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# Linkages Between Pro-Poor Growth, Social Programs and Labor Market: The Recent Brazilian Experience

NANAK KAKWANI
*University of New South Wales, NSW, Sydney, Australia*

MARCELO CÔRTES NERI
*Centro de Políticas Sociais and EPGE/FGV, Botafogo, RJ, Brazil*

and

HYUN H. SON *
*Asian Development Bank, Metro Manila, Philippines*

**Summary.** — This paper analyzes the relationship between growth patterns, poverty, and inequality in Brazil during its globalization process, focusing on the role played by the labor market and social programs. Methodologically, the paper makes two contributions to the literature. One is the proposal of a new measure of pro-poor growth, which links growth rates in mean income and in income inequality. The other contribution is a decomposition methodology that explores linkages between three dimensions: growth patterns, labor market performances, and social policies. The proposed methodologies are then applied to the Brazilian National Household Survey covering the period 1995–2004.


*Key words* — inequality, poverty, growth, pro-poor growth, labor market, social policy

## 1. INTRODUCTION

Globalization bears both optimistic and pessimistic views about its effects on the economy. According to a trade model in economics, lower tariffs and transportation costs should push each country to specialize in producing the goods that the country has a comparative advantage in. In principle, globalization should hence lead to an increase in the relative demand for skilled labor in rich industrialized countries, and an increase in the demand for the unskilled labor in poor developing countries. In contrast, a pessimistic view about the effects of globalization stems from that it could be a source of increased inequality. While integration with world markets can make a significant contribution to the productivity increase and thus economic growth, it may be detrimental to equity. Low wages and restricted workers' rights could be important factors to attract foreign investment and gain greater access to the world market, which overall tend to benefit capital owners. At the same time, globalization could engender more inequality among workers. This can occur if only a small proportion of the people who have skills benefit from increased economic integration and the rest are left behind. From empirical perspectives on the effects of globalization, the available evidence is mixed. The Asian experience over the past two decades suggests that globalization has a positive and dramatic impact on both growth and poverty reduction. Yet there has been an increase in inequality as observed in China and India. Moreover, several studies also suggest that Latin American countries have experienced an increase in wage inequality after their economic liberalization. This warrants a closer look at the merits of the relationship between globalization, growth, poverty, and inequality.

The Brazilian experience has been quite peculiar in the sense that structural reforms, and in particular trade liberalization, started comparatively late, only a few years ago. Whereas other countries in Latin America started opening their economies in the early or mid-1980s, the same process started in Brazil only in the early 1990s. As is generally claimed, there is a strong association between growth and poverty reduction in Brazil. Whether growth translates into significant poverty reduction depends upon numerous factors such as education, unemployment, minimum wages, social programs, *etc*. One of the most important factors influenced by all others is the degree of inequality in the country. High inequality in the country would have prevented the economy from growing faster. It is imperative to emphasize that a combination of economic growth and income distribution would lead to a more rapid and effective solution to poverty reduction. Studies have found that poverty is more responsive to growth when the distribution of income and assets is more equal. In this context, a more equal society will grow faster. Brazil has been notoriously known as one of the countries with the highest income inequality in the world (Li, Squire, & Zou, 1998; Psacharapoulos, 1991). After its steep rise in the 1960s, Brazilian income inequality has been high and stable between 1970 and 2000 (Bacha & Taylor, 1978; Barros & Mendonça, 1992; Barros, Henriques, & Mendonça, 2000; Bonelli & Sedlacek, 1989; Hoffman, 1989; Langoni, 1973; Ramos, 1993). In recent years, however, inequality has been on the decline with a pace comparable to the rise observed in the 1960s. This change reflects a combination of labor market improvements seen by low skilled workers, including increases in educational attainment

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and the adoption of increasingly targeted official income policies. But what are the share of these factors on the observed trends?

This paper analyzes the relationship between growth patterns, poverty and inequality in Brazil during its globalization process, focusing on the role played by the labor market and social programs. From a methodological point of view, the paper makes two contributions to the literature. One contribution is the proposal of a new measure of pro-poor growth, which links growth rates in mean income and in income inequality. The other contribution is a decomposition methodology that explores linkages between three dimensions: growth patterns, labor market performances, and social policies. The proposed methodologies are then applied to the Brazilian National Household Survey (PNAD) covering the period 1995–2004.

This paper is organized in the following manner. Section 2 is devoted to the derivation of pro-poor growth rate that adjusts for inequality. Section 3 outlines empirical aspects of calculating the pro-poor growth rate using household surveys. Section 4 develops a decomposition methodology to link pro-poor growth with labor market characteristics, while Section 5 describes trends in growth, inequality, and poverty in Brazil. Sections 6 and 7 present the empirical results for pro-poor growth rates and the decomposition method applied to labor market ingredients, respectively. Based on a Shapley decomposition, Section 8 looks at the contribution of main components to growth patterns. Similarly, Section 9 investigates the contributions of different non-labor income sources to growth. Section 10 concludes the study.

