



UN/POP/PD/2005/3

22 August 2005

**UNITED NATIONS EXPERT GROUP MEETING ON SOCIAL AND ECONOMIC
IMPLICATIONS OF CHANGING POPULATION AGE STRUCTURES**

Population Division

Department of Economic and Social Affairs

Mexico City, Mexico

31 August – 2 September 2005

**BEFORE IT'S TOO LATE: DEMOGRAPHIC TRANSITION, LABOUR SUPPLY, AND
SOCIAL SECURITY PROBLEMS IN BRAZIL**

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A. INTRODUCTION

One of today's central debates about the demographic transition centres on the relationships that connect changes in population age structure to economic growth. Demographers and economists alike are interested in examining the extent to which interactions between population age structure and both fertility and mortality declines yield increases in aggregate income levels. This phenomenon, usually called the demographic dividend or demographic bonus, has recently been presented as a combination of two separate dividends (see Mason, in this volume, and Mason and Lee, forthcoming). The first dividend is usually related to a temporary increase in the share of the population that is of working age and can be effectively measured by increases in the ratio of producers to consumers in the population (Mason and Feng, 2005). The second dividend, which has gone virtually unnoticed among most scholars, follows after the first dividend and is related to the creation of wealth that arises in response to population ageing. The magnitude of this effect depends largely on how wealth is created. Rapid capital accumulation or larger transfers from younger generations, private and public, can meet consumption demands of an increasing older population. Only in societies where capital-deepening prevails will the effects of population ageing ultimately increase the output per effective consumer (Lee, Mason and Miller, 2003).

The demographic dividends are not automatic; they depend on institutions and policies to transform changes in population age structure into economic growth (Bloom and Canning, 2001). Therefore, it comes as no surprise that some emerging economies that could benefit substantially from the demographic transition are also the ones that are more likely to fail in taking advantage of this process. Rigid labour-market regulations, low investments in human capital, tax evasion, socioeconomic inequality, and lack of well-regulated capital markets are some of the constraints that limit the ability of developing countries to benefit from changes in population age structure. Despite consensus among scholars about most of these issues, however, additional research is needed on the linkages between the policy environment and demographic transition.

Among the critical policy areas are social security and other forms of old-age support based on pay-as-you-go (PAYGO) schemes. Weaknesses in the governance and management of PAYGO pension programmes lead to negative effects for the demographic dividends. For example, if greater tax evasion or real increases in social security benefits offset increases in the share of working age population, the fiscal capability of Governments to invest in human capital will be reduced. In turn, efficiency loss may lower the effect of the demographic transition on both future productivity and economic growth. At the same time, declining social security support ratios (i.e., the ratio of social security taxpayers to beneficiaries) can represent a fiscal burden for future working-age populations, reducing the ability of workers to save for future consumption, thus putting at risk the second demographic dividend.

Brazil provides an important context for elaborating linkages between demographic transition and public policies. In a recent analysis of the first demographic dividend, Rios-Neto (2004) used income data from Brazilian municipalities to demonstrate that the association between working-age population growth and income growth was positive and significant during the period 1991-2000. It remains unclear, however, how much greater the economic growth would have been if Brazil had stronger institutions and more appropriate policies in place.

Brazil is distinct because, compared to other emerging economies, a relatively large public sector coexists with a rapidly ageing population. Public welfare support, across all levels of Government, reached about 21 per cent of GDP in 2002 (Brasil, 2003), an amount that is comparable to social expenditures in most developed countries. While social security benefits and

other forms of old-age support represented about 12 per cent of GDP, public expenditures on education and health amounted to 5.5 per cent and 3.5 per cent of GDP in 2002, respectively (Camargo, 2004). The size of the public sector, and in particular the amount of transfers to older persons, suggests that economic implications of demographic changes depend to a great extent on how public policies are designed.

