THE OPPORTUNITIES WE CANNOT FORGO: ECONOMIC CONSEQUENCES OF POPULATION CHANGES IN BRAZIL*♣

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1. INTRODUCTION

This paper analyzes the relationship between changes in population age structure and economic growth in Brazil between 1970 and 2045. While we know some facts about population growth and economic development**,** we know little about the interactions between population age structure and changes in demographic variables on economic growth. The transformation in population age structure can have important impacts on the economic growth, a phenomenon called demographic dividends. The rise in the share of working age population and individual responses to population aging can lead to these dividends. We use income and consumption age profiles, in conjunction with population projections, to study in detail the macroeconomic consequences of population changes in Brazil. We estimate the demographic dividends and discuss the gap between potential and observed economic growth.

The consequences of changes in population age structure have regained interest in recent years (Cutler et al, 1990; Bloom, Canning and Sevilla, 2003). Demographers and economists alike are interested in examining the extent to which interactions between population age structure and both fertility and mortality declines yield economic development. First, several studies indicated the role of population dynamics (age structure) on economic growth. For example, Bloom & Williamson (1998) showed that part of the Asian economic miracle was explained because the working-age population grew at faster rates than the dependent population from 1960 to 1995. They find that changes in population age structure account to about one-third of the observed economic growth in Asia during that period. Second, the early 1990´s brought a different issue to demographers and economists in developed countries. What would be the impacts of population aging in the developed world? Cutler et al (1990) investigated whether population aging is a challenge or an opportunity to economic development. They showed that the changing age structure can bring benefits to the society for two reasons: lower dependency ratio means more resources to be invested in the economy; and increase longevity affects working age population savings behavior creating positive effects on the income level.

The demographic dividend or demographic bonus has been recently presented as a combination of two separate dividends (Mason & 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, 2005). The second dividend, which has gone virtually unnoticed among most scholars, comes in succession to the first dividend and is related to the creation of wealth that arises in response to population aging. The magnitude of this effect depends

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largely on how wealth is created (Mason, 2005). Rapid capital accumulation or larger transfers from younger generations, private and public, can meet consumption demands of an increasing elderly population. Only in societies where capital-deepening prevails will the effects of population aging ultimately increase the output per effective consumer (Lee, Mason & Miller, 2003).

Unfortunately, the demographic dividends are not automatic and depend on institutions and policies to transform changes in population age structure into economic growth (Bloom and Canning, 2001; 2004). For example, it is fundamental that the labor market creates enough opportunities for the growing working age population, and that a developed financial market exists to fulfill individual's willingness to save (Mason, 2005). 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 (Mason, 2005).

Despite unabated interest among researchers in issues pertaining to macroeconomic consequences of population aging in developed countries, little is known about these issues in emerging economies. Brazil is one example of an important context for elaborating linkages between economic and population changes that has not been fully examined yet. Brazil has been characterized by rapid demographic changes (Carvalho and Wong, 1999), such as rapid fertility decline and improvements in life expectancy (Figure 1). From a young quasi-stable age distribution in 1970, the distribution has been gradually shifting to an older one. This transition in age structure implies in rapid growth of the working age population until 2045, from which the first dividend arises (Carvalho and Wong, 2005). Indeed, in a recent analysis, Rios-Neto (2004), using income data from Brazilian municipalities, shows that the association between working age population growth and income growth was positive and significant during the period 1991-2000. Yet, we expect that income growth would be greater if Brazil had stronger institutions, macroeconomic stability and more appropriate policies in place. Unfortunately, there are strong forces promoting stagnation (Pritchett, 1997).

Since 1980 the economy has been stagnant, with an annual growth rate of 2,17%, compared to a strong average annual rate of 7,5% in 1950-1980. Indeed, the years between 1980 and 1993 were characterized by macroeconomic instability and successive attempts to combat high inflation rates. It was only in 1994 that a successful economic plan consolidated price stability. In recent years, several other factors have jeopardized economic growth and put at risk the demographic dividends. First, the rising ratios of public debt as a share of GDP (56% in 2002) have reduced the fiscal capability of the public sector to invest in human capital. At the same time, large public transfers to the elderly that have been recently documented in Brazil (Turra and Rios-Neto, 2001), may represent an extra burden for future working age populations, reducing the ability and willingness of workers to save for future consumption. Third, income inequality has been persistent over the past few decades. Brazil has a much higher Gini coefficient (0.6) than the average coefficient for Latin America (0.4), and despite some improvements in educational attainment (Saboia, 1998), educational levels remain remarkably low. Finally, the labor market has not been able to absorb the growing working age population. During the last two decades unemployment and informality rates have increased (Table 1).

Despite the growing interest in this area, we are not aware of any study aiming to quantify the demographic dividends and to explain possible reasons for the inability to exploit the dividends in Brazil. In an influential study, Carvalho and Wong (1999) pointed out the need for policy makers to respond ahead of time in order to benefit from increases in working age population. Turra and Rios-Neto (2001) demonstrate that fiscal gains from demographic changes are transitory and may not last long given current public policies. Turra and Queiroz (2005) show how the absence of appropriate policies mitigate temporary benefits of population change, and aggravate adverse effects of population aging, in the case of the Brazilian social security system.

In this paper we show that almost 60% of the economic growth between 1970 and 2000 in Brazil could be explained by the demographic dividends. Our findings, however, suggest that most of this contribution was concentrated in the 1970s; in the last two decades the economy has not taken advantage of the demographic changes. We speculate that low investments in human capital and the lack of proper social and economic institutions are responsible for jeopardizing the demographic dividends in the country.

2. DEMOGRAPHIC DIVIDENDS

The first dividend arises and dissipates as changes in age structure interact with the lifecycle of production and consumption (Mason, 2005; Mason and Lee, forthcoming). The first dividend is related to a temporary increase in the share of the working age population and is calculated by increases in the ratio of producers to consumers in the population. In this sense, it measures increases in income due to the growth of working age population. The first dividend is temporary and not always positive. As population ages and the share of the elderly grows faster than the working age group, output growth will be depressed.