## 2. PRO-POOR GROWTH RATE

Suppose $x$ is the real income of an individual, which is a random variable with density function $f(x)$, then the real mean income of the population is defined as [1]

$$\mu = \int_0^\infty x f(x) dx. \tag{1}$$

A country's performance in average standard of living can be measured by the growth rate $\gamma$ given by

$$\gamma = \Delta Ln(\mu). \tag{2}$$

Economic growth has an impact on each individual in a different manner. Following Kakwani and Pernia (2000), growth is defined as pro-poor (or anti-poor) if the poor benefit proportionally more (or less) than the non-poor, that is, growth results in a redistribution of income in favor of the poor. When there is a negative growth rate, growth is defined as pro-poor (anti-poor) if the loss from growth is proportionally less (more) for the poor than for the non-poor. This is a relative concept of pro-poor (anti-poor) growth because growth leads to a reduction (or increase) in relative inequality. [2]

The pattern of growth can be described by two factors: (i) the growth rate in mean income defined by $\gamma$ and (ii) how inequality changes over time. To measure the pattern of growth, we need to specify a social welfare function, which gives a greater weight to utility enjoyed by the poor compared to utility enjoyed by the non-poor. [3] Suppose $u(x)$ is the utility function, which is increasing in $x$ and concave, then we can define a general class of social welfare function as

$$W = \int_0^\infty u(x) w(x) f(x) dx, \tag{3}$$

where $w(x)$ is the weight given to the utility of the individual with income $x$. The main problem with this social welfare function is that it is not invariant to the positive linear transformation of the utility function. Following Atkinson's (1970) idea of equally distributed equivalent level of income, we can get a money-metric social welfare function denoted by $x^*$ from (3) as

$$W = u(x^*) = \int_0^\infty u(x) w(x) f(x) dx, \tag{4}$$

where $x^*$ is the equally distributed equivalent level of income which, if given to every individual in the society, results in the same social welfare level as the actual distribution of income. Note that if $w(x) = 1$ for all $x$, then $x^*$ in (4) is identical to the money-metric social welfare proposed by Atkinson (1970).

To make pro-poor growth operational, we need to specify $u(x)$ and $w(x)$. The most popular form of the utility function is the logarithmic utility function which, given by $u(x) = \log(x)$, is increasing and concave in $x$. In this study, we adopt the logarithmic utility function not only because of its popularity, but also because of its attractive features such as the decomposability of growth rate in terms of some labor force characteristics (see next section). Atkinson (1970) specified $u(x)$ by an entire class of homothetic functions, which provide flexibility to choose any value of inequality aversion parameter. By choosing a logarithmic function, we have chosen the inequality aversion parameter to be equal to 1.

The inequality aversion parameter determines how much weight should be given to the poor relative to the non-poor; the higher the inequality aversion parameter, the greater is the weight given to the poor relative to the non-poor. Since Brazil has persistently suffered high degree of inequality, it is our opinion that we should choose the inequality aversion parameter to be higher than what is implied by the logarithmic utility function. We can achieve this objective by choosing $w(x)$, which is a decreasing function of $x$ so that the total weight given to all individuals add up to unity, which implies

$$\int_0^\infty w(x) f(x) dx = 1. \tag{5}$$

According to Sen (1974), the weighting function $w(x)$ can capture the relative deprivation suffered by the poor relative to the non-poor in society. Following him, a simple way to capture relative deprivation is to assume that an individual's deprivation depends on the number of persons who are better off than him/her in society. Such a weighting scheme is given by

$$w(x) = 2[1 - F(x)], \tag{6}$$

where $F(x)$ is the distribution function. This function implies that the relative deprivation suffered by an individual with income $x$ is proportional to the proportion of individuals who are richer than this individual. It can be verified that $w(x)$ in (6) is a decreasing function of $x$ and satisfies Eqn. (5). [4]

Substituting $u(x) = \log(x)$ and $w(x)$ from (6) in (4) gives the social welfare function

$$\log(x^*) = 2 \int_0^\infty [1 - F(x)] \log(x) f(x) dx, \tag{7}$$

which provides the basis for the empirical analysis presented in this paper. If we substitute $u(x) = x$ in (7), we would obtain a social welfare function developed by Sen (1974)

$$W = \mu(1 - G), \tag{8}$$

where $G$ is the Gini index. This social welfare function has been criticized on the ground that it is not strictly quasi-con-

cave. [5] It can be demonstrated that our proposed social welfare function in (7) is indeed strictly quasi-concave. This is not the only reason for using the proposed social welfare function. Sen's social welfare function cannot be used to directly link the growth pattern with the changes in labor force characteristics, which is an important contribution of this paper. [6]

It will be useful to write (7) as

$$\log(x^*) = \log(\mu) - \log(I), \tag{9}$$

where

$$\log(I) = 2\int_0^{\infty} [1 - F(x)][\log(\mu) - \log(x)] f(x)dx, \tag{10}$$

where $I$ is a new measure of inequality. Taking the difference in (9) gives

$$\gamma^* = \gamma - g, \tag{11}$$

where $\gamma^* = \Delta \log(x^*)$ is the growth rate of money-metric social welfare $x^*$, $\gamma = \Delta \log(\mu)$ is the growth rate of mean income $\mu$ and $g = \Delta \log(I)$ is the growth rate of inequality as measured by $I$. This equation describes a growth pattern which provides the linkage between growth rates in the mean income and income inequality.