In an influential study published a decade ago, Carvalho and Wong (1995) pointed out the need for policymakers to respond ahead of time in order to boost the benefits of temporary increases in the working age population in Brazil. In a more recent analysis, Turra and Rios-Neto (2001) combine several age schedules of public and family transfers with population forecasts to demonstrate that fiscal gains from demographic changes are transitory and may not last for more than ten years. While the political arena has been slow to act upon this information, the debate on the dividend continues among social scientists. Despite the lack of appropriate economic policies, however, some improvements in public education have been made as a result of lower fertility rates. Literacy levels and measures of enrolment and educational attainment have significantly improved in the last decades (Saboia, 1998): literacy rates jumped from 60 per cent in 1960 to 87 per cent in 2000 (Pinto and others, 2000) and in the last five years almost all children aged 7-14 have been enrolled in school (Schwartzman, 2003). Unfortunately, public education suffers from competition for resources with public programmes for the older population (Turra and Queiroz, 2005). Budget constraints have limited the Government's ability to improve the quality of schooling and reduce grade retention and school drop-out; problems that might reduce potential productivity growth.

This paper 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 ageing. By demonstrating that the Brazilian social security system works less efficiently than desired, we contribute to the debate on how critical policy areas may reduce the potential economic impact of demographic changes. Although we do not directly test for the effects of social security financial adequacy on economic growth, by using counterfactual projections of the social security support ratios we 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. We address several questions. First, we examine to what extent fertility and mortality declines have favoured the social security system through temporary increases in the working-age population. Next, by looking into the future, we explore a second and related question that is often ignored in economic studies, namely how the effects of population age structure mitigate the adverse effects of population ageing. We then look at how changes in labour supply, and both social security contributions and benefits have precluded or favoured the effects of demographic changes. Because we wish to demonstrate potential policy applications we also offer a snapshot of what the social security support ratios in Brazil would look like if social security rules of the United States were applied in that country. Motivations for using the U.S. as a contrast model to Brazil are manifold. First, as in many other developed countries compliance is high in the U.S. (Manchester, 1999), providing valuable comparisons with the performance of the social security system in Brazil. Second, despite socioeconomic differences between the two countries, Brazil shares some similarities with the United States, including a relatively young population, unequal distribution of wealth, large expenditures on public pensions, and the dominance of public transfers directed towards the elderly. Finally, data are readily available for the U.S., which makes our analyses feasible.

B. THE SOCIAL SECURITY SYSTEM IN BRAZIL

The pension system in Brazil consists of three main segments: the general system (private workers), the civil servants system, and other several private funded systems; most pension systems are based on the PAYGO scheme. The country also has a large non-contributory system with means-tested eligibility that provides benefits for low-income older persons.

The social security system for private workers (general system) is an unfunded defined-benefit programme. 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 and the Mint, 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 all the revenues and expenditures from sector-specific programmes as well as its assets and liabilities. Another major change during this time was in the scheme of the programme, which changed from a capitalization system to a PAYGO schemes (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).

Until 1998, full pension benefits were granted to all workers who had contributed for 10 years to the system, had reached normal retirement age through the Old-Age Pension Benefit (65 for men and 60 for women), or could prove that they had 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 are 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 programme'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 Programme 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).

The general system was conceived when rapid population growth and low life expectancy combined to sustain the programme. 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 per cent of the GDP, but it increased to 1.7 per cent in 2004 (Giambiagi and others, 2004). The implicit debt, a long-term measure of the system's financial adequacy, is also large and amounts to about two times the GDP (Bravo, 2001).

Alongside the general pension system, civil servants have their own pension programme, which is also an unfunded PAYGO defined-benefit programme. Although smaller in absolute numbers when compared to the general programme, expenditures of the civil servants programme are not trivial, reaching 4.7 per cent of GDP in 2002 (Medici, 2004). According to Medici, the programme is a complex chain of federal, state and local systems, including special programmes for different civil servant categories. Benefits are more generous in the civil servant system than in the general system: replacement rates are higher and time of contribution to receive full pension benefits is shorter. The programme deficit is high and has been increasing over the past decade, having reached about 3.6 per cent of the GDP in 2004 (Giambiagi and others, 2004).

