2010)

6.1.2 Estimating the Baseline Scenario

The baseline scenario does not aim to provide with the expected trend in the public pension measures for Brazil between 2005 and 2050. The idea is to have a simple model to compare and contrast to other scenarios that will be discussed in the following section.

The baseline scenario assumes that main drive of changes in public pension measures is the demographic forecast. The paper uses the IBGE 2008 population projection to construct this scenario. IBGE assumes that mortality will continue to decline, increasing life expectancy, fertility will decline and then stabilize at 1.8 children per woman. The population age structure in 2050 will be very different from what is observed today, old-age dependency ratio will reach 0.38. This level is very closed to what is projected to the US and Canada in 2050.

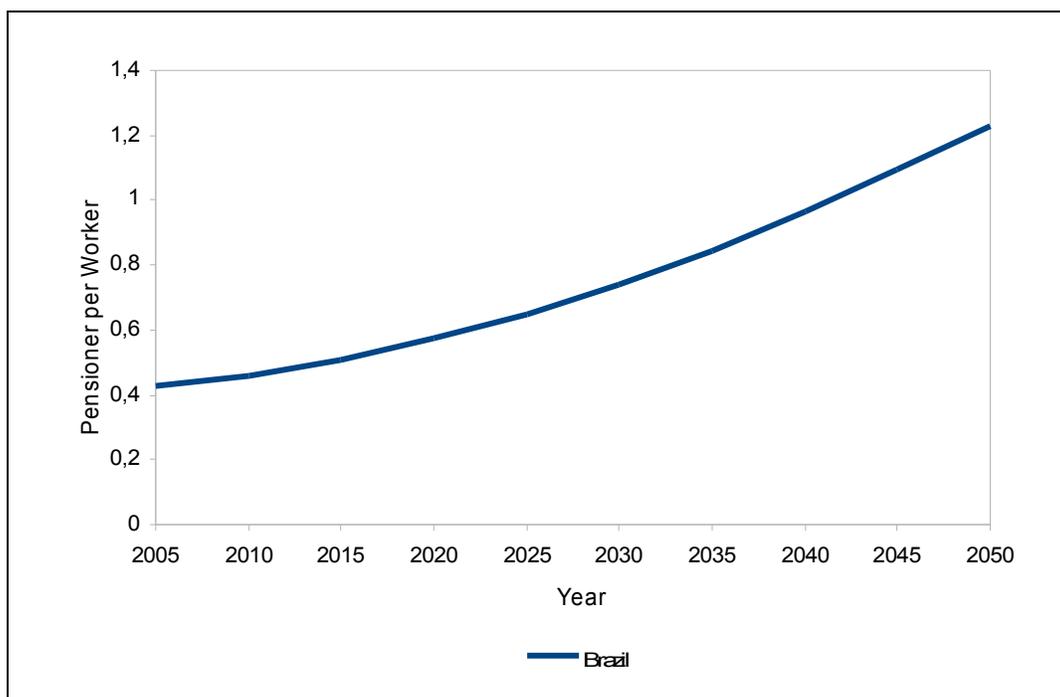
All other variables in the baseline scenario assume that age and sex profiles of employment will remain at the levels observed in 2005. The changes observed in ER are due to changes in the age composition of the population in the labor force. The baseline scenario does not include changes in the female labor force participation rates or improvements in the contribution rates. The same goes for PR, constant age profiles, assuming that the age of retirement will not change from 2005 to 2050 or any major change in social security legislation. All changes in PR are only due to population aging. Finally, it is assumed that Benefit Ratio (BR) remains constant at the levels observed in 2005 for Brazil. That is, the estimates assume that benefits will increase at the same rate as wages, or in other words the indexation scheme will be the rate of variation in real wages. It is assumed that this is a reasonable

assumption because the main interest is to investigate how population changes affect the sustainability of the Brazilian public pension system.

The baseline projection shows the impacts of demographic changes to the level of expenditure as it maintains employment and retirement profiles fixed at current level. The scenario does not incorporate any feed-back effects or policy changes proposed by the government. This analysis provides empirical evidence to support the thesis that the absence of appropriate policies can mitigate temporary benefits of population changes, and aggravate adverse effects of population aging in Brazil; besides of providing us with a benchmark scenario.