$\gamma^*$ is the proposed measure of the pro-poor growth rate. If $g$ is positive, then growth is accompanied by an increase in inequality. In this case, we have $\gamma^* < \gamma$ and thus, there is a loss of growth rate due to the increase in inequality. If $g$ is negative, this implies that growth is accompanied by a decrease in inequality, in which case, $\gamma^* > \gamma$, which suggests that there is a gain in growth rate due to the decrease in inequality. Growth is defined as pro-poor (or anti-poor) if there is a gain (or loss) in growth rate. Thus, a change in inequality is captured by the gain and loss in growth rate.

It is interesting to note that the proposed pro-poor growth rate $\gamma^*$ for Atkinson's (1970) money-metric social welfare (when inequality aversion parameter is equal to 1) is obtained as

$$\gamma^* = \int_0^{\infty} g(x) f(x)dx, \tag{12}$$

where $g(x) = \Delta \log(x)$ is the growth rate enjoyed by a person with income $x$. This equation implies that the growth rate of every person receives the same weight. This is in fact the Ahluwalia and Chenery's (1974) equal weight index. Note that the growth rate of mean income $\gamma$ gives exactly the same weight to a dollar increase in income of every recipient but $\gamma^*$ in (12) gives exactly the same weight to a 1% increase in income of everyone. Thus, the Ahluwalia and Chenery index gives greater weight to the increases in income of poorer persons than those of richer persons. [7]

The idea of equal proportional weight is interesting but given the persistent high inequality in Brazil, we may wish to give greater weight to growth rates of poorer persons than those of richer persons. Our proposed growth rate $\gamma^*$ in (11) meets this requirement: the weight given to growth rates declines monotonically with the income level.

## 3. CALCULATING PRO-POOR GROWTH RATE FROM HOUSEHOLD SURVEYS

This study utilizes the *Pesquisa Nacional por Amostra de Domicilios* (PNAD, the Brazilian Annual National Household Survey) from 1995 to 2004. Each household survey contains a variable called the weighting coefficient (WTA), which is the number of population households represented by each sample household. The sum of the WTAs for all sample households provides the total number of households in the country. A population weight variable (POP) can be constructed by multiplying the weighting coefficient (WTA) by the household size. The sum total of the (POP) variable for all sample households provides an estimate of the total population in the country. The total population estimate for Brazil was calculated as equal to 148.11 million for 1995, which increased to 173.71 million in 2004.

Using the (POP) variable, one can easily calculate the relative frequency that is associated with every sample household. Suppose $f_{jt}$ is the relative frequency associated with the $j$th household at year $t$. If $x_{jt}$ is the *per capita* real income of the $j$th household at year $t$, then the mean income of all individuals in the country at year $t$ can be estimated as

$$\mu_t = \sum_{j=1}^{n} f_{jt} x_{jt}, \tag{13}$$

which was estimated for every year between 1995 and 2004. We then estimate the growth rate of the mean income at year $t$ as

$$\gamma_t = \Delta \log(\mu_t). \tag{14}$$

To compute the social welfare function defined in (7), we need an estimate of the probability distribution function $F(x)$. An unbiased estimate of $F(x)$ for the $j$th household at year $t$ is given by [8]

$$p_{jt} = \sum_{i=1}^{j} f_{it} - f_{jt}/2 \tag{15}$$

when households are arranged in ascending order of their *per capita* real income $x_{it}$. Substituting (15) into (7) gives a consistent estimate of money-metric social welfare $x_t^*$ as given by

$$\log(x_t^*) = 2\sum_{j=1}^{n} f_{jt}(1 - p_{jt}) \log(x_{jt}), \tag{16}$$

which gives an estimate of the pro-poor growth rate at year $t$ as

$$\gamma_t^* = \Delta \log(x_t^*). \tag{17}$$

Growth will be pro-poor (or anti-poor) at year $t$ if $\gamma_t^*$ is greater (or less) than $\gamma_t$.

## 4. LINKING PRO-POOR GROWTH WITH LABOR FORCE CHARACTERISTICS

The PNAD provides labor force characteristics of individuals. From the individual information, we can calculate the following variables at the household level:

- *Per capita* real labor income ($y_l$).
- *Per capita* non-labor income ($y_{nl}$).
- *Per capita* employed persons in the household ($e$).
- *Per capita* labor force participation rate ($\ell$).
- *Per capita* hours of work in the labor market ($h$).
- *Per capita* years of schooling in the household ($s$).

Using these variables, we calculate the following variables of interest: [9]

- Employment rate: $e_r = e/\ell$.
- Hours worked per employed person: $h_e = h/e$.
- Productivity: $\xi = y_l/h$.