C. METHODS

To estimate what the social security support ratios (i.e., the ratio of social security taxpayers to beneficiaries) in Brazil would look like under different demographic and economic scenarios we projected the population of 1970 using the cohort-component method of projection in five-year intervals of time and age (Shryock and Siegel, 1973; Preston, Heuveline and Guillot, 2001). We then calculated taxpayers and beneficiaries at the beginning of each five-year period by applying age- and sex-specific (1) labour force participation rates, (2) taxpayer rates, and (3) beneficiary rates. Here, taxpayer rates are defined as the proportion of workers in the labour force who pay social security taxes, by age and sex; beneficiary rates are defined as the proportion of individuals receiving any social security benefit from the general system, by age and sex.

To capture the full effects of demographic transition on social security support ratios, we end the projection period in the year 2045. Actual demographic and economic rates are used from 1970 to 2000, whereas projected rates are applied in the period 2000-2045. For purposes of this exercise we assume that the population in Brazil is closed to migration during the period of analysis. In addition, we assume that demographic and economic rates are independent, and therefore do not affect each other. Such models that focus on first-order effects have been used in previous demographic analyses (e.g., White and Preston, 1996).

Our first question is how changes in fertility and mortality rates (demographic effects) impact social security support ratios. This estimate is made by projecting forward the social security support ratios under the actual and projected fertility and mortality rates, but assuming that economic rates are fixed at 1970 levels. We present total demographic effects – mortality and fertility rates varying together – as well as separate effects for each demographic variable. To highlight the effects of population momentum on dependency ratios, we present an additional set of projections using the age distribution of stable-equivalent populations for each five-year interval. The stable equivalent populations are the underlying populations that would emerge had the fertility and mortality rates for each time interval remained constant for a long period of time (Preston, Heuveline and Guillot, 2001).

Next, we examine the effects of changes in the labour force participation (LFP) rates on the support ratios. To do this, we project forward the social security support ratios under the actual and projected LFP rates but assume that demographic rates and the other economic rates are fixed

at 1970 levels. Given the well documented sex differentials in LFP rates, we separate the effects by sex. We then estimate what we call the “evasion effect”, that is, the impact of changes in taxpayer rates on the support ratios. We use the definition of tax evasion by Manchester (1999). The term is broadly defined to include both tax evasion and tax avoidance by working in the informal sector. The estimate is made by projecting forward the social security support ratios under the actual and projected taxpayer rates, but assuming that demographic rates and the other economic rates are fixed at 1970 levels. Further, we estimate the impact of changes in beneficiary rates on the support ratios in a manner analogous to that described above for the other components. We call this the “generosity effect”. Together, the “evasion” and the “generosity” effects reflect the rules that have governed the social security system in Brazil. In order to emphasize the idiosyncrasies of the system, we present a final scenario that uses the U.S. beneficiary rates of 2001 and assumes that 95 per cent of the workforce contributes to the system; but assumes actual and projected demographic rates and LFP rates for Brazil.

The hypothetical scenarios described above are compared to two main time series: one that uses actual and projected demographic and economic rates, and one that keeps all rates fixed at 1970 levels.

D. DATA

Mortality and fertility estimates (actual and projected) used in our counterfactual projections were prepared by the Population Division of the United Nations and the United States Census Bureau (United Nations, 2003; United States of America, 2005). In addition, population figures for 1970 are taken from the 5 per cent sample census data for Brazil available in the Integrated Public Use Microdata Sample (Sobek and others, 2002).