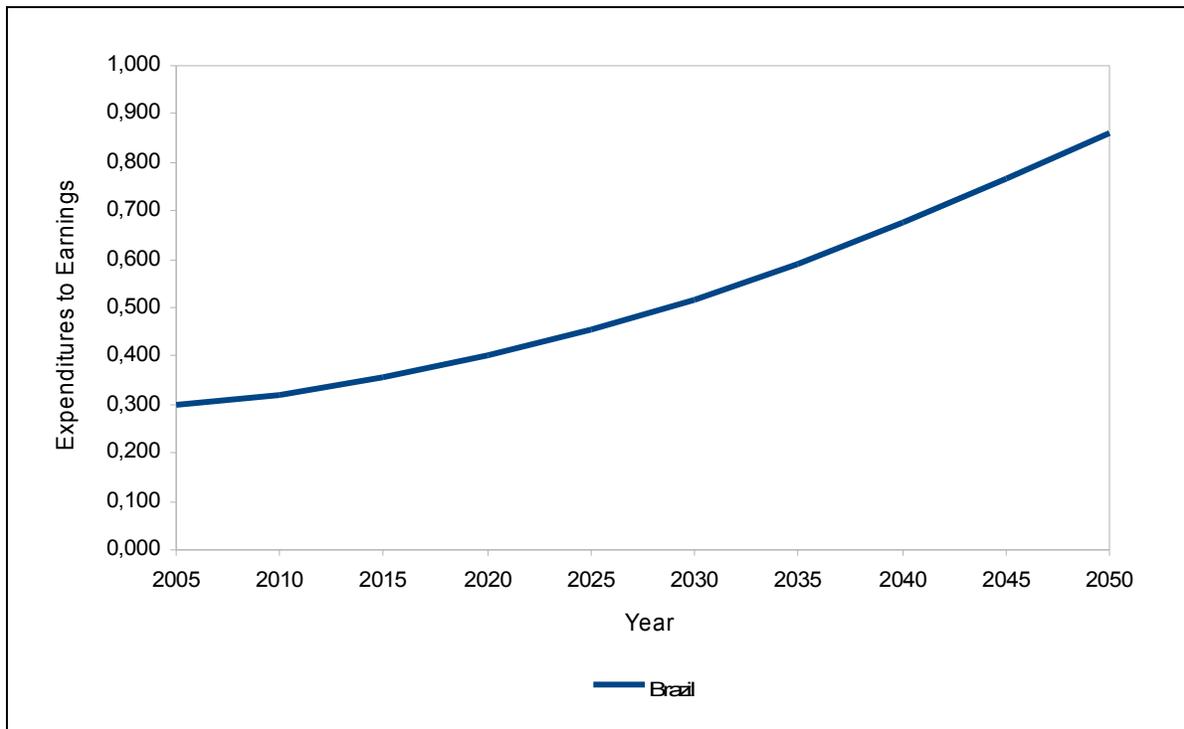
Figure 11 shows the baseline projections of the pensioner per worker ratio (PWR). The number of pensioners per worker rises substantially with time, as it would be expected by the rapid process of population aging in Brazil (shown by the rise in old-age dependency ratio). In 2050, PWR is projected to reach 1.23, that is, 123 pensioners per 100 workers. The trend in Brazil is similar to what is projected for Italy where PWR is projected to be 1.55 in 2050. PWR in Brazil is project to be the second highest among the countries analyzed here (based on Bongaarts estimates). For instance, the ratio in the US is project to reach 0.46 in 2050 compared to 0.27 in 2000.

