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# 8                      Generational Accounting                               in Brazil

Regina Villela Malvar

## 8.1 Introduction

Brazilian economic experience in most of the recent past has been characterized by unstable growth and high inflation rates. Between 1986 and 1991 the economy was subjected to five stabilization plans, which were unable to control price pressures. Between 1988 and 1992 real per capita income declined by an average rate of 2 percent. In mid-1994 a new stabilization scheme known as the “Real Plan” was implemented, and at least until late 1996 inflation remained at a low and stable rate.<sup>1</sup> The performance of the economy also improved: between 1994 and 1995 real GDP grew at an average rate of 5.1 percent.

The Constitution of 1988 altered virtually all aspects of fiscal policy. Of particular relevance was the reform in social insurance. Mainly because of the new constitutional rules, expenditures on social insurance benefits and welfare jumped from 2.6 percent of GDP in 1988 to 5.0 percent of GDP in 1995, while

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1. The *real* is the new Brazilian currency; it replaced the *cruzeiro*.

social insurance sources of revenue increased only moderately, from 4.6 to 5.3 percent of GDP. As expenditures on benefits increased, the traditional procedure of allocating part of payroll contributions to public health could no longer be accomplished. The crisis in social insurance was then extended to public health financing.

Since 1993 the Brazilian federal government has relied on transitory taxes to finance health expenses, while constitutional amendments (including in the social insurance system) are being debated in Congress. There is little room, however, to address the social insurance crisis in the short run because the level of expenditures with existing retirees is fixed and payroll taxes are already considered to be at prohibitively high levels. Long-run prospects are dim, as an aging population and a decline in total fertility rates signal additional pressures in the future.

Constitutional amendments in the tax system and in the structure of public administration are also being discussed in Congress. Some of the main issues in the tax reform debate include the large number of taxes, overlapping bases of incidence, and high payroll taxes. The proposal for public administration reform aims to contain the level of government consumption expenditure.

The purpose of this paper is to address how current and alternative fiscal policies, like some of those being discussed in Congress, can affect the distribution of resources between current and future generations. In addition, it estimates by how much the social insurance reforms of 1988 helped the current elderly at the expense of their grandchildren. The general conclusion is that the actual path of fiscal policies, coupled with the demographic transition, imposes a heavy burden on future generations of Brazilians.

To bring the issues into perspective, section 8.2 summarizes major facets of economic policy in Brazil since 1988, as well as the course of some recent debates on fiscal reform. Section 8.3 presents a description of data sources used in the calculations. Brazilian baseline generational accounts for 1995 are reported in section 8.4. That section also investigates the impact of changes in social insurance, performs a sensitivity analysis for different choices of parameters, including the evolution of the population, and examines the implications of alternative fiscal policies for intergenerational balance. A summary of the main results and general conclusions is presented in section 8.5.

## **8.2 Summary of Recent Fiscal Policies and Current Fiscal Debates**

In 1986, after 22 years of military regimes, Brazilians were eager to adopt changes that could promote stable growth and a more equitable society. The result of a long participative process, the Constitution of 1988 altered important aspects of political, economic, and social life. In terms of fiscal policy, the major changes were the increase in the process of decentralization of tax revenues and the expansion of the welfare state.

The decentralization of tax revenues resulted mainly from two factors. First,

compulsory intergovernmental tax revenue transfers from the central administration to the other two federated units increased. Second, the state and municipal tax base was enlarged, with a corresponding decrease in the tax base at the federal level. The new division benefited local and state governments, whose share of total disposable income increased, at a cost to the federal government.

In an attempt to improve social conditions, the Constitution of 1988 integrated and enlarged previous public programs in health, social insurance, and social assistance under a new order, denominated social security system.

Public health remained a universal program available to all, regardless of age or economic condition. The scope of social assistance was broadened. Social insurance was maintained as a pay-as-you-go system of benefits, due to workers of the private sector. Its main objective continued to be the maintenance of income in numerous circumstances, such as old age, disability, length of service, sickness, death, and maternity, as well as child benefits, among others. Most important, however, the Constitution imposed expensive obligations on the social insurance system, to be effective in 1989 or, at the latest, in 1992, without the accumulation of sufficient previous financing. The main measures in terms of their impact on outlays were recalculation of the value of all existing benefits, in order to recuperate their initial real value; periodic readjustment of benefits to maintain their real value through time; increase in the minimum value of benefits to one minimum wage (most rural workers received half this amount); and decrease in the age of retirement for rural workers (by five years for males and ten years for females).

A new structure of taxation was designed to finance the higher level of expenditures of the health, social assistance, and social insurance programs. The federal budget was fragmented, and social security was granted its own budget (apart from the fiscal one). Since 1992, as a result of the fiscal changes promoted by the Constitution, social security contributions have surpassed federal fiscal revenues.

The Brazilian economic environment was very unstable during the period that lasted from the formation of the National Assembly that gave rise to the Constitution of 1988 through the implementation of its main rules. In the six-year period from 1986 to 1991 the economy was subject to five stabilization plans, which were able to control price hikes for only short periods of time. In fact, as shown in table 8.1, inflation rates skyrocketed from an annual rate of 65 percent in 1986 to 2,700 percent in 1993. From 1988 to 1992, average real GDP decreased by 0.3 percent and average real per capita income by 2 percent.