We use data from the *Pesquisa Nacional por Amostra de Domicilio*, or PNAD (IBGE, 2005) to estimate actual social security taxpayer rates and beneficiary rates. To estimate projected rates we assume that rates remain fixed at 2002 levels. The PNAD is a nationally representative stratified random sample of the Brazilian population collected annually since the late 1970s. The PNAD contains a comprehensive and comparable set of demographic and socioeconomic variables, including detailed information on employment status, occupation, income, and education for all members of the household. The survey asks respondents whether they contribute or not to the social security system, and whether they receive social security benefits. Data limitations prevent us from examining different types of social security benefits. For example, we only know if the respondent is receiving retirement or survival benefits. We do not know whether the retirement benefit is due to old age, length of service, disability, or social assistance. We do not believe that our conclusions are substantively affected by these limitations, however. A comparison of estimates with those based on official data from the Social Security Administration Office in Brazil show that the two sets of estimates produce the same conclusions regarding to levels and trends of social security support ratios.

We estimate labour force participation rates using both census (Sobeck and others, 2002) and household survey data (PNAD). In addition, we use projected labour force participation rates prepared by the International Labour Organization (ILO, 2005) and the Economic Commission for Latin America and Caribbean (ECLAC, 1999). Labour force participation rates are defined by ILO as the proportion of the population, usually between ages 16 and 65 years, who are able to work and are either working or actively seeking work.

E. TRENDS FOR VARIOUS PROJECTION COMPONENTS

1. Demographic variables

The panels of Figure I display some of the main features of demographic changes that have occurred in Brazil over the last decades. Figure I also depicts future demographic scenarios. The demographic transition started with mortality improvements in the 1930s, which were followed by fertility declines in the later 1960s. Despite the delayed onset, the demographic transition in Brazil has been characterized by rapid demographic changes (Wong and Carvalho, 2005). The total fertility rate has declined by more than half since 1970 (from 5.3 to 2.13 in 2000), and life expectancy at birth has improved steadily: from 57.5 years in 1970 to 70.3 years in 2000. These trends have interacted to transform the population age structure. From a young quasi-stable age structure in 1970, the age distribution has gradually shifted to an older distribution. Until 2000, the most important changes were the decline in the share of the young and a rise in the share of the working-age population. Significant increases in the elderly population are expected to occur only in the next decades. The projections indicate that by 2050, the population aged 65 and older will represent about 16 per cent of the total population, compared to 3 per cent in 1970. These shifts in the age structure can be seen in the dependency ratios, which follow a well documented pattern: the total dependency ratio will decline until 2010 due to the decline in the young dependency ratio. The trend will then shift upwards as increases in the old-age dependency ratio became more important.

2. Labour supply

Figure II depicts some of the changes in the age- and sex-specific labour force participation rates since 1970. For men, it is clear that the length of working life has fallen over time, due to both increases in educational attainment (younger workers) and changes in retirement behaviour (older workers). In 1970, almost 76 per cent of the male population aged 60-64 years was in the labour force; this number declined to 65 per cent by 2000. The fall in economic participation is even greater for older workers (65 and over), of whom 30 per cent were in the labour force in 2000 compared to 60 per cent in 1970. Indeed, a summary indicator of early retirement, defined as the age in which less than 50 per cent of the population is out of the labour force, shows that the median retirement age for males declined from 69 years in 1960 to 63 years in 2000, a decline of 1.5 years on average per decade¹ (Queiroz, 2005).

Among women, labour force participation rates have shown a different trend, increasing steadily over the last decades (from 13.5% in 1950 to 44% in 2000). As shown in Figure II, the rapid increase in female rates was driven mainly by rising participation of prime-age women (20-60), while labour force participation at the youngest and oldest ages have changed little between 1970 and 2000. Economic development, higher educational levels, decline in fertility rates, and changes in social norms towards women are some of the factors that explain this pattern (Rios-Neto & Wajnman, 1994; Costa, 1990). However, the rapid increase in female labour force participation has been highly concentrated in the informal sector, so that the impact of female labour force on social security finances will be smaller than one might otherwise expect (Wajnman, Queiroz and Liberato, 1998).