The second dividend comes in succession to the first dividend and is related to the creation of wealth that arises in response to population aging (Mason and Lee, forthcoming; Mason, 2005). Two underlying mechanisms are responsible for producing the second dividend. First, aged people carry larger amounts of capital than young people and therefore, increases in the proportion of the old-age population may increase the amount of capital available in the economy. Second, declines in the risk of dying at older ages, which are also typical of an aging population, may boost capital growth if the additional resources needed to smooth consumption after retirement are met by capital accumulation rather than transfer wealth (Lee, 1994). It is worth mentioning that the amount of capital necessary to keep the capital-labor ratio constant is reduced when the working age population is growing at slower rates and thus, capital accumulation does not need to be too pronounced to generate economic growth in an aging society (Cutler et al, 1990).

We follow Mason and Lee (forthcoming) to formalize the demographic dividends. According to the authors, output per effective consumer can be expressed by Equation 1:

$$\frac{Y_t}{N_t} = \frac{L_t}{N_t} * \frac{Y_t}{L_t}$$

, where Y_t is the total output, N_t is the effective number of producers, and L_t is the effective number of consumers. The effective number of producers is the population weighted by the age income profile, and the effective number of consumers is the population weighted by the age consumption profile (Cutler et al, 1990; Mason, 2005). The support ratio is given by the ratio of effective producers (N_t) to the number of effective consumers (L_t).

By taking the natural log of both sides of Equation 1 and deriving it in respect to time, Mason and Lee (forthcoming) obtain rates of growth (Equation 2):

$$\dot{y}_t = \dot{L}_t - \dot{N}_t + \dot{y}^l_t$$

Therefore, the rate of growth in output per effective consumer is equal to the sum of two components. The first component, given by the difference between the growth in the number of effective producers and growth in the number of effective consumers (i.e. the rate of growth of the support ratio), is the first dividend. The second component - the rate of growth of productivity – reflects increases in the ratio of capital-labor and therefore, represents the second dividend. Mason (2005) shows that the rate of growth of productivity is proportional to the ratio of capital to labor income when both capital and transfer wealth grow at the same rate (i.e. when there are no changes in intergenerational transfer policy). Given that the accumulation of wealth in year *t* for the cohort born in year *b=t-a* or earlier is defined by the difference between the present value of future lifetime consumption and future lifetime production (Equation 3):

$$W(\leq b,t) = \overline{c}(t)\,\mathrm{PVC}(\leq b,t) - \overline{y}^l(t)\,\mathrm{PV\,L}(\leq b,t).$$

the ratio of capital to labor income can be easily estimated by dividing the expression above by labor income and manipulating algebraically its terms, so that (Equation 4) (Mason 2005):

$$w(\leq b,t) = [\overline{c}(t)/\overline{y}^l(t)]\,\mathrm{PVC}(\leq b,t)/L(t) - \mathrm{PV\,L}(\leq b,t)/L(t).$$

3. DATA SOURCES AND METHODS

Estimates of the demographic dividends require both income and consumption age profiles. The results in this paper are based on age profiles estimated using Brazilian data. We make extensive use of the Living and Standards Measurement Survey of Brazil (PPV) to estimate age schedules of economic flows. The PPV was carried out between 1996 and 1997 by the Brazilian census office in a joint project with the World Bank. With a sample size of 4940 households, the PPV is representative of 70 percent of the national population and 75 percent of GDP (Turra, 2000). The surveys contain a comprehensive and comparable set of demographic and economic variables, including detailed information on household budget and expenditures. We also make use of administrative records, which provide us with information on taxes and public spending on education, health care and social security in 1996. More information about the data can be found elsewhere (Turra, 2000; Turra & Rios-Neto, 2001).

To estimate age profiles of consumption we apply different rules depending on how data on expenditures were colleted in the survey (i.e. individual or household data). Out-of-pocket expenditures on education and health were reported for all respondents and thus, are drawn directly from the survey. Expenditures on cigarettes are allocated proportionally among adults aged 15 and older in the household. Expenditures on children and adult apparel are distributed proportionally among persons between ages 0 and 15 and persons aged 15+, respectively. Residual expenditures are allocated by age using equivalence scales based on Engel's method (Deaton 1997). Following the Lee transfer framework, the age consumption profile also includes (1) the mean value of public consumption by age (e.g. public spending on education and health), and (2) the value of services provided by consumer durables and housing, which are allocated by age using Engel's equivalence scales.

Information on labor earnings is collected for all individuals ages 10 and older who worked for pay during the survey's reference week. Labor earnings are self-reported and include income before taxes from all jobs held during the reference week as well as the value of fringe benefits. To estimate labor earnings we include both employment and self-employment income. For self-employed individuals, we assume that 2/3 of their earnings is labor income and 1/3 is return to capital (Lee and Mason, 2004).

4. TRENDS IN SIMULATION COMPONENTS

4.1. Demographic Transition

The panels of Figure 1 display some of the main features of the demographic changes that have occurred in Brazil over the last decades. Figure 1 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 changes (Carvalho & Wong, 1999). The total fertility rate has reduced by more than half since 1970 (5.3 to 2.12 in 2000) and life expectancy at birth has improved steadily: from 57.5 years in 1970 to 70.3 years in 2000. 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 percent of the total population, compared to 3 percent 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 following the decline in the young dependency ratio. The trend will then shift upwards as increases in the old-age dependency ratio became more important.