Starting at the end of 1993 until July 1994, Brazil implemented a stabilization scheme known as the "Real Plan." Policies were structured in three stages. The first stage, designed to improve federal fiscal revenues, was based on a temporary increase in taxes and decrease in constitutional compulsory transfers. The second stage lasted as long as four months. It consisted of a gradual conversion of wages and prices in a new monetary value, which by itself was adjusted daily. The objective was to eliminate distortions in relative prices pro-

Table 8.1 General Indicators, 1988–95

Year	GDP <sup>a</sup> (billion U.S.\$ at 1995 prices)	Population <sup>b</sup> (millions)	Inflation Rate <sup>c</sup> (%)
1988	635.3	139.8	1,037.6
1989	655.6	142.3	1,782.9
1990	627.4	144.7	1,476.6
1991	629.3	147.1	480.2
1992	624.3	149.4	1,158.0
1993	650.5	151.6	2,708.6
1994	689.5	153.7	1,093.8
1995	718.5	155.8	14.8

Note: Exchange rate assumed to be 1.0917 U.S. dollars per real (BACEN 1996b, table I.1).

<sup>a</sup>Value for 1995 is from BACEN (1996b, table I.1). Values for other years are calculated retroactively based on GDP real growth rate.

<sup>b</sup>BACEN (1996b, table I.2).

<sup>c</sup>Índice Geral de Preços; Deflator Implícito. Fundação Getúlio Vargas, *Conjuntura Econômica* (Rio de Janeiro, May 1996).

duced by years of high inflation, so that economic agents could again take the price system as a reliable indicator of investment opportunities. The third stage took place in July 1994, when all values were converted into the new currency—the *real*.

Unlike plans implemented during 1986 to 1991, the Real Plan brought price stabilization. In 1995 Brazilians had the lowest annual rate of price increase in 35 years: 15 percent. With inflation under control and an international environment of sustainable growth, GDP grew by a yearly average rate of 4.8 percent from 1993 to 1995. In 1995 real per capita income reached U.S.\$4,610, its highest level since 1987.

Overvalued exchange rates and a process of import liberalization (in effect since 1990) were essential in containing price pressures, but they contributed in 1995 to the first trade deficit since 1980 (Banco Central do Brasil [BACEN] 1996c, 121). High domestic interest rates and an international market in search of emerging economies were able to attract a net inflow of capital equivalent to 4.2 percent of GDP in 1995.<sup>2</sup> As a result, in 1995, the balance of payments still registered a surplus equivalent to 1.8 percent of GDP (BACEN 1996b, table IV.1).

Public national debt in 1995 represented 30 percent of GDP (BACEN 1996b, table III.13). In an attempt to make adjustments in public sector financing, the central government is promoting reforms in the tax system, social insurance, and public administration. The difficulty is that any one of these re-

2. In 1994 and 1995 real annual federal securities rates were 25 and 34 percent, respectively. Data are from BACEN (1996a, table II.24).

forms implies changes in the Constitution, which requires the approval, in two rounds of voting, of three-fifths of the members of Congress.

An important issue in fiscal reform is the complexity of the fiscal system. Brazil has approximately 80 taxes (Almeida and Cavalcanti 1995). Of these, 14 are fiscal taxes, 20 are social contributions, and the rest comprise a multitude of specific taxes and economic contributions.

A related problem is the inefficiency caused by overlapping bases of incidence. There are two value-added taxes, one at the federal and another at the state level. In addition, two social security contributions have very similar bases of incidence—gross revenue. What exacerbates the distortions is that each of these two social security contributions is cumulative, since it is not based on the concept of value added and is applied in every stage of production.

The complexity of tax rules and overlapping bases of incidence have contributed to the growth of the informal economy, reducing even more the base of incidence of taxes and social contributions. In 1993 and 1994, when the Constitution was under general revision (and changes could be made by a smaller quorum) several proposals were made to reform the fiscal system. At that time, reactions by enraged taxpayers popularized proposals in favor of a unique tax on monetary transactions or a consumption tax on a small number of products, in place of the actual fiscal system.

Since 1988, the financing of social security and the scope of social insurance have been among the most debated topics of government policy. The level of imposition to finance social security is high. Employers' contributions are levied on three different criteria: wage bill, gross revenue, and "social profits." Employers pay, on average, a monthly tax of 22 percent levied on *total* payroll,<sup>3</sup> a tax of 2 percent on gross revenue,<sup>4</sup> and a tax of 8 percent on social profits.<sup>5</sup> Workers contribute with a tax that varies from 8 to 11 percent of net wages up to a cap, and all levels of government are required to allocate resources to the social security budget.

In 1991 and 1992, when most of the new rules regarding social insurance were implemented, it became apparent how feeble the structure of social security financing really was. In 1988 social insurance benefits and welfare to the poor (old or disabled) consumed 57 percent of payroll contributions, whereas in 1992 this ratio had risen to 87 percent (Ministério da Previdência e Assistência Social [MPAS] 1995). As social insurance and welfare consumed more and more of payroll contributions, less and less of that source could be transferred

3. Employers contribute with an additional 5.8 percent levied on payroll to finance education and programs of a private nature.

4. To finance unemployment benefits and programs of economic development, there is an additional tax of 0.65 percent levied on a basis that is very similar to gross revenue.

5. The rules for financial institutions are different. As of 1996, they do not pay taxes on gross revenue, but the levy on social profits is 18 percent.

to health (decreased from 28 percent in 1988 to 13 percent in 1992). At the same time, proceeds from other sources (gross revenues and social profits) were not enough to finance the gap in health expenditures plus remaining social security costs.

Without conditions to promote radical changes in the structure of social security, in 1993 the central administration started a cycle in which transitory taxes are created as soon as old ones expire. From 1993 to 1996, new legislation (including three amendments to the Constitution) was introduced in an attempt to provide the system with enough financing. As of 1996, public health has had an additional source of revenues: a transitory tax of 0.20 percent on all monetary transactions, to be in effect until 1998. Another set of temporary taxes, aimed at the whole social security system, was in effect until 1997.