The linkage between the growth rate of *per capita* labor income and growth rates of the four labor force characteristics

(which include employment, hours of work per employed person, labor force participation rate, and productivity) is provided through the following identity:

$$\ln(y_l) = \ln(e_r) + \ln(h_e) + \ln(\ell) + \ln(\xi). \quad (18)$$

Using this definition, it is easy to show that growth rate in *per capita* labor income is related to growth rates of the four labor force characteristics in an additive fashion

$$\gamma(y_l) = \gamma(e_r) + \gamma(h_e) + \gamma(\ell) + \gamma(\xi). \quad (19)$$

The first factor is the employment rate. If this factor is positive, this suggests that the employment rate has improved in the economy, contributing positively to economic growth. A similar interpretation can be given to the other factors. The last factor is the contribution of change in productivity to the growth rate of *per capita* labor income.

Again using the identity (18) in (16), it is easy to show that the pro-poor growth rate of *per capita* labor income is also related with pro-poor growth rates of the same four labor market characteristics in an additive fashion as [10]

$$\gamma^*(y_l) = \gamma^*(e_r) + \gamma^*(h_e) + \gamma^*(\ell) + \gamma^*(\xi). \quad (20)$$

Subtracting (19) from (20) gives the decomposition of the growth rate of inequality in total income in terms of four factors as

$$g^*(y_l) = g^*(e_r) + g^*(h_e) + g^*(\ell) + g^*(\xi). \quad (21)$$

The growth rate of labor income is pro-poor (or anti-poor) if $g^*(y_l)$ is greater (or less) than 0. This equation provides the contributions of various labor force characteristics to a gain (or loss) of growth rate due to changes in the pattern of *per capita* labor income. [11] If, for instance, $g^*(e_r)$ is positive (or negative), it means that employment generated in the economy contributes to a decrease (or increase) in inequality in *per capita* income. A similar interpretation applies to the other factors.

Schooling is a major factor that has an impact on productivity. It is generally true that the higher the level of schooling an individual possesses, the greater is his/her productivity (or labor earnings per hour). Thus, an increase in years of schooling should lead to an increase in productivity. But the relationship between schooling and productivity is not that simple. Changes in years of schooling are also accompanied by changes in returns from schooling. The returns from schooling also vary from one household to another depending on a host of factors such as age, location, occupation, and so on. Growth rates of returns are also not uniform across households.

Productivity of the $j$th household denoted by $\xi^j$ can be written as

$$\xi^j = y_l^j / h^j, \quad (22)$$

where $y_l^j$ is the *per capita* labor income of the $j$th household and $h^j$ is the *per capita* hours of work in the labor market provided by the $j$th household. Suppose $\bar{r}$ is the average hourly return from per year of schooling of all the working population and $\bar{r}^j$ is the average return (per hour) from per year of schooling of the $j$th household. Then the productivity of the $j$th household can be written as

$$\xi^j = s^j \bar{r}(\bar{r}^j/\bar{r}), \quad (23)$$

where

$$\bar{r}^j = \xi^j / s^j. \quad (24)$$

Taking the logarithm in both sides of Eq. (23), we obtain

$$\log(\xi^j) = \log(s^j) + \log(\bar{r}) + \log(\bar{r}^j/\bar{r}), \quad (25)$$

which on utilizing the averages of the variables and taking first differences gives

$$\gamma(\xi) = \gamma(s) + \gamma(\bar{r}), \quad (26)$$

which shows that the growth rate in the mean productivity can be decomposed into two components. The first component is the growth rate of mean years of schooling, and the second is the growth rate of average returns from per year of schooling. [12]

Applying the identity (25) in (16), it can be easily shown that the pro-poor growth rate of productivity is related to three factors in an additive fashion as

$$\gamma^*(\xi) = \gamma^*(s) + \gamma^*(\bar{r}) + \gamma^*(\bar{r}^j/\bar{r}). \quad (27)$$

Subtracting (26) from (27) gives the decomposition of the growth rate of inequality in productivity in terms of three factors

$$g^*(\xi) = g^*(s) + g^*(\bar{r}) + g^*(\bar{r}^j/\bar{r}). \quad (28)$$

The first term on the right hand side of (28) relates to how growth in years of schooling is distributed among the poor and the non-poor. The schooling will be pro-poor (or anti-poor) if $g^*(s)$ is greater (or less) than zero. The second term in (28) will always be zero, because $\bar{r}$ is the same for all households. The third term measures the impact of the redistribution of the rates of returns among households. If $g^*(\bar{r}^j/\bar{r})$ is greater (or less) than 0, changes in the rates of returns from schooling favor poor (or non-poor) households more than non-poor (or poor) households. This decomposition is useful in understanding the impact of schooling on growth and inequality.

## 5. MACROECONOMIC AND POVERTY TRENDS

### (a) *Macroeconomic background*

Brazil experienced some of the world's highest inflation rates over the period from 1960 to 1995. From at least the beginning of the 1980s, curbing inflation became the focus of public policy in Brazil. Successive macroeconomic packages and three major stabilization efforts have been attempted since then: the Cruzado Plan in 1986, the Collor Plan in 1990, and the Real Plan in 1994. The Real Plan was based on an "exchange-rate-based stabilization" model that led to consumption booms instead of recessions. But the need to support an overvalued exchange rate for stabilization purposes increased the fragility of the Brazilian economy, making it vulnerable to external shocks such as the Mexican (1995), Asian (1997), and Russian (1998) crises.