In fact, another important aspect of the labour market in Brazil is the decline in the share of workers in the formal sector (defined as the sector that complies with labour market regulations). The formal market has declined from 70 per cent in the mid-1980s to about 60 per cent in 2000. In general, labour market segmentation and/or economic recession explain the increase of the informal sector in developing economies. In Brazil, during the 1980s, the size of the informal sector was negatively correlated with the economy's growth rate, following closely the business

cycle in that decade. The informal sector increased during the recession years as workers looked for work in the informal sector, while decreased during economic expansion when part of the labour force was absorbed by the formal labour market. The 1990s, on the other hand, observed a structural growth of the informal sector, a behaviour that is inconsistent with traditional economic theory (Loayza, 1997; Carneiro & Henley, 2001; Soares, 2004). The segmentation of the labour market is clear: a formal and an informal sector coexist, as in many developing countries. Only those employed in the formal market (registered workers) are covered by labour market regulations, including social security coverage. Workers in the informal sector work without formal labour contracts, and normally do not pay taxes and are not covered by welfare regulations² (Soares, 2004; Ulyssea, 2005).

3. Social security participants

Social security benefits are the most important sources of income for older Brazilians. As discussed above, 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. Figure III reveals important trends over the last decades. 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, which corroborates the finding that the average age at retirement has declined. At the same time, taxpayer 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.

F. RESULTS

1. Demographic effects on social security support ratios

Not surprisingly, if all economic and demographic rates had remained at the 1970 levels, social security support ratios would be roughly constant throughout the period of analysis, declining slightly from 3.33 in 1970 to 2.85 in 2045 because of the initial effects of the demographic transition (figure IV and table 1). If instead the demographic rates had varied, holding everything else constant, increases in the share of the working age population would initially produce a demographic bonus in the social security system that would last for about 20 years (1970-1990). Although the bonus looks small – the ratio would be about 5 per cent higher than when demographic rates are held constant – it is not negligible, given the size of the social security programme in Brazil and the challenges that it will face in the future. Eventually, demographic changes will have a negative impact on the support ratios, which would decline to 2.86 in 2000 and reach 1.0 in 2045 because of fertility and mortality reductions alone. Our estimates based on stable-equivalent populations suggest, however, that the effect of these changes would be noted much earlier if past fertility and mortality had not played a central role. Without the effects of population age structure, support ratios would reach 2045 levels (0.8 taxpayers for each beneficiary) between 2005 and 2010. Not surprisingly, most of the demographic effects are due to changes in fertility. Table 1 shows that the effect of mortality declines on social security support ratios is minimal, indicating that the proportionate impact of mortality improvements on the population age structure is fairly neutral during the period of analysis.

Comparison of the “all rates” and “only demographic rates” scenarios in figure IV also shows that actual support ratios have been declining faster than expected if based only on changes in the demographic rates. The reasons for this pattern will be revealed in the next sections.

2. Effects of changes in labour supply on support ratios

A comparison of the support ratios for the scenario that assumes that only LFP rates varied (holding everything else constant) with the two baseline models – all rates held constant, and all rates vary – indicates the significance of increases in labour supply to the social security system. The results are shown in Figure V. Changes in labour force participation rates would have increased the support ratios by about 5 per cent in the first three decades (1980 to 2010), while they would have produced support ratios 20 per cent larger in the last decades of the analysis (2025 to 2045). Most of the effect comes from increases in female labour force participation, reflecting structural aspects of the labour market that were discussed above. Although increases in labour supply have favoured social security by slightly augmenting the demographic bonus (results not shown), as well as by mitigating the adverse effects of population ageing, the magnitude of these effects is much smaller than that of the demographic effects.

3. Effects of changes in taxpayer and beneficiary rates on support ratios

Have public policies and institutions improved the financial adequacy of the social security system in recent decades? Unfortunately, neither policies nor institutions benefited social security finances. Figure VI shows what the social security ratios would look like if only the taxpayer rates had varied, holding everything else constant. Following the growth of the informal sector, support ratios would decline steadily until 2000 due to the declining share of the population in the labour force paying social security taxes. The “evasion effect” would reduce support ratios significantly, by about 30 per cent, from 3.33 in 1970 to 2.41 in 2000. In addition, when changes in tax rates are projected together with demographic changes, the bonus is shortened by five years, ending in 1985 (results not shown). Because we assume that projected taxpayer rates will be fixed at 2000 levels, our counterfactual projections are not very informative for years thereafter. Yet, it is indisputable that tax evasion will play a key role in social security deficits over the next decades. Given the low rates of tax paying, legislation to stimulate the formalization of the labour market could mitigate substantially the effects of population ageing.