Since 1994 revenues from payroll contributions have not been transferred to public health. Even so, social insurance is in a financial crisis. In 1995 and 1996 expenditures with benefits consumed 94 percent from payroll contributions. The ratio between the number of contributors and the number of beneficiaries dropped from 2.5 in 1982 to 1.8 in 1995 (Instituto Brasileiro de Geografia e Estatística [IBGE] 1982, 1995; MPAS 1994, 1995). The system does not count on a trust fund to ensure the payment of benefits when expenditures exceed revenues, or for the payment of future benefits. In 1995, the average value of social insurance checks was 1.7 minimum wages.<sup>6</sup> This situation has imposed a policy dilemma. The system of collection imposes a heavy burden on economic agents and, perhaps as a consequence, is not able to provide enough financing. On the other hand, it is difficult to cut expenses because the majority of beneficiaries already receive low benefits.

During the revision of the Constitution in 1993 and 1994 several propositions tried to change the nature of social insurance. A few recommended its privatization. Others suggested a system composed of two parts: (1) a compulsory pay-as-you-go plan with a lower cap of contributions and benefits and (2) an optional plan based on capitalization. The final proposition addressed another very sensitive issue—social security of federal public workers. In this regime, pensions and survival benefits correspond mainly to full earnings. The proposal suggested the integration of public workers (except the military) into the social insurance system and the adoption of rules limiting the access to benefits within that unified regime. By that time, however, with general elections only a few months away, the political environment did not support the approval of any relevant reforms.

During 1996, most of the negotiations between the Congress and the federal government were channeled toward a constitutional amendment of social insurance. Due to strong political pressures, however, the proposition approved in the House of Representatives did not change the structure of social insur-

6. This represented 46 percent of the average remuneration of the economy (IBGE 1995).

ance. The plan preserves the basic characteristics of the social insurance system for private workers and increases the cap of contributions and benefits from eight to ten minimum wages. Public workers continue to have the right to receive full pensions, but access is restricted to those with more than 10 years of service. As of 1997, the proposal is being discussed in the Senate, and it seems that the general lines approved in the House of Representatives will be maintained.

Long-term prospects are dim. In addition to the problems emphasized before, Brazil is experiencing swift changes in its demographic characteristics, particularly a decrease in the fertility rate and an aging population. The total fertility rate decreased from 5.8 in 1970 to 2.4 in the first half of the 1990s. Between 1970 and 1991, the proportion of young generations decreased from 43 to 35 percent; middle-aged cohorts expanded moderately, while the proportion of the elderly in the total population increased from 3 to 5 percent (Instituto de Pesquisa Econômica Aplicada [IPEA] 1996c, chap. 4). The Ministry of Social Insurance is particularly concerned. A smaller rate of growth of middle-aged cohorts and an aging population will add stress to the already debilitated pay-as-you-go system. Health officials expect increasing pressures because diseases typical of older generations are associated with high costs.

To date, regardless of many distortions, social security remains under the same rules that created it. Radical changes will have to come, but no one knows when they will be made or how effective they will be.

### 8.3 Description of Data Sources

A broad database is required to produce generational accounts. It includes population projections; the age-sex composition of tax payments and transfer receipts; the value of taxes, transfers, and government consumption; an estimate of government net debt; and alternative growth and interest rates.

The Brazilian population was projected up to 2200. From 1995 to 2050 the estimates are from CELADE.<sup>7</sup> In this scenario, the total fertility rate is equal to 2.1 in 2000, remaining at this level thereafter. Moreover, life expectancy improves over time for all age groups. In particular, life expectancy at birth is projected to increase from 67.9 years in 1995–2000 to 78.4 years in 2045–50. From 2050 to 2200, estimates followed a program of the Brazilian Bureau of Statistics.<sup>8</sup> Baseline calculations were conducted under the assumption that the total fertility rate and age-sex mortality rates would remain constant at their

7. CELADE is the Latin American Demographic Center. It is the institution within the United Nations organization ECLAC (Economic Commission for Latin America and the Caribbean) responsible for population studies, including population projections. See Latin American Demographic Center (1996).

8. The program used to project Brazilian population from 2050 to 2200 was designed by Fernando Fernandes from DEPIS/IBGE (see Fernandes 1995).



**Table 8.2 Public Sector Tax Revenues and Transfer Payments, 1995 (billions of U.S. dollars)**

Revenues	Amount	Expenditures	Amount
Labor income taxes	15.1	Welfare	2.9
Capital income taxes	13.2	Social insurance benefits: private workers	33.7
Seigniorage	4.4	Unemployment benefit <sup>c</sup>	3.6
Value-added taxes <sup>a</sup>	69.4	Other social security benefits	11.2
Social security contributions	62.7	Social security of public workers	16.1
Payroll	31.2	Transfers to state and local workers	17.8
Gross revenue <sup>b</sup>	16.6	Education	21.9
Social profits	6.1	Total expenditures	107.1
Gross revenue: unemployment <sup>c</sup>	6.4		
Federal public workers	2.3		
Other taxes <sup>d</sup>	38.9		
Total revenues	203.6		

Sources: IBGE, "Carga Tributária 1994 e 1995" (Rio de Janeiro 1996); IBGE, "Tabulação Especial: Transferências de Assistência e Previdência" (Rio de Janeiro, 1996); Ministério da Educação e do Desporto (1996); BACEN (1996a).

Note: Exchange rate assumed to be 1.0917 U.S. dollars per real.

<sup>a</sup>Includes tax on industrialized products (IPI), state value-added tax on the circulation of products (ICMS), and tax on credit, exchange rate, and insurance (IOF).