The 1999 Brazilian devaluation crisis triggered important changes in macroeconomic policy that can be still observed today, including (1) the adoption of floating exchange rates; (2) the adoption of inflation targets; and (3) the implementation of the Fiscal Responsibility Law, which is binding on all government levels and state enterprises alike but has increased the size of the tax burden by about 10 percentage points of GDP from 1995 onward, reaching around 37% at the end of 2008. One also has to bear in mind that there were very high real interest rates and an expansion of public expenditures that contributed both to the rise in Brazil's public debt, which reached more than 50% of GDP, and also to the slow growth trend assumed. During the 2002 elections, Brazil faced another crisis, which was controlled by the new government in the

following year. This was done by means of a so-called confidence shock, which meant keeping the country's previous directions for macroeconomic policy. Following a mild recession in 2003, a boom in the global economy and improved internal fundamentals isolated the Brazilian economy from adverse external shocks.

### (b) *Pro-poor growth and poverty trends*

For this study, we have chosen *per capita* real income as a welfare indicator. *Per capita* real income is defined as *per capita* nominal income adjusted for prices, which vary across regions and over time. This is achieved by dividing the *per capita* nominal income by the *per capita* poverty line expressed as a percentage. The poverty line used in this paper takes into account regional costs of living (Ferreira, Lanjouw, & Neri, 2003).

Table 1 presents growth rates of *per capita* real income and *per capita* money-metric social welfare. The results reveal that the trend in *per capita* real income has been declining at an annual rate of 0.63% over 1995–2004. Hence, the actual growth rate of *per capita* real income has been almost stagnant. This unimpressive performance in *per capita* real income worsened even further in the second period 2001–04, when *per capita* real income fell at an annual rate of 1.35%.

This pessimistic picture, however, tends to disappear if growth is evaluated in terms of social welfare, which makes an adjustment for inequality, (which is called the pro-poor growth rate in the table.) This is a more relevant concept for evaluating a country's performance in relation to its standard of living. In the first period (1995–2001), the trend in the pro-poor growth rate, although positive, was only 0.10%, which cannot be regarded as a good performance, but the trend in the growth rate in the second period (2001–04) increased to 3.07%, which is an exceptionally good performance.

The last column of Table 1 is obtained by subtracting the actual growth rate from the pro-poor growth rate. Gains in growth rates imply a decline in inequality, while losses in growth rates imply an increase in inequality. Substantial gains in growth rates are quite noticeable in the second period, 2001–04. There were gains in growth rates equivalent to 4.42% per annum because of falling inequality in the 2000s. By contrast, the gains were merely 0.40% per year in the first period, 1995–2001. Thus, in the second period, the poor were able to benefit proportionally much more from growth than in the first period. This growth pattern has led to an unprecedented reduction in inequality in Brazil (which is evident from Figure 1).

Having examined the trends in growth and inequality, it is interesting to analyze the trends in poverty over 1995–2004. Poverty estimates for the headcount ratio, the poverty gap ratio and the severity of poverty are presented in Table 2. The results show a significant reduction in poverty during 1995–98.

However, the percentage of poor increased from 27.83% in 1998 to 28.81% in 1999, which could be due to the impact of the Asian crisis upon the Brazilian economy. Since 1999, poverty had been on the decline. Note that the real minimum wage had increased to its highest point during the period 2000–01, 9.1%. It appears that raising the minimum wage is an important measure that reduces poverty in Brazil as a whole. It should be highlighted, however, that the positive impact of a higher minimum wage rate can be reduced with a rising unemployment rate, due to higher costs. In Brazil, the annual growth rate of the minimum wage has been increasing over time and the unemployment rate has been on the rise as well. The unemployment rate recently reached almost 10% in 2001 (WDI, 2004). This indicates that the positive impact of the increasing minimum wage on poverty reduction could have been mitigated by the rising unemployment rate in the 1990s.

All in all, the Brazilian experience exhibits an interesting pattern between growth in *per capita* real income and poverty: while *per capita* real income declined over the period, poverty also fell. This is an interesting case that does not support *a priori* the notion that a positive (or negative) growth leads to a

Table 1. *Growth rates of per capita real income and social welfare. Source: Authors' calculation based on PNAD*

| Period | Actual growth rate | Pro-poor growth rate | Gain(+)/loss(−) of growth |
|---|---|---|---|
| 1995–96 | 1.59 | −5.95 | −7.54 |
| 1996–97 | 0.65 | 4.42 | 3.77 |
| 1997–98 | 0.97 | 5.07 | 4.10 |
| 1998–99 | −5.15 | −2.53 | 2.63 |
| 1999–2001 | 0.76 | −2.17 | −2.94 |
| 2001–02 | 0.11 | 8.98 | 8.87 |
| 2002–03 | −6.12 | −9.64 | −3.52 |
| 2003–04 | 3.56 | 14.11 | 10.55 |
| 1995–2004 | −0.63 | 0.73 | 1.36 |
| 1995–2001 | −0.30 | 0.10 | 0.40 |
| 2001–04 | −1.35 | 3.07 | 4.42 |