4.2. Consumption and Income Age Profiles

In assessing the impacts of demographic change on the Brazilian economy, it is important to start by examining the broad features of economic dependency. Usually, youth and old-age dependency ratios are used to describe the trends in the economic lifecycle (Figure 1). However, income and consumption age profiles provide more detailed and richer information about the lifecycle and economic dependency. Figure 2 depicts income and consumption age profiles pattern in Brazil estimated by Turra (2000). The results show that the lifecycle pattern in Brazil is quite similar to patterns found in developed nations (Lee, 2003). Like in most developed nations today, where retirement emerges as an important stage of the lifecycle, the old-age dependency starts around age 60 in Brazil. On the other hand, youth dependency ends at about age 20. As Mason (2005) points out, the age profiles imply a gradation of dependency. For example, those aged 70 and over are more economically dependent than those aged 60-69, and children age 0-9 are more dependent than those aged 10-19.

5. THE DEMOGRAPHIC DIVIDENDS

5.1. The First Demographic Dividend

The first dividend is related to a temporary increase in the share of working age population and it is effectively measured by increases in the ratio of producers to consumers in the population. Estimates of the first demographic dividend use age profiles of income and consumption and population age distributions. The results presented here were estimated using Brazilian profiles for 1996 (Figure 2). We assume that this cross-sectional profile is constant during the period of analysis (1970-2050). This assumption ignores how socioeconomic development might affect the patterns of income and consumption in the future. Also, we are assuming that demographic changes will not affect the arrangements of intergenerational transfers (Preston, 1984), nor how the expansion of public programs might affect patterns of consumption (Becker and Murphy, 1988). In this paper, we are mainly concerned on how demographic changes can have impacts on economic growth. On further research we are considering alternative scenarios.

Figure 3 presents the support ratio and the first dividend. The two vertical lines indicate when the support ratio crosses 1.0 (in 1995) and when the growth rate of the support ratio turns negative (i.e. the first dividend equals to zero), in 2020. The support ratios (effective producers to effective consumers) in Brazil are unfavorable during the 1970´s and 1980´s. The support ratio is less than 1.0 until 1990. High fertility rates and declining infant and child mortality led to a larger proportion of children, about 50% of the population under age 20 during this period, causing the low support ratio.

From the late 1990´s on the country experience a rapid rise in the support ratio lasting until 2040. These improvements in the support ratio are caused by the fertility decline since 1970s and the consequent increase in working age population (Figure 1). The support ratio reaches its peak in 2015 (1.127), accumulating an increase of about 25% from 1970 to 2015. The trend in the Brazilian support ratio shares some similarities with the Indian experience, shown in Mason (2005a). They both have only one peak contrary to the US experience, and the rise in the support ratio starts later in these two countries compared to the United States and Japan. However, the rate of growth of the support ratio is faster in Brazil than in Indian because fertility decline in India was much slower than in Brazil. Brazilian's support ratio peaks in 2015 while support ratio in India will not peak until 2040 (Mason, 2005a).

The first dividend, the rate of growth of the support ratio, is also shown in Figure 3. Brazil has one clear period of demographic dividend, starting in 1975 and lasting until 2020. The dividend is strongly positive during those decades. In this period the economy should have grown 0.6% per year on average due to the first dividend only. The effects of population aging are already observed after 2000, when the first dividend starts to decline, but they are more evident after 2020 when it turns negative. The first demographic dividend after 2020 will be a drag to economic growth.

Figure 4 compares the duration of the first dividend in Brazil with other countries. The first dividend in Brazil will last longer than what is observed in industrialized countries. The first dividend in Brazil is about 20 years longer than the developed world experience. Mason (2005a) shows that the first dividend last for 30 years in both Japan and the USA, and it is already being a drag to economic growth since 2000. The dividend in Brazil is shorter than other developing nations, more specifically Asian countries. For exemple, the first dividend in India started in 1975 and it is expected to last until 2040 (about 15 years longer than in Brazil).

Table 2 shows the potential impact of the first demographic dividend on actual economic growth. We follow Mason (2005a) to analyze the contribution of the dividends on economic growth. The table reports the first dividend (growth rate of the support ratio), the growth rate of GDP per capital, growth rate of GDP per effective consumer, and the contribution of the first dividend to the observed economic growth rate. GDP per effective consumer is a better measure rather than GDP per capita because it incorporates the effects of demographic changes on population consumption and needs (Mason, 2005a).

The results presented in the table show some interesting patterns of the Brazilian economic growth from 1970 to 2000. During this period the decline in fertility rate and the consequent increase in working age population led to an increase in GDP per effective consumer of 0.6% per year on average. In the future the expected changes in the Brazilian population age structure will lead to a negative effect on economic growth. From 2020 to 2040 Brazil will experience a negative effect, 0.4% per year on average, on potential economic growth.

The first dividend contributed to almost 30% of the observed economic growth from 1970 to 2000. The first dividend's contribution in Brazil is greater than the ones observed in Japan, India and the United States. Mason (2005a) estimates the contribution of the growth rate of the support ratio in 20% for the United States and about 10% for India during the same period. However, Table 2 shows that Brazil failed to take better advantage of the process in recent years. Most of the contribution of the first dividend is from 1970 to 1980. In the 1980s and 1990s the growth rate of support ratio could have led to an increase of the GDP per effective consumer of 0.7% and 0.85% per year, respectively. However, the observed economic growth was smaller than the first dividend alone. The growth rate of GDP per effective consumer from 1980 to 1990 was negative 0.75% per year, and from 1990 to 2000 it was 0.75% per year.

5.2. The Second Demographic Dividend

To estimate the second dividend we follow Mason (2005) and apply several simplifying assumptions. First, we measure the ratio of capital to labor income at ages 50 and older to represent the wealth accumulated over the individual life cycle. Second, although we assume that the age patterns of consumption and labor income do to not change over time, we do allow consumption and income levels to increase by 1.5% a year. To estimate the present values of consumption and labor income we further assume a rate of interest of 3% in order to keep our results consistent with previous applications of the model (e.g. Mason 2005). Finally, to translate changes in the ratio of capital to labor income into productive growth we assume that the elasticity of labor income with respect to capital is 0.5. As indicated above, on further research we are considering alternative scenarios.