Figure 11. Pensioners per Workers Estimates, 2005-2050, Brazil



Public Pension Expenditure in relation to current labor income (earnings) is shown in Figure 12. As Bongaarts (2004) show, PER is proportional to the trend in PWR. Public expenditure in Brazil, in relation to labor earnings, rise rapidly because of demographic transition. The expenditure is projected to grow from 29% of labor earnings in 2005 to 86% in 2050. The estimated expenditure in Brazil is larger than what is projected for all G-7 economies. In Italy, where is observed the largest increase, the ratio is forecasted to rise from 35% in 2000 to 75% in 2050. In the US the expenditure ratio will almost double, from 8% to 14%. These trends indicate that current regulations of the public pension system in Brazil is unsustainable over the long term. The system will benefit a little from the demographic transition, from 2005 to 2020, when rates of population in working-age groups will grow faster than old-age individuals leading to a slower growth in the expenditure ratios. But, when this bonus period is over, ratios are projected to increase at a much faster pace (Queiroz, Turra & Perez, 2008; Turra & Queiroz, 2009). The findings reveal that Brazilian policy makers have made decisions that are poorly grounded on a technical basis and overlooked the temporary nature of the demographic transition. By granting new forms of benefits without requiring contribution (e.g., inclusion of rural workers in 1988) and by not approving reforms to encourage social security contribution, policy makers have reduced the benefits of the demographic transition and aggravated financial issues from population aging. In other words, Brazil is going to the period of demographic bonus (or demographic dividend), that is, a period in which working age population grows faster than the youth and old-age population. This population scenario creates the possibility of greater economic growth, greater investments in education and possible reforms to the pension system. Unfortunately, this change in population age structure is temporary, Brazilian population is aging fast, and the window for such reforms is closing rapidly.

Figure 12. Public Pension expenditures as percentage of Labor Income, baseline scenario, 2005-2050, Brazil



6.2 Simulating Alternative Scenarios

In Section 2 it was presented the evolution of public pension regulations in Brazil and, briefly, discussed proposed changes in the system. Population aging and rising costs of public pensions can act as a burden to economic development and reduce investments in other social areas, especially investments in education and health. This paper now simulates some parametric changes, that is, we maintain the basic structure of the system. The proposed reforms (or changes are):

a) Increase labor force participation and percentage of individuals paying social security taxes, and consequently the retirement rates. Employment Ratio for females is much lower than for males. We do a simulation by equalizing female employment ratio to the male employment ratio observed in 2005. The employment ratio for males is about 0.50 whereas for females is below 0.30. We simulate changes with $ER = 0.50$. It is show how these changes have different impacts over time, in the short-term it benefits the system, and later on it imposes more costs to the system;

b) Delay retirement by disconsidering length of contribution retirement benefits. In this exercise we assume that individuals can only retirement by age (65 for males and 60 for females);

c) Reduce public pension benefits: instead of the observed 70% replacement ratio observed in Brazil, we reduce the benefit ratio to 50% as observed in Germany and Italy.

d) Increase labor force participation for females, equalizing it to the male labor force participation observed in 2005 (see item a), the age profile to workers making contribution to the system – which affects the probabilities of retirement, and delay retirement;

e) perform all changes (a, b and c) at the same time.

Figure 13 – Pensioners per Worker Ratio, Alternative Scenarios, Brazil, 2005-2050