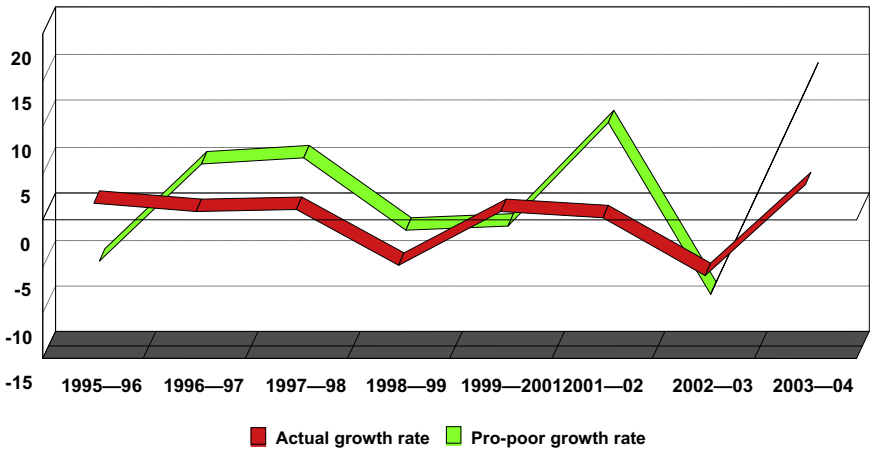


Figure 1. *Growth rates of per capita real income and social welfare.*

Table 2. *Poverty estimates. Source: Authors' calculation based on PNAD*

| Period | Headcount ratio | Poverty gap ratio | Severity of poverty |
|---|---|---|---|
| 1995 | 29.37 | 12.80 | 7.69 |
| 1996 | 29.23 | 13.31 | 8.26 |
| 1997 | 29.24 | 13.00 | 7.98 |
| 1998 | 27.83 | 12.28 | 7.40 |
| 1999 | 28.81 | 12.58 | 7.53 |
| 2001 | 28.28 | 12.75 | 7.84 |
| 2002 | 27.39 | 11.78 | 6.95 |
| 2003 | 28.19 | 12.32 | 7.51 |
| 2004 | 26.04 | 10.87 | 6.36 |
| *Annual growth rates* | | | |
| 1995–2001 | −0.68 | −0.54 | −0.50 |
| 2001–04 | −2.20 | −4.32 | −5.52 |
| 1995–2004 | −1.00 | −1.46 | −1.76 |

decrease (or increase) in poverty. More importantly, the negative growth during the period, 1995–2004, was pro-poor in the sense that the poor made positive gains in their incomes, despite the fact that average incomes declined. Thus, there was a sharp decline in inequality over the period which offset the adverse effect of the negative growth on poverty.

## 6. PATTERNS OF PRO-POOR GROWTH

*Per capita* total income can be derived from both labor and non-labor income sources. Table 3 shows growth rates of *per capita* labor income during 1995–2004. Consistent with the growth rate in *per capita* total income, earnings from the labor market did not perform well over the period. *Per capita* real labor income declined at an annual rate of 1.49% during 1995–2004. The second period was even worse, when the growth rate in labor income became −2.05% per annum. However, the *per capita* growth rate in social welfare became positive, with an annual rate of 0.97% in the second period. Thus, there was gain of 3.02% in growth rate, which is attributed to a decline in inequality. This indicates that in the 2000s, the labor market conditions improved for the poor relative to the non-poor. Figure 2 shows that labor income had benefited the poor proportionally more than the non-poor in the latest period, 2003–04, in particular. It will be interesting to find out which factors of the labor market—such as employment and productivity, among others—played a major role in explaining this pro-poor growth pattern in this period. This task is taken in the next section.

The changes in non-labor income are in sharp contrast with those in labor income. The story of non-labor income can be told with the help of Table 4. *Per capita* non-labor income grew at an annual rate of 2.64% during 1995–2004, the growth rate being much slower in the second period.

In view of the pro-poor growth, the non-labor income performed even better than the actual growth. Interestingly, when the non-labor income is adjusted for inequality, the growth rate becomes much higher for the second period than for the first period. This is suggested by the fact that the annual pro-poor growth rates are 5.20 and 9.14% for 1995–2001

Table 3. *Growth rates of per capita labor income. Source: Authors' calculation based on PNAD*

| Period | Actual growth rate | Pro-poor growth rate | Gain(+)/loss(−) of growth |
|---|---|---|---|
| 1995–96 | 1.16 | −7.21 | −8.37 |
| 1996–97 | 0.33 | 3.71 | 3.38 |
| 1997–98 | −1.66 | 3.97 | 5.63 |
| 1998–99 | −6.23 | −3.38 | 2.84 |
| 1999–2001 | 0.39 | −3.54 | −3.93 |
| 2001–02 | −0.58 | 7.24 | 7.82 |
| 2002–03 | −7.15 | −15.20 | −8.05 |
| 2003–04 | 3.28 | 16.24 | 12.97 |
| 1995–2004 | −1.49 | −0.73 | 0.76 |
| 1995–2001 | −1.30 | −0.97 | 0.32 |
| 2001–04 | −2.05 | 0.97 | 3.02 |