The estimates of lifecycle wealth and the second demographic dividend are presented in Figure 5, which shows the estimates of the ratio wealth to output, and Figure 6, which shows estimates of the second dividend from 1970 to 2045.

Lifecycle wealth has been growing quite slowly until recently. According to our estimates the ratio of lifecycle wealth to output will not reach 1.0 until 2010. Mason (2005a) shows that the United States reached this level in 1905, Japan in 1940, and India in 1985. In recent years we estimate more rapid grow to this ratio in Brazil because age structure is changing fast with the population getting older. Our long-term projections shows that wealth-output ratio in Brazil will reach 3.0 in 2040 and will continue to increase. We estimate wealth-output ratio growth rate in 3.3% per year from 2015 to 2045. Despite raising growth rates, the wealth-income ratio in Brazil is much lower than what it observed in other countries developed and developing (Mason, 2005). The low levels of capital accumulation might have negative effects on future economic growth.

The increasing wealth translates in economic and productivity growth. Wealth accumulation and consequent capital deepening has direct effect on productivity and economic growth. Figure 6 depicts productivity growth rate from 1970 to 2045. Before 2010, capital deepening caused by population aging would have raised productivity level by 0.61% per year on average. The effects of population aging are clearly observed after 2015, when one-forth of the population is over 50 years old. From 2015 to 2045, the productivity effect would almost triple, jumping to 1,66% per year on average.

5.3. Combining the Dividends

Table 3 presents the contribution of the first and second demographic dividends to growth in GDP per effective consumer. The second dividend is smaller than the first dividend for all periods but 1975-80 and 1980-85. This is the opposite from what Mason (2005a) observes for the USA, Japan and India, in these three countries the second dividend is greater than the first and the magnitudes are large. The combined effect of the first and second dividends contributed to 56% of the observed growth rate in GDP per effective consumer from 1970 to 2000. As with the first dividend, the Brazilian economy failed to take advantage of the second dividend. We show that for the two most recent decades the growth rate in GDP per effective consumer was lower than what the demographic dividends would predict. For example, from 1995 to 2000 GDP per effective consumer growth rate was one-third of what the demographic dividends would predict.

Population change seems to be favorable to economic growth in Brazil in the near future. From 2010 to 2045, the demographic dividends (first + second) could raise GDP growth per effective consumer by 1,35% per year on average (Figure 6). On the contrary, developed countries studied by Mason (2005a) will have a small or even negative contribution from the demographic dividends to economic growth.

6. CONCLUSION

This paper has shown that demographic changes might favor economic growth when appropriate policies and institutions are in place. We also have contributed to extend and deepen the knowledge of how much demographic changes in Brazil can impact on economic growth. More specifically, we now have some understanding that the country is failing to take advantage of the positive impacts of the demographic dividends. In the last few decades, the Brazilian economy grew at much slower rates than what the demographic dividends alone would predict, contrary to the experience of other developing countries (e.g. Asian countries).

One of the main findings of our work is that the demographic dividends explain 56% of GDP per effective consumer from 1970 to 2000. However, our results also indicate that the economy growth rate could have been greater if the country had taken advantage of the changes in population age structure. In addition to that, we find that most of the dividends' contribution happened in the 1970s, the last two decades have observed economic growth rates much smaller than what demographic changes would predict. These findings reveal that Brazilian policy makers have not made decisions to transform changes in population age structure into economic growth. Moreover, if policies are not adopted future benefits of the dividends will also be lost.

In attempting to explore further benefits of demographic changes we also simulate future trends in the demographic dividends. Our results indicate that the Brazilian economy can still benefit from population dynamics and boost economic growth. On one hand, the possible advantages from the first dividend will last until 2020, thus, there is still some time to elaborate policies to benefit from this opportunity. On the other hand, the benefits from the second dividend are permanent but they will be realized only if capital deepening prevails. The experience of Asian economies should provide some insights on how to benefit from the demographic bonus. Investments in human capital and policies to incentive wealth accumulation should be top priority for current and future governments.

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Table 1
General Economic Indicators, Brazil, 1976-2003 (selected years)

Variable	1976	1981	1985	1996	2003
GDP per capita (U$ 2003)	2577	2808	2875	3157	3212
Annual Inflation Rate (%)	46,2	95,2	235,13	9,33	7,66
Unemployment Rate (%)	1,82	4,26	3,38	9,95	5,24
Average Years Schooling	3,23	3,9	4,3	5,4	6,3
Formal Employment Rate (%)	57	41	39	55	58
Gini Index	0,62	0,58	0,59	0,6	0,58
Economic Growth (a.a. %)	10,26	-4,25	7,85	2,66	0,54

Source: Ferreira and de Barros (1999) and Ipeadata, 2005

Table 2
Growth Rates of the support ratio and GDP per effective consumer
Brazil, 1970-2000

Period	Support Ratio	GDP per Capita	Effective Consumer	GDP per Consumer	Ratio
1970-75	0,184	7,022	0,130	6,892	2,67
1975-80	0,393	4,512	0,180	4,332	9,07
1980-85	0,622	-0,942	0,220	-1,162	-53,53
1985-90	0,778	-0,054	0,290	-0,344	-226,16
1990-95	0,895	1,438	0,360	1,078	83,02
1995-2000	0,808	0,788	0,360	0,428	188,79
1970-2000	0,613	2,127	0,020	2,107	29,09