We have repeated the simulation described above, but this time varying only beneficiary rates and holding everything else constant. A comparison of the support ratios under this projection is informative in showing that the new regulations approved in the 1988 Brazilian Constitution have worsened the social security support ratio and consequently the fiscal balance³. Figure VII shows that the “generosity effect” is very similar in magnitude to the “evasion effect” (figure VI): ratios would decline from 3.33 in 1970 to 2.37 in 2000. Together, the “evasion” and “generosity” effects would be responsible for reducing potential social security support ratios by about 50 per cent since the late 1990s.

To the extent that the “evasion” and “generosity” effects were already high in 1970 compared to international standards, the results presented in the previous simulations will underestimate true effects. We thus prepare a final set of projections that compare social security support ratios in Brazil assuming that 95 per cent of the work force pays social security taxes and assuming the beneficiary rates for the United States in 2001. Figure VIII shows striking results. If both tax evasion and early retirement were eliminated in Brazil, social security ratios would change drastically. For example, in 2000 the ratio would be about 3 times higher than the actual ratio. In addition, the ratios would remain larger than 2 until the year 2045, despite the negative effects

from changes in demographic rates. Finally, the demographic bonus would have been two times larger had appropriate policies been in place in Brazil since 1970.

G. CONCLUDING REMARKS

A growing literature has examined the importance of changes in population age structure for economic growth. Although there is evidence to support the view that the demographic transition leads to an income boost, the gains from this association depend on several conditions, including the ratio between producers and consumers, the degree of capital deepening, and the existence of appropriate institutions and economic policies. In this article we argue that some developing countries have been neglecting the opportunities that changes in population dynamics can bring to the economy by maintaining domestic policies that are less efficient than desired. In that sense, the case of Brazil is remarkable because of the historical low levels of educational attainment and the increasingly large pay-as-you-go pension systems. In 2004, the public pension systems transferred about 12 per cent of the GDP from the working age population to the elderly in Brazil, a significant amount for a country where only 6 per cent of the population is above age 65.

The analysis examines social security support ratios under several counterfactual scenarios to provide insights into how institutional and policy issues reduce the potential economic impact of population changes. 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 tax payments, policy makers have reduced the benefits of the demographic transition and aggravated financial issues from population ageing. This myopic view has also buffered fiscal gains from increases in labour supply.

Two other findings in the present analysis should be interpreted as warning signs. First, the effects of age structure on the pace of population ageing (i.e. population momentum) have provided extra time for social security; about 30 to 40 years until support ratios will reach levels that will be too low to avoid a financial crisis. Second, policy simulations suggest that increasing the minimum age at retirement and eliminating evasion could boost social security support ratios, help honour obligations, and create future conditions for economic growth by (1) producing surpluses to be invested on human capital and (2) relieving the burden facing future generations. We believe that implementing these changes will not be an easy task in Brazil, however. Reducing tax evasion, for example, requires, in addition to law enforcement measures, the flexibilization of the labor market and a deep reform of the social security system to encourage participation among workers who were left in the informal sector. Answers for these challenges facing Brazil should be increasingly discussed in the political arena if we want to preserve old-age security for current and future retirees, without putting economic growth at risk.

ENDNOTES

¹ Similar measure for females is not very informative because of different trends in labour force participation rates over the period of analysis.

² Despite the increase in tax evasion, however, low-income workers from the informal sector can still claim retirement benefits when they become old in Brazil.