<sup>b</sup>Social contribution incident on gross revenue (COFINS) and allocated to social security.

<sup>c</sup>Social contribution incident on gross revenue (PIS/PASEP) and allocated to finance unemployment benefit and bonus to low-income workers.

<sup>d</sup>Includes state and local administrations taxes, tax to finance trust fund for employees (FGTS) and other taxes or social contributions.

<sup>e</sup>Includes unemployment benefit plus bonus to low-income workers.

2050 levels until 2200. Because Brazil is considered a closed country in population flows, the projection does not incorporate immigration or emigration variables.

Table 8.2 shows the composition of overall public sector tax revenues and transfer payments in 1995. Tax payments to federal, state, and local governments include labor and capital income taxes,<sup>9</sup> seigniorage, indirect taxes, and social security contributions. Transfer payments include welfare, social insurance benefits to private workers, unemployment benefits (including bonuses to low-income workers), social security to public workers, transfers paid by state and local governments to their public employees, expenditures with education, and other transfers.<sup>10</sup> It is worth noting that the total value of revenues and expenditures reported in table 8.2 does not coincide exactly with the value presented in national accounts statistics. There are two reasons for the differ-

9. Capital income taxes were not adjusted to account for investment incentives.

10. In the Brazilian national accounts, part of health expenditures are in government consumption and part in transfer payments. However, up to now, the available data do not permit the separation of those amounts. Hence, it was not possible to isolate health benefits and distribute their value across a health profile.

ence. First, the values in table 8.2 are in dollars and not in reals. Second, in table 8.2 revenues include seigniorage, and transfer payments include educational expenditures.

Specific age-sex profiles are used to distribute the total amount of the corresponding tax or transfer among males and females from ages 0 to 90. The distribution of income taxes and payroll contributions are from the Ministry of Finance database for 1994. The composition of indirect taxes is derived from the Brazilian Bureau of Statistics 1987 Household Expenditure Survey. The age-sex profile of social insurance benefits used in the baseline calculations refers to the Ministry of Social Insurance database for 1992. To account for changes in social insurance legislation, the profile for 1987 is used instead. Finally, the unemployment benefit profile corresponds to the Ministry of Labor composition for 1994.

All profiles were benchmarked against national accounts values for 1995 and seigniorage against the change in aggregate monetary base between December 1994 and December 1995, as registered by the central bank.

Public expenditure on preschool, elementary, middle, and superior education corresponds to the Ministry of Education estimates for 1995. These four kinds of expenses were distributed equally among the population of males and females of the appropriate educational category.

The level of consumption of federal, state, and local governments (including consumption expenditures associated with social security programs) was U.S.\$105.7 billion in 1995. This value was derived from national accounts statistics and includes wage payments to public workers, government consumption of goods and services, and subsidies; it excludes educational expenditures.

Government net debt for 1995 corresponds to internal and external government net debt held by federal, state, and local governments as well as public enterprises (BACEN 1996b, table III.13). The expected present value of resources to be obtained with privatization, estimated by the Ministry of Planning as 7 percent of GDP,<sup>11</sup> was deducted from that amount. As a result, the value of net public debt for 1995 used in the calculations corresponds to \$167.6 billion.

Tax payments, transfer receipts, and government consumption after 1995 are projected by assuming that the corresponding per capita values will grow at the same rate as the economy. Those future values are discounted to the base year of 1995 by using a specified interest rate.

#### **8.4 Brazilian Generational Accounts**

How much can living and future generations of Brazilians expect to pay to the government due to current and alternative fiscal policies? How will the demographic transition and the reform of social insurance in 1988 affect the

11. Estimated at 7 percent of GDP (see Giambiagi and Pinheiro 1996).

**Table 8.3**      **Generational Accounts of Current and Future Generations: Baseline**  
(thousands of U.S. dollars)

Generation's Age in 1995	Average (1)	Males (2)	Females (3)
0	10.2	17.3	2.8
5	12.3	20.6	3.8
10	17.1	27.0	6.9
15	22.6	34.3	10.6
20	27.0	41.0	13.1
25	30.1	46.5	13.9
30	31.3	48.9	14.0
35	28.0	45.6	10.8
40	19.7	36.0	4.0
45	6.9	19.4	-4.9
50	-6.3	0.9	-13.0
55	-18.1	-16.3	-19.7
60	-28.1	-30.5	-25.9
65	-33.4	-44.3	-23.9
70	-32.9	-47.7	-20.7
75	-22.1	-33.6	-13.1
80	-14.4	-22.3	-8.7
85	-9.6	-13.5	-6.9
90	-2.7	-4.1	-1.8
Future generations	22.1	37.5	6.1
Percentage difference	116.4	116.2	116.2

*Note:* Growth rate assumed to be 1.5 percent; interest rate, 5 percent.

fiscal burden of those currently alive and of future generations? Those are some of the questions addressed in this section.

#### 8.4.1 Baseline Results

Table 8.3 shows baseline generational accounts as of 1995 for a typical member of a living generation between ages 0 and 90 years, and generational accounts for an average member of future generations (those born after the base year of 1995). The baseline calculation assumes an economic growth rate of 1.5 percent and a rate of interest of 5 percent. It also assumes that current policies will prevail in the future.

Column (1) of table 8.3 reports “net payments” of living and future generations. “Net payment” is the difference between the present value of all taxes a typical member of each generation can expect to pay to the government over his or her remaining years of life and the present value of all transfers he or she can expect to receive from the government from the base year into the future. Generational accounts (net payments) are forward looking. They disregard net payments made in the past (before the base year of the calculations) and estimate remaining lifetime bills.