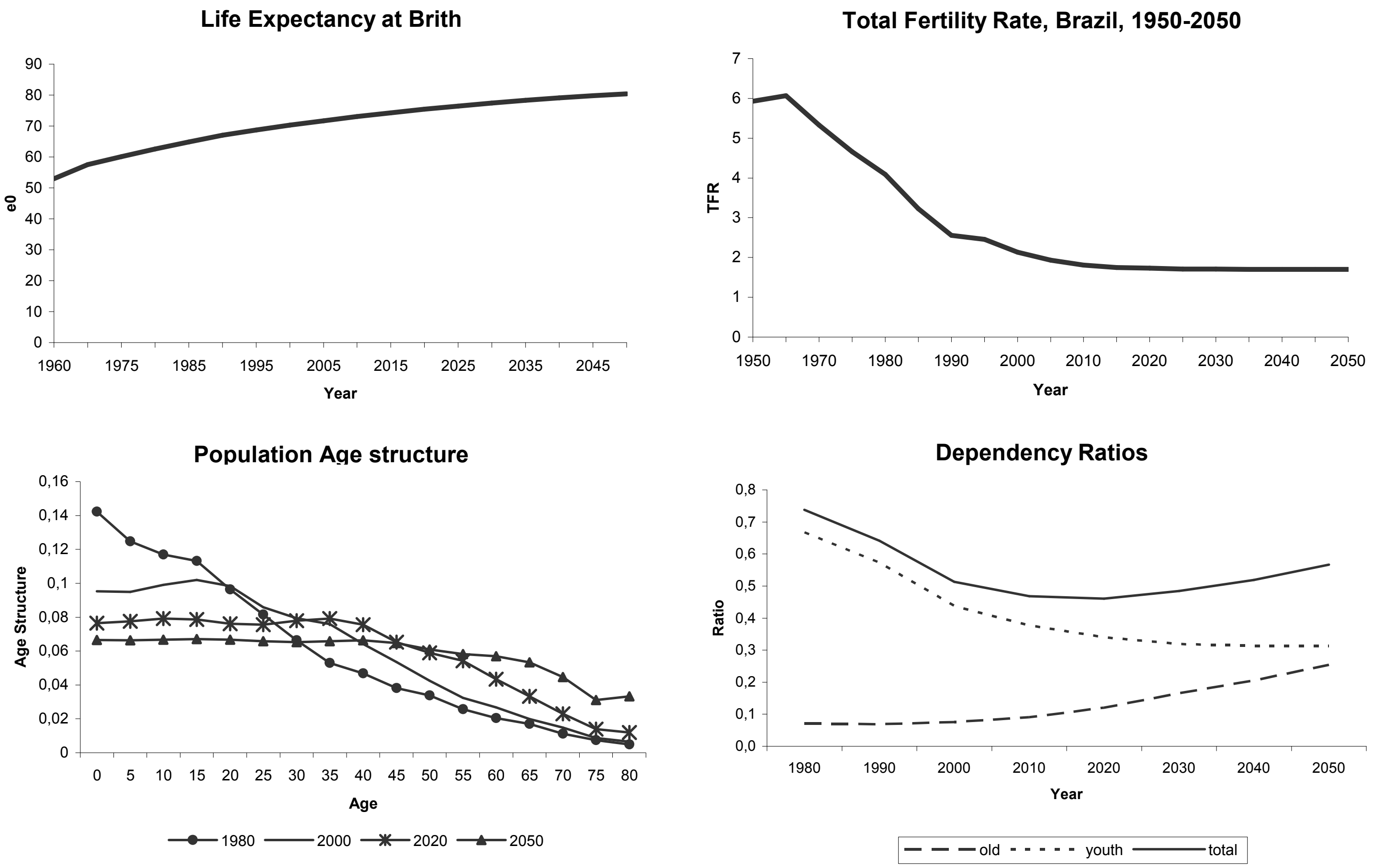
Source: Growth rates of per capita GDP based on IPEADATA. Rates are calculated using real values (R$ as of 2004).

Table 3
Growth Rates of the support ratio and GDP per effective consumer
Brazil, 1970-2000

Period	GDP per Consumer	First Dividend	Second Dividend	First + Second	Dividends / Actual
1970-75	6,892	0,184	0,173	0,357	0,05
1975-80	4,332	0,393	0,442	0,835	0,19
1980-85	-1,162	0,622	0,770	1,392	-1,20
1985-90	-0,344	0,778	0,760	1,538	-4,47
1990-95	1,078	0,895	0,684	1,579	1,46
1995-2000	0,428	0,808	0,560	1,368	3,20
1970-2000	2,107	0,613	0,565	1,178	0,56