³ We found some small variations in the beneficiary rates, particularly, a decline in the rates during the period 1980-1985 (see Figure VII). Although there is no apparent reason for these changes, we believe it may be explained by a combination of factors including the macro-economic environment (recession and

high inflation in the 1980s) and data quality issues in the PNADs (e.g. weights). These variations are of a too small magnitude, however, to affect our conclusions about the “generosity effect”.

ACKNOWLEDGMENTS

This research was partially supported by Grants R01-AG025488-01 and R37-AG11761 from the National Institute of Aging to the University of California-Berkeley and the East-West Center, Ronald Demos Lee and Andrew Mason, principal investigators.

REFERENCES

- Bloom, David, David Canning. (2001). Cumulative causality, economic growth, and the demographic transition. In *Population Matters: Demographic change, Economic Growth, and Poverty in the Developing World*. Nancy Birdsall, Allen C. Kelley and Steve W. Sinding, eds. New York, Oxford University Press, pp.165-197
- Brasil, Ministerio da Previdencia Social (2002). *Livro Branco da Previdencia Social*. Brasilia, DF.
- Brasil, Ministerio da Fazenda, Secretaria de Politica Economica (2003). *Gasto Social do Governo Central: 2001 e 2002*. Brasilia, DF.
- Bravo, J. (2001). Vieillessement de la population et systemes de retraite: L’Amerique Latin dans une. *Perspective Internationale*, Les Dossier du CEPED No.62. Paris, France.
- Camargo, Jose M. (2004). Politica social no Brasil: prioridades erradas, incentivos perversos. *Sao Paulo em Perspectiva*, Volume 18, No. 2.
- Carneiro, Francisco Galvao and Henley, Andrew (2001). Modelling formal vs. informal employment and earnings: micro-econometric evidence for Brazil. U of Wales at Aberystwyth Management & Business Working Paper No. 2001-15.
- Carvalho, Jose Alberto M., Laura Rodrigues Wong (1995). A window of opportunity: some demographic and socioeconomic implications of the rapid fertility decline in Brazil. Working paper. Cedeplar, UFMG, Belo Horizonte
- Costa, L. (1990). Aumento da participacao feminina: uma tentativa de explicacao. In: Encontro Nacional de Estudos Populacionais, 7, ABEP, 1990. v. 2, p. 231-243.
- ECLAC. Boletim Demografico (1999). No. 64. America Latina: Populacion Economicamente Ativa, 1980-2025.
- Giambiagi, Fabio, J.L. de Oliveira Mendonca, K. I. Beltrao, V. L. Ardeo. (2004). Diagnostico da previdencia social no Brasil: o que foi feito e o que falta reformar? Texto para Discussao do IPEA, no 1050.
- ILO International Database (2005). LABORSTA at <http://laborsta.ilo.org/>
- Instituto Brasileiro de Geografia e Estatistica, IBGE (2005) at <http://www.ibge.gob.br>
- Lee, Ronald D., Andrew Mason, Timothy Miller (2003). Saving, wealth, and the transition from transfers to individual responsibility: the cases of Taiwan and the United States. *The*

Scandinavian Journal of Economics(Malden, Massachusetts), vol. 105, No. 3, pp.339-357.