Given the prospective nature of the calculations, net payments are smaller

for young cohorts, reach a maximum for those in middle age, and are negative for older living individuals. This life cycle pattern can be observed in table 8.3. During the remaining years of their lives, newborns can expect to pay U.S.\$10,200 to the government. Net payments increase with age and reach a maximum value of \$31,300 at age 30. This happens because members of this age group are near the peak of their taxpaying years, while retirement is still some years away. Generational accounts become negative at age 50, as the present value of transfer payments they will receive from the government outweighs the present value of taxes they will pay during their remaining years of life. Net payments decrease for older cohorts and reach a minimum at age 65, when they can expect to receive net transfers from the government of \$33,400. Finally, the value of future net payments increases for those aged 70 or older, because they are approaching the end of their lives (90 years) and so have a reduced number of transfers to receive from the government.

As reported in table 8.3, lifetime net payments for an average member of future generations amount to \$22,100, which is 116 percent higher than expected net payments of newborns. This means that if the current path of fiscal policies prevails in the future, generations born after 1995 will have to pay much more in taxes and social security contributions throughout their lifetimes, or will receive much less in benefits (or a combination of both), than those born in 1995.

Table 8.3 also shows an assessment of how generational accounts differ according to gender. During working years males pay more taxes than females, and during inactivity they generally receive more than their female counterparts. The contrast arises because women receive lower wages than men and have lower rates of participation in the labor market. Moreover, since in Brazil the value of pensions is a function of workers' wages and years of contribution, women are entitled to receive, on average, lower social insurance checks than men. Those differences are highlighted by what happens at age 35: remaining net payments of a typical male in this age group (\$45,600) are four times higher than net payments of his female counterpart (\$10,800).

Generational accounting methodology also shows that in Brazil women start collecting pensions earlier than men. As table 8.3 shows, on average, women at age 45 can expect to receive, during their remaining years of life, a net transfer from the government of \$4,900, while men in the same age group can expect to pay, over their remaining years, a net amount of \$19,400. The contrast can be attributed to different eligibility criteria for granting social insurance benefits. Females from the urban sector can retire at age 60 and males at age 65. For rural workers the age limits are lower: 55 years for women and 60 years for men. Females can start receiving length-of-service pensions after 25 years of work, while for men the minimum required is 30 years.

A detailed description of the distribution of different payments and receipts among age groups is reported in table 8.4. The present value of remaining income tax payments and payroll contributions is concentrated among those

**Table 8.4**                      **Composition of Generational Accounts: Present Value of Payments and Receipts (thousands of U.S. dollars)**

Generation's Age in 1995	Payments						Receipts						
	Income Taxes	VAT	Social Security			UI	Other*	Social Security			Social Security of Federal Public Workers	Education	State and Municipal Transfer Payments
			Payroll Contributions	Net Revenue and Social Profits	Welfare			Social Insurance of Private Workers	Other	UI			
0	3.8	9.5	4.1	3.4	0.9	5.7	0.6	4.9	1.8	0.5	2.4	4.1	2.7
5	4.4	11.0	4.7	3.9	1.0	6.6	0.7	5.7	1.8	0.6	2.7	4.8	3.1
10	5.3	13.1	5.6	4.7	1.2	7.9	0.7	6.8	1.7	0.7	3.2	3.8	3.7
15	6.2	15.3	6.6	5.5	1.4	9.2	0.8	7.9	1.7	0.8	3.8	2.4	4.3
20	7.2	17.3	7.8	6.2	1.6	10.8	0.9	9.2	1.6	0.9	4.4	1.9	5.0
25	8.5	18.1	9.1	6.5	1.7	12.5	1.2	10.8	1.6	0.8	5.1	1.1	5.8
30	9.8	18.1	10.3	6.6	1.6	14.0	1.2	12.7	1.5	0.7	6.1	0.2	6.8
35	10.6	17.3	10.8	6.3	1.6	14.7	1.2	14.9	1.4	0.6	7.1	0.0	8.0
40	10.6	15.7	10.2	5.6	1.4	14.0	1.3	17.2	1.3	0.4	8.3	0.0	9.3
45	10.1	13.5	8.9	4.8	1.2	12.4	1.5	20.1	1.2	0.3	9.8	0.0	10.9
50	8.8	11.6	6.9	4.0	1.0	10.0	1.7	22.4	1.1	0.2	11.0	0.0	12.3
55	7.3	8.2	5.0	2.7	0.7	7.4	1.9	22.7	1.0	0.1	11.2	0.0	12.5
60	6.2	6.0	3.5	1.9	0.5	5.3	2.3	23.5	0.9	0.0	11.7	0.0	13.0
65	4.7	4.2	1.8	1.2	0.3	2.7	2.6	21.7	0.7	0.0	10.9	0.0	12.1
70	3.7	2.5	0.3	0.6	0.2	0.5	3.1	17.9	0.6	0.0	9.1	0.0	10.1
75	2.8	1.6	0.0	0.4	0.1	0.1	3.4	11.2	0.5	0.0	5.7	0.0	6.3
80	2.3	1.1	0.0	0.2	0.1	0.0	3.7	6.8	0.4	0.0	3.5	0.0	3.9
85	1.6	0.8	0.0	0.2	0.0	0.0	3.8	4.0	0.3	0.0	2.0	0.0	2.3
90	0.4	0.1	0.0	0.0	0.0	0.0	0.9	1.1	0.1	0.0	0.5	0.0	0.6

*Note:* Growth rate assumed to be 1.5 percent; interest rate, 5 percent.

\*Includes seigniorage, tax to finance the trust fund for employees (FGTS), and remaining taxes.