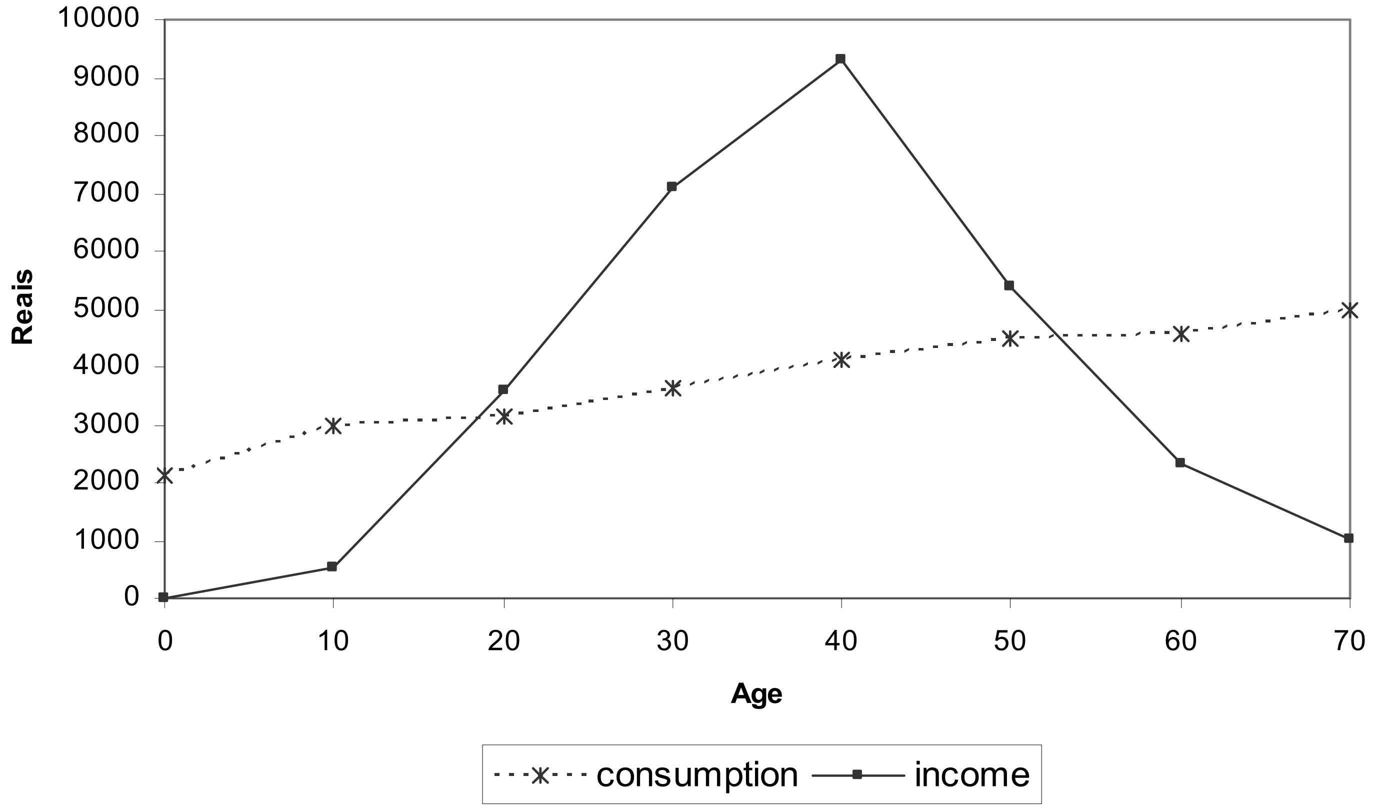
Source: Growth rates of per capita GDP based on IPEADATA. Rates are calculated using real values (R$ as of 2004).