- Leite, Celso (1983) *Um Seculo de Previdencia Social*. Zahar Editores.
- Loayza, Normal (1997). The Economics of the Informal Sector: a simple model and some empirical evidence from Latin America. Working Paper, The World Bank.
- Manchester, Joyce (1999). Compliance in social security systems around the world. In *Prospects for Social Security Reform*. Olivia S. Mitchell, Robert J. Myers, and Howard Young, eds. Philadelphia, University of Pennsylvania Press, pp.295-312.
- Mason, Andrew, Wang Feng (2005). Demographic dividends and China's post reform economy. Paper presented at the XXV IUSSP General Population Conference. Tours, France, 18-23 July.
- Mason, Andrew, Ronald D. Lee (forthcoming). Reform and support systems for the elderly in developing countries: capturing the second demographic dividend. *Genus*
- Medici, Andre. (2004). The political economy of reform in Brazil's civil servant pension scheme. Technical Note on Pension, No. 002, Technical Paper Series: Inter-American Bank of Development.
- Pinto, Jose M. R., Liliane Brant, Carlos E.M. Sampaio, Ana R.P. Pascom. (2000). Um olhar sobre os indicadores de analfabetismo no Brasil. *Revista Brasileira de Estudos Pedagogico* (Brasilia), vol.81, no. 1999.
- Preston, Samuel H., P. Heuveline, and M. Guillot. (2001). *Demography: Measuring and Modeling Population Processes*. Oxford England: Blackwell Publishers.
- Queiroz, Bernardo. (2005) *Labor Force Participation, Social Security and Retirement in Brazil* Ph.D. Dissertation. Department of Demography, University of California at Berkeley, 2005
- Rios-Neto, E.L.G (2004). Diagnostico demografico e socioeconomico sobre o Brasil. In: Projeto Brasil 3 tempos: 2007, 2015, 2022. Centro de Pesquisa Economica e Social, Universidade de Brasilia.
- Rios-Neto, E. L. G., Wajnman, S. (1994). Participacao feminina na populacao economicamente ativa no Brasil: alternativas para projecoes de niveis e padroes. *Pesquisa e Planejamento Economico*, v.24, n. 2.
- Saboia, Ana Lucia (1998). Situacao educacional dos jovens. In *Jovens Acontecendo na Trilha das Politicas Publicas*. Brasilia: CNPD, pp.499-518
- Schwartzman, Simon (2003). The challenges of education in Brazil. Center for Brazilian Studies, Working paper. Oxford University, 2003.
- Shryock, Henry S. and Jacob. S. Siegel (1973). *The Methods and Materials of Demography*. Washington, DC: US Government Printing Office.
- Soares, Fabio Veras (2004). Some stylized facts of the informal sector in Brazil in the last two decades. Anis do XXXII Encontro Nacional de Economia, 142, ANPEC.
- Sobek, Mathew, Steven Ruggles, Robert McCaa, Miriam King, and Deborah Levison (2002). *Integrated Public Use Microdata Series-International: Preliminary Version 1.0*.

Minneapolis: Minnesota Population Center, University of Minnesota
(<http://www.ipums.org/international>)

- Stephanes, Reinhold. (1998) *Reforma da Previdencia: sem segredos*. Rio de Janeiro, Editora Record
- Turra, Cassio M., Eduardo Rios-Neto. (2001). Intergenerational accounting and economic consequences of aging in Brazil. Paper presented at the XXIV IUSSP General Population Conference, Salvador, Brazil.
- Turra, Cassio M., Bernardo L. Queiroz. (2005). Intergenerational transfers and socioeconomic inequality in Brazil: a first look. Paper presented at the *Taller sobre Transformaciones Demograficas, Transferencias Intergeneracionales y Proteccion Social en America Latina*, CELADE, July 6-7, Santiago, Chile
- Ulyssea, Gabriel (2005). Labor market informality in Brazil: a literature survey. Texto para Discussao do IPEA, no 1070.
- United Nations, Population Division (2003). *World Population Prospectus: The 2002 Revision*. New York, United Nations.
- United States of America, Census Bureau (2005). International Programs Center at <http://www.census.gov/ipc/www/idbnew.html>
- Wajnman, Simone, Bernardo Queiroz, and Vania Liberato. (1998). O Crescimento da Atividade Feminina nos Anos Noventa no Brasil. In *Anais do XI Encontro Nacional de Estudos Populacionais da ABEP*
- White, Kevin M., Samuel H. Preston (1996). How many Americans are alive because of twentieth-century improvements in mortality? *Population and Development Review* (New York), vol. 22, No. 3, pp.415-429.
- Wong, Laura, Jose Alberto M. de Carvalho (2005). Demographic bonuses and challenges of the age structural transition in Brazil. Paper presented at the XXV IUSSP General Population Conference. Tours, France, 18-23 July.