**Table 8.5**      **Baseline Results and Sources of Generational Imbalance**

Scenario	Generational Imbalance (%)
Baseline	116.4
Zero debt	99.0
No demographic change	64.1

*Note:* Growth rate assumed to be 1.5 percent; interest rate, 5 percent.

between ages 30 and 45, whereas the payment of indirect taxes (value-added taxes and gross revenue contributions) is distributed over a wider range of ages (5 to 50). Welfare is targeted toward older cohorts, since most assistance benefits in Brazil go to the old poor. Social insurance payments for private and public workers are highest for those at age 60. Those between ages 25 and 55 also benefit substantially from social insurance, as this program comprises a wide range of benefits regardless of age, such as disability and length-of-service pensions and survival benefits payable to the living spouse. Educational expenditures are targeted to younger cohorts, reflecting the concentration of public funds on elementary education.

The burden imposed on future generations would be lower if the public sector did not hold any debt or if the structure of the population remained constant in the future. Table 8.5 outlines some of the sources of intergenerational imbalance and compares the associated burdens with the baseline calculation. In the absence of public sector debt, net payments of future generations would be 99 percent higher than those of newborns. In a hypothetical scenario where the population of each age cohort is maintained constant from 1995 to 2200, unborn generations would have to pay on average 64 percent more than newborns. Why is the burden imposed on future generations lower in these two cases than in the baseline calculation? A smaller net debt (in the absence of changes in the current path of government consumption expenditures or in net payments it will receive from living generations) means that the government can reduce the net payments it will impose on future generations and still balance its intertemporal budget constraint. With a constant population structure, the proportion of old cohorts in the total population will remain constant over time and, as a consequence, will not constitute an increasing pressure on the level of transfer payments.

What can be done to ensure that future generations will not have to pay more to the government than today's newborns? Table 8.6 reports spending cuts and tax increases required to eliminate generational imbalance. In all cases, considerable changes are necessary. Net payments of future generations will equal those of newborns if the level of government consumption, net of educational expenditures, decreases by 26.2 percent. Equilibrium between current and future newborns can also be attained if total revenue has an immediate and permanent increase of 11.7 percent, or if the value of all transfer payments has an

**Table 8.6** Spending Cuts or Tax Increases Required to Eliminate Generational Imbalance

Change	Cut or Increase (%)
Cut in government purchases	26.2
Increase in all tax revenues	11.7
Cut in all transfer payments	17.9
Increase in payroll contributions	74.1
Cut in social insurance outlays	47.2

*Note:* Growth rate assumed to be 1.5 percent; interest rate, 5 percent.

immediate and permanent reduction of 17.9 percent. Alternatively, if only the social insurance program is adjusted, a 74 percent increase in revenues from payroll taxes or a 47.2 percent reduction in all outlays is required to produce balance.

#### 8.4.2 Impact of Changes in Social Insurance

As discussed earlier, the implementation of the Constitution of 1988 substantially increased the level of social insurance outlays. The objective of this section is to investigate how baseline generational accounts would be affected if the Constitution of 1988 had not changed the structure of social insurance benefits. This is a purely hypothetical exercise and was conducted only with the purpose of illustrating how social insurance reform can affect living and future generations in opposite ways.

To explore this hypothetical situation it is necessary to assume that social insurance legislation in 1995 is the same as it was in 1988 (the last year of the old legal regime). For that, some of the baseline values need to be revised. First, the profile of social insurance and welfare outlays for 1987 is used, so as to capture the age-sex composition of benefits prior to the reform. Second, the hypothetical value of benefits in 1995 under the old rules is estimated<sup>12</sup> and used instead of the observed level of outlays, so as to incorporate the lower level of expenditures before the reform. With those corrections it is possible to project net payments of current and future generations under the old social insurance rules. Those results can then be compared with the baseline calculations, which reflect current policy.

Table 8.7 shows net payments of living and future generations of males and females for the scenarios “current policy” and “old social insurance rules,” as well as the absolute and relative differences between them. The conclusion is that the reform of 1988 involved a substantial redistribution of resources toward living generations at the expense of those born in the future. As the last

12. This was done by assuming that the average value of benefits in 1995 would be equal to the average value of benefits observed in 1988 times the number of beneficiaries that would have existed in 1995 had the law not changed (and rural workers had to retire at later ages).

**Table 8.7 Impact of Changes in Social Insurance Legislation: Net Payments of Males and Females (thousands of U.S. dollars)**

Generation's Age in 1995	Males				Females			
	Current Policy (baseline) (a)	Old Social Insurance Rules (b)	Absolute Difference (a) – (b)	Relative Difference (%) (a)/(b)	Current Policy (baseline) (a)	Old Social Insurance Rules (b)	Absolute Difference (a) – (b)	Relative Difference (%) (a)/(b)
0	17.3	18.5	-1.1	-6.2	2.8	5.5	-2.7	-48.6
5	20.6	21.9	-1.3	-6.1	3.8	6.8	-3.1	-45.1
10	27.0	28.6	-1.6	-5.5	6.9	10.6	-3.6	-34.4
15	34.3	36.1	-1.8	-5.1	10.6	14.8	-4.2	-28.5
20	41.0	43.1	-2.1	-5.0	13.1	18.0	-4.8	-26.9
25	46.5	49.0	-2.4	-4.9	13.9	19.8	-5.9	-29.9
30	48.9	51.7	-2.8	-5.3	14.0	20.7	-6.7	-32.4
35	45.6	48.9	-3.3	-6.7	10.8	18.4	-7.6	-41.2
40	36.0	39.8	-3.8	-9.6	4.0	12.9	-8.9	-69.1
45	19.4	24.0	-4.6	-19.2	-4.9	5.7	-10.6	-186.6
50	0.9	6.5	-5.7	-86.6	-13.0	-0.7	-12.3	1,692.6
55	-16.3	-11.9	-4.4	36.8	-19.7	-6.0	-13.7	229.6
60	-30.5	-20.1	-10.4	51.5	-25.9	-9.7	-16.2	167.8
65	-44.3	-25.5	-18.8	73.9	-23.9	-8.3	-15.7	189.4
70	-47.7	-23.2	-24.5	105.9	-20.7	-6.5	-14.2	218.7
75	-33.6	-15.7	-17.9	114.4	-13.1	-3.6	-9.6	269.1
80	-22.3	-10.6	-11.7	110.4	-8.7	-2.7	-6.0	223.4
85	-13.5	-7.4	-6.1	82.7	-6.9	-1.6	-5.3	330.6
90	-4.1	-1.5	-2.6	178.1	-1.8	-0.4	-1.4	401.7
Future generations	37.5	20.3	17.2	84.9	6.1	6.1	0.1	1.4
Percentage difference	116.2	9.7			116.2	9.7		