Figure 1
Demographic Transition in Brazil, 1950-2050



Source: Author´s calculations based on IBGE Population Projections

Figure 2
Income and Consumption Age Profiles, Brazil, 1996



Source: PPV, 1996

Figure 3
Support Ratio and First Demographic Dividend, Brazil, 1970-2045

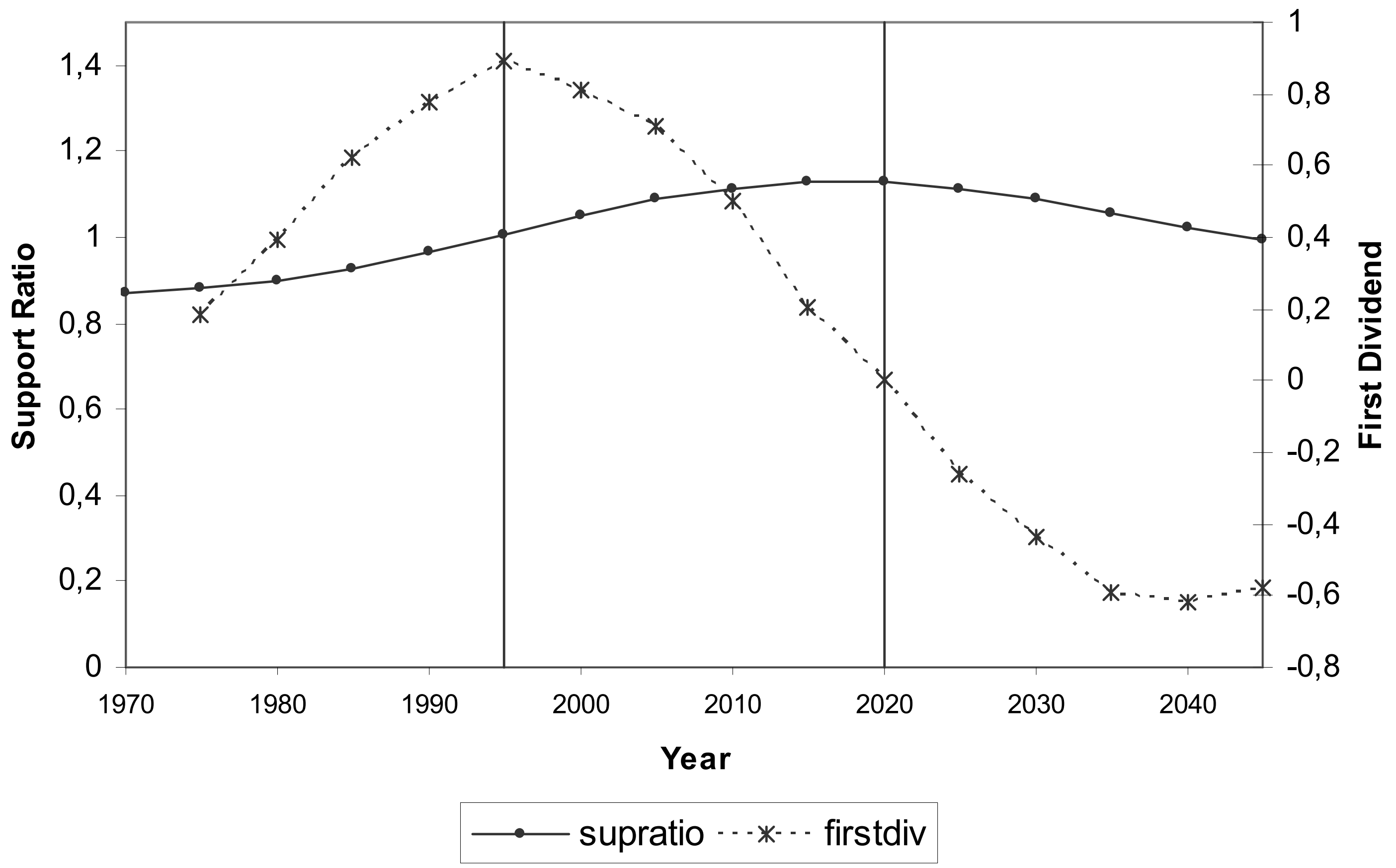
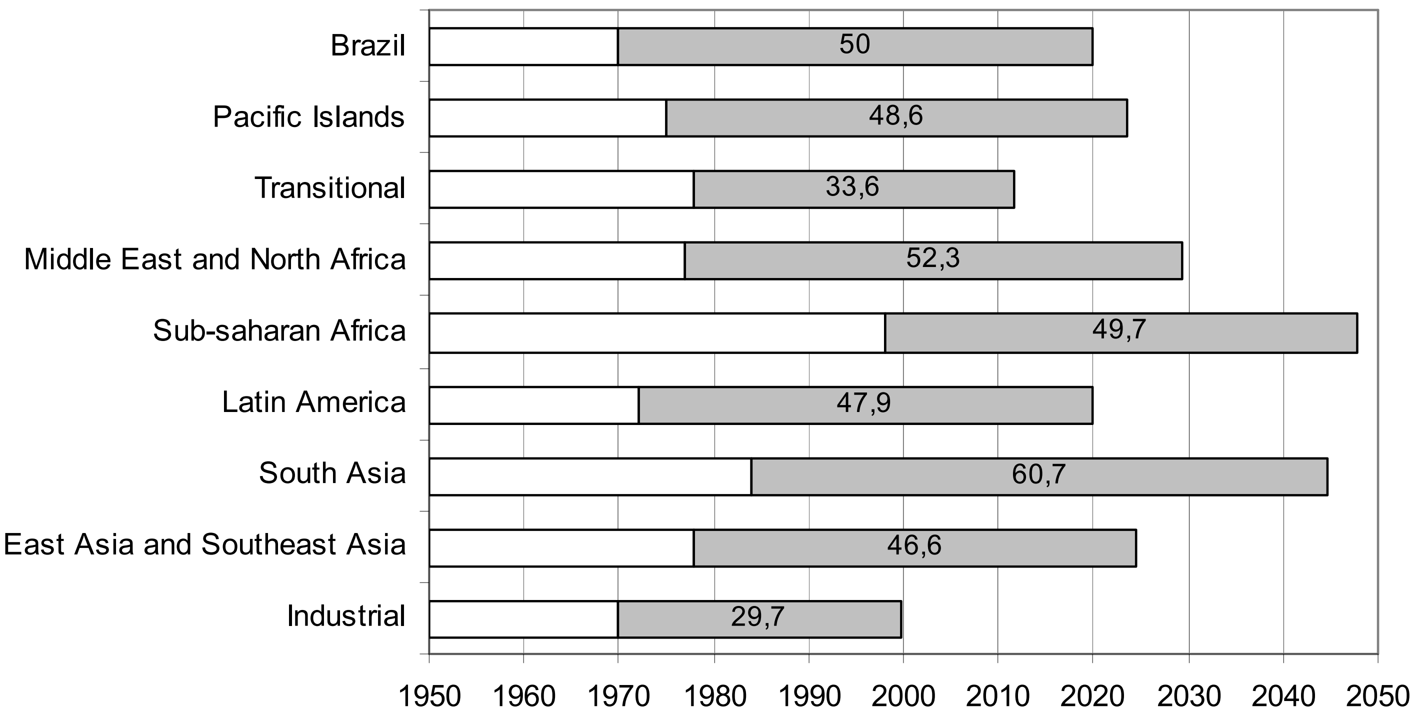
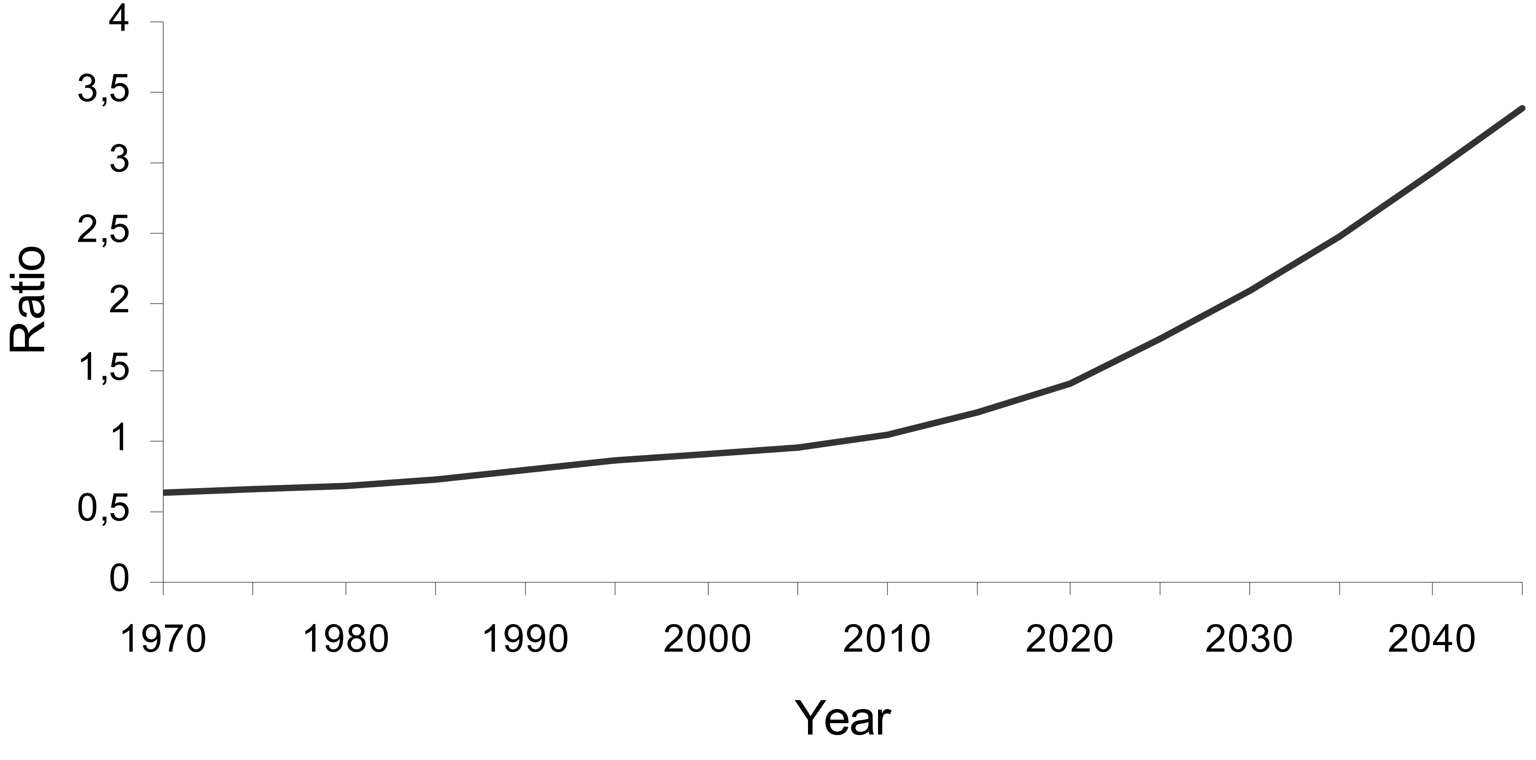