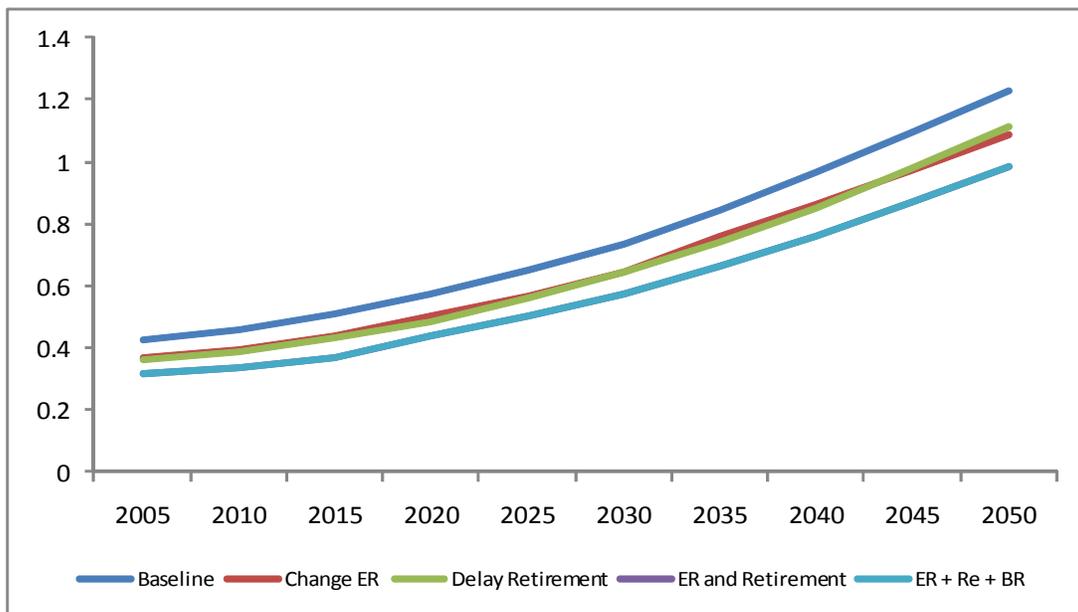
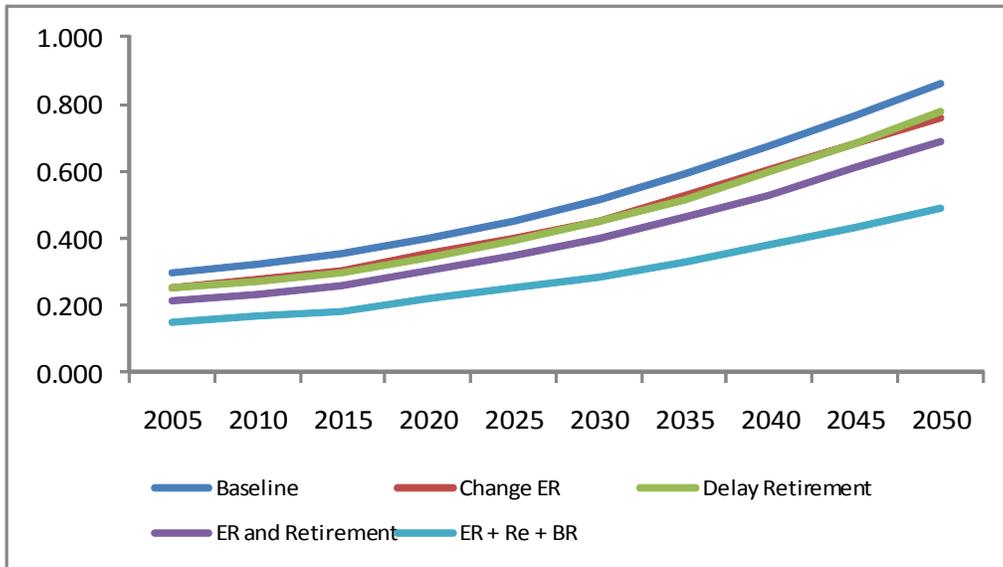


Figure 13 show the simulation exercises to PWR in Brazil. As shown before, a large proportion of workers do not contribute to the public pension system. Any rise in formal employment would have a significant effect on the relation between pensioners and workers in the next few decades. In 2050, we estimated for the baseline scenario a PWR of 1.23, by increasing the current number of employees in the formal sector to the male levels observed in 2050 (around 50%) the ratio declines to 1.02. This effect reduce the PWR in 11%. The simulation exercise incorporates changes in the probability of retirement. In the short-run, there are more people paying social security taxes (one of the changes proposed) and reduces the indicator compared to the baseline. In the long-term, the current working age individuals will retire, but since population is changing (young cohorts are smaller) there will be more people receiving benefits than the baseline model.

The literature review and preliminary data analysis showed that retirement ages in Brazil are relatively low compared to other developed and developing countries (Queiroz, 2008). We simulate an increase in retirement age by eliminating length of contribution retirement benefits. In 2050, this change in retirement patterns would reduce PRW by 10% compared to the baseline scenario. The final exercise simulates at the same time an increase in contribution rates, delay in retirement and reduction of the pension benefit replacement rate. The final scenario implies in a reduction of PWR by 20% compared to the baseline scenario.