Note: Growth rate assumed to be 1.5 percent; interest rate, 5 percent.



row of table 8.7 shows, if social insurance rules had not changed, unborn generations would pay 9.7 percent more than newborns. Under current policy, the burden facing future generations is much greater, since they can expect to pay 116 percent more than newborns.

Why were future generations left with this sizable burden? The reason is that since all members of living generations can expect to receive, during their remaining years of life, higher transfer payments from the government, the only way to balance the government intertemporal budget constraint (in the absence of a reduction in consumption expenditures or the debt) is to increase net payments to be received from future generations.

An additional result drawn from this analysis is that even though social insurance reform benefited all members of living generations, the gains were not distributed uniformly across all age groups or between males and females. To see this, it is useful to look at the absolute and relative difference columns presented in table 8.7. The first reports the absolute difference between net payments (taxes minus transfers) under current policy and net payments under the old social insurance rules. The absolute difference is negative for all age cohorts of living generations, indicating that as a result of the reform, males and females currently alive can expect to receive higher levels of transfer payments than they would otherwise. The relative difference is negative for younger cohorts, showing that under current policy they will have to make lower net payments than they would under the old social insurance rules. That difference is positive for older cohorts, indicating that with current policy they will receive higher levels of net transfer payments than they would otherwise.

All members of current generations are better off, but males aged 60 to 80 gained more than other males and females aged 45 to 70 benefited more than other females. This can be seen in the absolute difference columns. For example, if the old rules still prevailed, net payments of a typical male aged 65 would be  $-\text{U.S.}\$25,500$  (indicating that during his remaining years of life, transfer receipts exceed tax payments). Under the new rules, his expected net payment is  $-\$44,300$ . The difference of  $\$18,800$  represents what he can expect to receive in terms of higher social insurance benefits. Why did older cohorts benefit more than younger ones? The new rules increased the value of all existing benefits and hence represented a sizable gain for those already receiving social insurance checks. Younger cohorts also benefited from the reform, but their gain will occur only in the future. Since all the calculations are in present value terms, a payment received today has a higher present value than the same payment received in the future.

Another conclusion is that women benefited more than men. This can be seen by noting that the absolute value of the relative difference columns is always higher for women than for men in the same age cohort. This pattern probably accrues because some aspects of the new legislation favored women more than men: the retirement age for female rural workers was reduced more than for male rural workers, and female workers gained the right to ask for length-of-service retirement earlier than males.

### 8.4.3 Sensitivity Analysis

The baseline result gives generational accounts for a particular choice of parameters. It is useful, then, to measure how the calculations would change if a different set of values were more appropriate.

Table 8.8 shows net payments of living and future generations for reasonable assumptions regarding productivity growth and interest rates. The choice of these parameters affects the burden to be imposed on future generations, but it does not change the overall conclusion that if current fiscal policies, including social insurance, are maintained in the future, net payments of unborn generations will be much higher than those of newborns.

The calculations are sensitive to the hypothesis regarding the population projection, as well. Those results are reported in table 8.9. If the structure of the population observed in 1995 remained constant in the future, that is, in the absence of an aging population and a declining fertility rate, the burden on future generations would be 64 percent higher than that on newborns. Different assumptions concerning the behavior of the fertility rate also affect the results. If the number of children per woman of reproductive age remains at 2.1 after 2000, future generations will pay 116 percent more than newborns. However, if the total fertility rate falls from 2.1 to 1.8 after 2055, net payments of unborn generations will be 349 percent higher than those of newborns. This happens because with lower fertility rates there will be fewer members of future generations left to pay the bills not paid by current generations.

### 8.4.4 Effect of Policy Changes

Another important application of generational accounting is to assess how policy changes affect net payments of different generations. Table 8.10 reports generational accounts of males and females under three alternative scenarios. A general conclusion drawn from these experiments is that policy changes are not neutral with respect to gender or age.

In Brazil, given the high level of payroll taxes, one proposition often suggested is a shift in the tax base, from payroll contributions to value-added taxes. As column (2) of table 8.10 shows, this change in tax structure benefits males aged 0 to 60 as their net payment to the government declines. Young females and older cohorts of both sexes lose, since they will have to pay higher taxes than they would otherwise. Why do the elderly lose? They did not pay payroll taxes and hence do not benefit from their elimination, but they are hurt by higher value-added taxes. Young females are worse off because the ratio of young females' to young males' indirect tax payments is higher than the ratio of payroll taxes. As a result, an increase in indirect taxes hurts young females more than young males, and a cut in payroll taxes favors young males more than young females.