Table 4. *Growth rates of per capita non-labor income. Source: Authors' calculation based on PNAD*

| Period | Actual growth rate | Pro-poor growth rate | Gain(+)/loss(−) of growth |
|---|---|---|---|
| 1995–96 | 3.56 | 0.95 | −2.61 |
| 1996–97 | 2.10 | 7.63 | 5.53 |
| 1997–98 | 11.77 | 11.66 | −0.11 |
| 1998–99 | −1.13 | 1.01 | 2.14 |
| 1999–2001 | 2.09 | 3.42 | 1.33 |
| 2001–02 | 2.51 | 14.53 | 12.02 |
| 2002–03 | −2.69 | 5.06 | 7.76 |
| 2003–04 | 4.48 | 9.18 | 4.71 |
| 1995–2004 | 2.64 | 6.30 | 3.66 |
| 1995–2001 | 3.69 | 5.20 | 1.51 |
| 2001–04 | 1.02 | 9.14 | 8.12 |

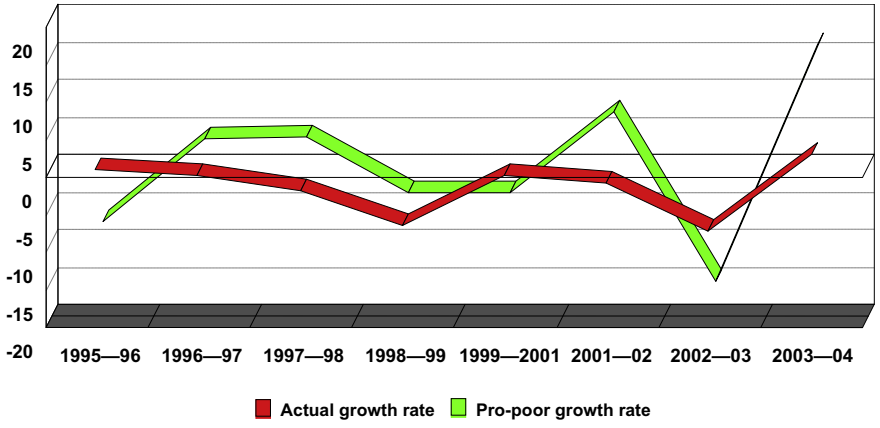


Figure 2. *Actual and pro-poor growth rates of per capita labor income.*

and 2001–04, respectively. Hence, the growth in non-labor income was much more pro-poor in the period of 2001–04. More importantly, the high pro-poorness of non-labor income is the factor that underpins the fall in inequality during the second period. It can be seen clearly from Figure 3 that the gap between the pro-poor growth rate and the actual growth rate widened in the second period compared to the first period.

In summary, growth in total income is much more pro-poor in the second period than in the first. This is due mainly to the non-labor income that benefited the poor proportionally more than the non-poor. Compared to the non-labor income, the pro-poorness of the labor income was rather small over the period. Figure 4 sums up these findings.

## 7. LINKAGES BETWEEN LABOR MARKET AND PRO-POOR GROWTH [13]

Using a decomposition presented in the paper, this section attempts to explain the pro-poor growth in Brazil in terms of the four labor market characteristics, which include the labor force participation rate, the employment rate, hours of work per employed person, and productivity. The impact of labor productivity is further explained by years of schooling and average and relative rates of returns. The decomposition results are presented in Tables 5–7.

The *per capita* labor income declined at an annual rate of 1.49% in the entire period from 1995 to 2004. The employment rate and hours of work contributed to a decline in growth rate by 0.34% and 0.25%, respectively. The decline in productivity was the major factor that contributed to a decline of growth rate of 1.63%. Despite the weak labor market, the labor force participation rate increased at an annual rate of 0.73%, which made a positive contribution to growth of the same magnitude.

It is also evident that the work force in Brazil is getting more educated. The years of schooling of the labor force increased at an annual rate of 2.99% during the 1995–2004 period, which contributed to an increase in productivity at the same rate (2.99%). The expansion of education has been accompanied by a decline in the average rates of return from schooling at an annual rate of 4.62%. This suggests that the demand in the labor market has been sluggish and that growth in wage rates has not kept up with the supply of workers with more years of schooling.