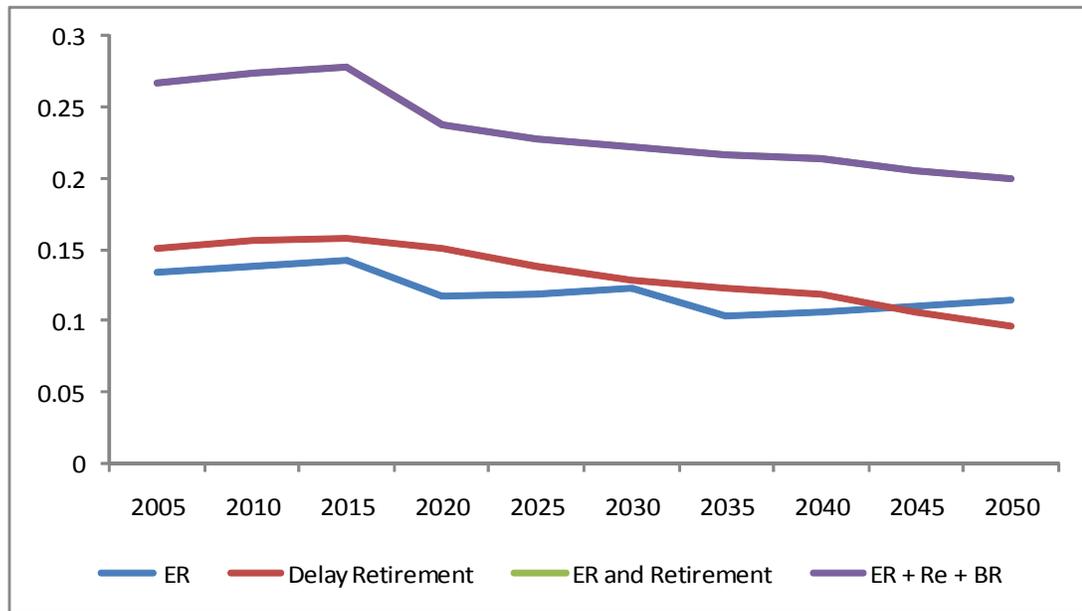
Finally, we focus on the Public Pension Expenditure (PER), future trends are shown in Figure 14. PER gives a measure of public expenditures in social security. As discussed elsewhere (Caetano, 2007), social security expenditures in Brazil are one of the largest in the world. The measure relates expenditures to current wage levels (labor earnings). The baseline scenario shows that in 2050, expenditures would reach 86% of labor income. It should be stressed that we simulate this situation by keeping current conditions fixed and assuming that pension benefits will increase at the same rate as labor income. A change in employment ratio and postponing retirement would reduce PER by 46% in 2050. Even with policy makers decide not to alter benefit replace rates, but increase contribution rates and put policies in place that delay retirement, PER would reduce significantly. A change in the labor force profile (contribution and retirement) would reduce PER by 25% in 2050 compared to the baseline scenario (0.86 to 0.64).

Figure 14 – Public Pension Expenditures as percentage of labor income, Alternative Scenarios, Brazil, 2005-2050



The raise in the number of workers paying social security taxes in scenarios A, D and E imply in an increase in the number of beneficiaries in the future. The reduction in the PWR, in relation to the baseline scenario (Figure 15) is not constant overtime. In relation to scenario A, change in ER, it is observed that the rate of reduction increases in the short-term, when there is only an increase in retirement by disability and survivors benefits, but decreases faster after 2020 when new retirees reach retirement by length of contribution, and decrease faster in 2035 when individuals reach minimum retirement age.

Figure 15 – Change in Pensioner per Worker, comparing simulation exercise to baseline model



6.2.2 Public Pension Reform: political conflict

The Constitution of 1988 was influenced by the political opening and criticisms towards the authoritarian regime. The implementation of universal social policies and expansion of current existent ones were the basic premise of the reform. In relation to the pension system, the 1988 reform guaranteed the lowest pension benefit to be equal one minimum age, reduce the age requirement for rural workers, created a non-contributory benefit for low income elderly, and maintained length of service benefit which does not require minimum age to retire. The new constitution also kept the differences between the general sector and civil servants systems. The reform did not considered demographic changes, mechanisms to incorporate informal sector workers or to increase revenues.

An increasing deficit, plus the pressure of population aging, made clear the need to reform. Since 1994, small reforms aimed to increase revenue and make eligibility requirements tighter, such as the introduction of a new formulae to calculate benefits. A minimum retirement age has been proposed several times without any success, mainly because groups who are eligible to early retirement have more political power and influence.

Recent opinion polls showed great discontent of the society with the idea of a minimum retirement age across all income and educational groups. The poll showed that 40% of the population disagree with the minimum age, even though 75% believe that it is important to reform the social security system. The government faces opposition from the civil society and the mass media regarding

social security reform. The explanation of the reform and its importance is picture by the opposition as an imposition from the International Monetary Fund and the 'neoliberal' system, suggesting that the government wants to privatize the system and deprive the population of retirement.