Figure 4
The Timing of the First Demographic Dividend: Brazil and Other Countries' Groups.



Source: Mason (2005) and author´s calculation´s for Brazil data

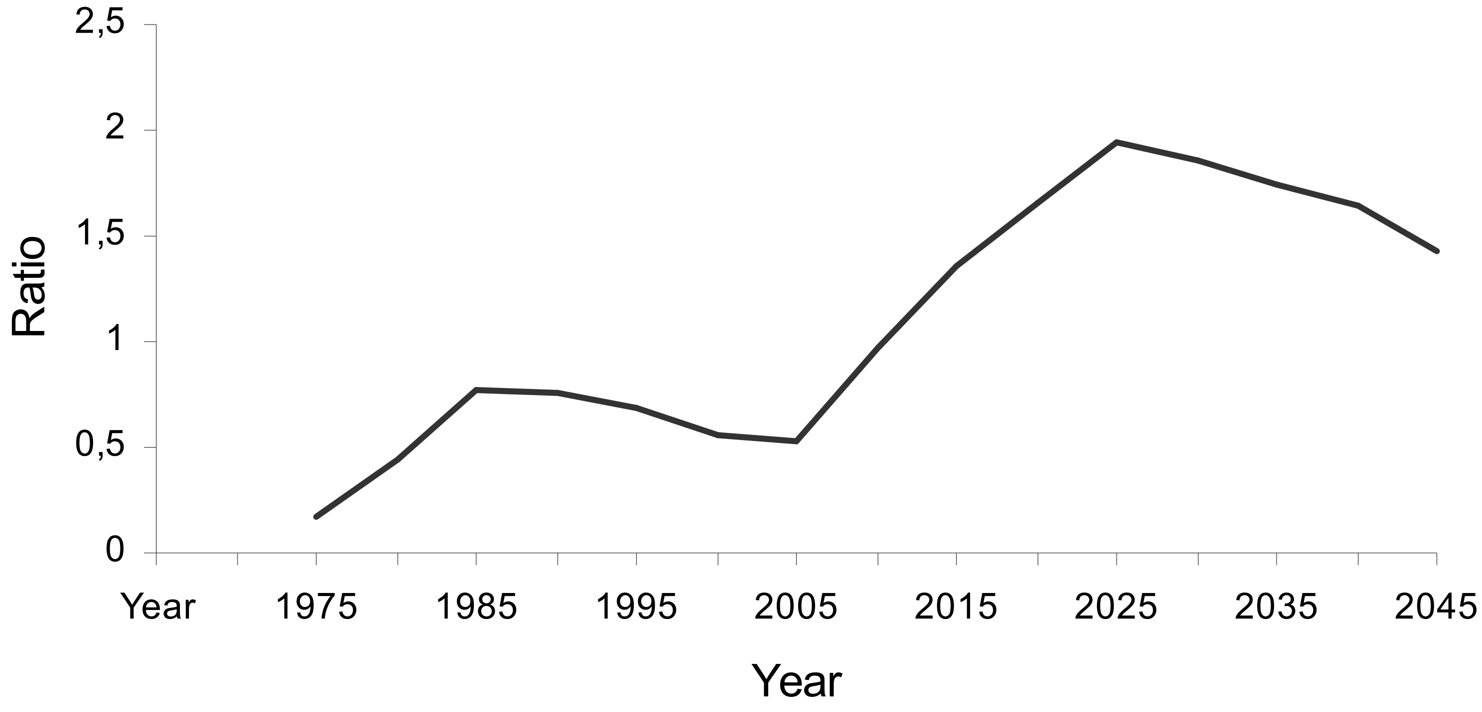
Figure 5
Wealth (50+)/Output



Source: Author´s calculations based on PPV 1996

Figure 6

Estimates of the Second Dividend. Brazil. 1970-2045



Source: Author´s calculations based on PPV 1996