The second experiment is a 1 percent increase in social insurance expenditures every year until 2030. All living generations gain from this measure, since they benefit from higher transfers from the government. Females gain more

**Table 8.8**      **Sensitivity with Respect to Productivity Growth and Discount Rate (U.S. dollars)**

	<i>g</i> = 1			<i>g</i> = 1.5			<i>g</i> = 2		
	<i>r</i> = 3	<i>r</i> = 5	<i>r</i> = 7	<i>r</i> = 3	<i>r</i> = 5	<i>r</i> = 7	<i>r</i> = 3	<i>r</i> = 5	<i>r</i> = 7
Net Payments									
Present generation	15,726	8,498	3,579	17,304	10,229	4,611	18,174	12,097	5,811
Future generations	35,203	18,791	10,481	40,840	22,132	12,080	46,791	26,042	14,041
Generational imbalance (% difference)	123.9	121.1	192.8	136.0	116.4	162.0	157.5	115.3	141.6

*Note:* *g* is productivity growth (percent); *r* is interest rate (percent).

**Table 8.9**                      **Sensitivity with Respect to Population Parameters**

Assumption Regarding Population	Generational Imbalance (%)
Constant population structure from 1995 to 2200	64.1
Fertility rate of 2.1 after 2000 (baseline)	116.4
Lower fertility rate of 1.8 after 2055	349.2

*Note:* Growth rate assumed to be 1.5 percent; interest rate, 5 percent.

**Table 8.10**                      **Generational Accounting under Alternative Policy Changes: Net Payments of Males and Females (thousands of U.S. dollars)**

Generation's Age in 1995	Baseline (1)	Switch from Payroll to Value-Added Taxes (2)	Increase in Social Insurance Benefits by 1% Every Year until 2030 (3)	Reduction in Government Consumption by 2% Every Year until 2200 (4)
<i>Males</i>				
0	17.3	16.9	14.9	17.3
10	27.0	26.4	23.6	27.0
20	41.0	39.7	36.6	41.0
30	48.9	44.3	43.7	48.9
40	36.0	29.8	30.6	36.0
50	0.9	-2.9	-3.6	0.9
60	-30.5	-32.8	-33.5	-30.5
70	-47.7	-46.8	-49.0	-47.7
80	-22.3	-22.0	-22.7	-22.3
90	-4.1	-4.1	-4.1	-4.1
Future generations	37.5	38.8	52.1	35.9
Percentage difference	116.2	129.4	250.8	107.4
<i>Females</i>				
0	2.8	3.7	0.9	2.8
10	6.9	8.1	4.4	6.9
20	13.1	14.3	9.8	13.1
30	14.0	13.7	9.9	14.0
40	4.0	2.8	-0.2	4.0
50	-13.0	-13.5	-16.6	-13.0
60	-25.9	-26.0	-28.3	-25.9
70	-20.7	-20.3	-21.8	-20.7
80	-8.7	-8.4	-9.1	-8.7
90	-1.8	-1.8	-1.8	-1.8
Future generations	6.1	8.4	3.3	5.9
Percentage difference	116.2	129.4	250.9	107.3

*Note:* Growth rate assumed to be 1.5 percent; interest rate, 5 percent.

than males. Women in their 40s and men in their 50s profit more than the other age groups, since they are closer to retirement and will be granted higher pensions during their entire period of inactivity. The gain to living generations, however, hurts future generations, whose burden is 250 percent higher than that of current newborns.

The last experiment is a reduction in government consumption by 2 percent every year until 2200. This policy does not change what living generations pay or receive from the government because it does not entail alterations in tax policy or social security transfers. As a result, the beneficiaries of a thriftier government are future generations who face lower net payments.

## 8.5 Conclusions

The application of generational accounting to the Brazilian case suggests that if the actual path of fiscal policies, including social insurance, remains unchanged, future generations will face a burden 116 percent higher than current newborns.

What are the sources of intergenerational imbalance in the Brazilian situation? The level of public debt and an aging population associated with lower fertility rates can partially explain why expected net payments of future generations are much higher than those of current generations. Most of the imbalance, however, can be attributed to the changes in social insurance legislation brought by the Constitution of 1988. The reform increased the value of all existing benefits and decreased the age for retirement of rural workers without securing appropriate financing. If this windfall to the initial elderly had not taken place, the burden on future generations would be 9.7 percent higher than that on newborns, which is significantly lower than the burden associated with current social insurance policy.

Several measures can ensure that future generations will not pay more to the government than current newborns. They encompass a cut in government spending by 26.2 percent, an increase in revenues from taxes and social contributions by 11.7 percent, or a reduction in all transfer payments to public and private workers by 17.9 percent. Any of those changes are, without doubt, extremely hard to accomplish. However, if relevant corrections are postponed to a later date, the intergenerational imbalance against future generations gets even worse. For instance, if during the next five years the Brazilian government is unable to promote structural reforms in fiscal policies, generations born five years from now will face a burden 153 percent higher than that on newborns. And if the lag period is ten years, the onus will be almost 200 percent.

Another important lesson from generational accounting is that policy changes are not neutral with respect to gender or age. For example, a shift in the tax base from payroll to indirect taxes helps current males but hurts young females and the elderly. The social insurance reform of 1988 benefited all

members of living generations, but in general, women gained more than men and the current elderly gained more than young and middle-aged cohorts.

Finally, why should Brazilian policymakers or politicians be concerned about the burden on future generations? The government strives, almost daily, to find resources to pay public employees, keep hospitals open, and pay current retirees. The answer is that the intergenerational distribution of resources can have important consequences for a nation's capacity to save. For instance, if the marginal propensity to consume out of remaining lifetime income rises with age, policies that increase social insurance benefits (like the reform of 1988) may tend to stimulate current consumption and reduce domestic savings.

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