The civil servant program also faces innumerable problems. The influence of this group on the executive branch and the congress is even stronger than the rest of the society what makes any sort of reform more complicated. Interestingly, civil servants are among the strongest supporters of the government that took office in 2003. The struggle to overcome opposition from this group, members of the congress and judiciary limited the scope of the reform. Only in 2004, the government was able to establish a minimum retirement age for civil servants, 53 for men and 48 for women. In addition to a minimum age, pension benefits are now calculated using a complicated formula that takes into account the worker's earning history instead of being based on the most recent wage.

CONCLUSION

Retirement is an important stage on one's life cycle. Contrary to the past, most workers today enjoy a long and healthy period of retirement. In Brazil, the expansion of the social security system, economic development and rising income have allowed more workers to leave the labor market. In addition, improvements in goods and services provided to the elderly have transformed retirement into a more pleasurable and desirable stage of life. What will happen in the future? Is Brazil ready to support a large population of retirees?

The rapid process of population aging will have huge impacts on the sustainability of the Brazilian pension system. The increase in the old age dependency ratio means a larger number of beneficiaries will depend on a smaller number of workers. The demographic problem is not the sole issue in this matter. There is also a strong downward trend in labor force participation at older ages. Early retirement has increased the dependency ratio more than would be predicted by demographic analysis (Turra & Queiroz, 2009). Labor force participation rates of older men fell significantly between 1950 and 2000. During this time, the Brazilian social security system expanded, absorbing a larger group of the population and helping to accelerate the trends toward early retirement. Social security regulations in Brazil, like in many other countries, provide incentives for the working population to postpone retirement until the age at which benefits are available. This occurs at age 65 in some cases but is sometimes at earlier ages, such as 55, due to the existence of benefits based on length

of service.

The rapid population aging, size and fiscal problems of pension systems in the developed world led researchers to devote considerable attention to this problem in those countries. However, developing countries are aging more rapidly than developed countries, and social welfare programs will be asked to provide more support than they might be able to give. It is generally assumed that the Brazilian pension system is not generous and only pays small benefits. Another common idea is that low life expectancy at birth justifies early retirement ages, and by the fact that individuals have worked enough. This paper shows that this popular perception overlooks the role of the security system in shaping the evolution of retirement behavior in Brazil, how duration of retirement has increased in recent years, and the degree of generosity of the program, especially for some sub-groups of the population.

The paper has two important findings that support previous evidence. First, the effects of age structure on the pace of population ageing (i.e. population momentum) have provided extra time for social security; about 25 years until pensioner per worker ratio and public pension expenditure reach levels that will be unsustainable to the system and to the economy. Second, simulation exercises indicate that increasing retirement age and increasing number of individuals making contributions (investments in the formal sector) could reduce the impact of population aging, help honour obligations, and create future conditions for economic growth.

Brazil is facing a problem similar to that of developed nations. With population aging, these countries are looking for ways to increase the average retirement age and minimize the impact of population aging on the public sector. The empirical evidence presented before points to the importance of establishing a minimum retirement age, providing actuarially fair benefits for those who remain in the labor force beyond the minimum retirement age, and creating incentives to bring in to the system workers in the informal sector who do not contribute but can still be eligible for benefits.

In recent months, the government was discussing the possibility of ending the Fator Previdenciario. The Fator creates incentives for older workers to stay in the labor force since it increases the possible benefit one can receive as they work longer. The Fator improved the conditions of the social security system in Brazil. In any case, as population ages and individuals live longer, establishing a minimum retirement age and ending length of contribution retirement benefit is one of the most important changes in the Brazilian public pension system. However, such policies (increasing labor supply) should also consider labor demand impacts. There are not much research on age

discrimination in the Brazilian labor market. If the social security rules creates incentives for workers to remain in the labor force, one does not know whether companies will hire or not those workers. It is also important to consider changes in the labor market regulations in order to increase the number of contributors to the pension system. More important, reform should be started as soon as possible when the country is going thru the demographic dividend period.

The importance of the public pension systems throughout the world is unquestionable, and the well-being of the elderly depends heavily on the provision of income from such programs. However, the necessity to reform the Brazilian pension system is clear. The main question is how the reform should take place and which generations will pay for the burden of the reform.

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