A similar story emerges when one looks at the sub-periods: 1995–2001 and 2001–04. However, the story changes if one looks at the changes that occurred during 2003–04, when the *per capita* labor income increased by 3.28%. Again, productivity was the major factor contributing to the growth, but in this case, it contributed a positive rate of 1.86%. The labor force participation rate increased by 1.06%, while the employment

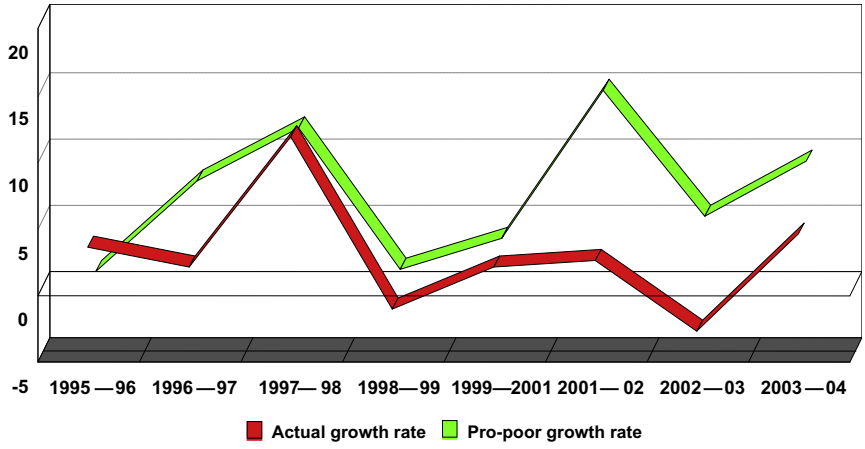


Figure 3. *Actual and pro-poor growth rates of per capita non-labor income.*

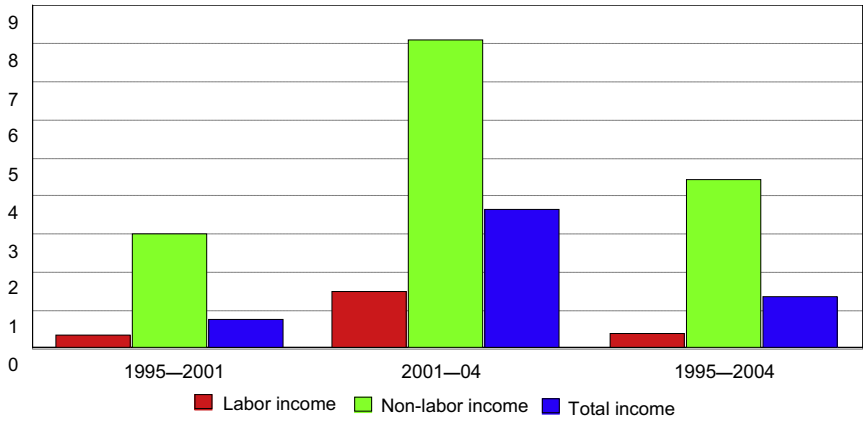


Figure 4. *Gains and losses of growth rates.*

Table 5. *Explaining growth rates of per capita real income. Source: Authors' calculation based on PNAD*

| Explanatory factors | 1995–2004 | 1995–2001 | 2001–04 | 2003–04 |
|---|---|---|---|---|
| Labor force participation rate | 0.73 | 0.48 | 1.27 | 1.06 |
| Employment rate | −0.34 | −0.66 | 0.07 | 0.79 |
| Hours of work per person employed | −0.25 | −0.07 | −0.72 | −0.43 |
| Productivity | −1.63 | −1.05 | −2.67 | 1.86 |
| Years of schooling | 2.99 | 2.34 | 4.04 | 4.49 |
| Average rate of returns per year of schooling | −4.62 | −3.38 | −6.71 | −2.63 |
| Relative rate of returns per year of schooling | −0.00 | 0.00 | 0.00 | −0.00 |
| Total labor income | −1.49 | −1.30 | −2.05 | 3.28 |

Table 6. *Explaining pro-poor growth rate of money-metric social welfare. Source: Authors' calculation based on PNAD*

| Explanatory factors | 1995–2004 | 1995–2001 | 2001–04 | 2003–04 |
|---|---|---|---|---|
| Labor force participation rate | 0.41 | 0.19 | 1.24 | 2.69 |
| Employment rate | −0.68 | −1.14 | 0.17 | 2.35 |
| Hours of work per person employed | −0.41 | −0.21 | −1.01 | 0.44 |
| Productivity | −0.05 | 0.18 | 0.56 | 10.76 |
| Years of schooling | 3.95 | 2.80 | 6.47 | 7.54 |
| Average rate of returns per year of schooling | −4.62 | −3.38 | −6.71 | −2.63 |
| Relative rate of returns per year of schooling | 0.61 | 0.77 | 0.81 | 5.85 |
| Total labor income | −0.73 | −0.97 | 0.97 | 16.24 |

Table 7. *Explaining gains and losses in growth rates. Source: Authors' calculation based on PNAD*

| Explanatory factors | 1995–2004 | 1995–2001 | 2001–04 | 2003–04 |
|---|---|---|---|---|
| Labor force participation rate | −0.32 | −0.29 | −0.03 | 1.63 |
| Employment rate | −0.34 | −0.48 | 0.11 | 1.56 |
| Hours of work per person employed | −0.17 | −0.14 | −0.29 | 0.87 |
| Productivity | 1.58 | 1.23 | 3.23 | 8.90 |
| Years of schooling | 0.97 | 0.46 | 2.43 | 3.05 |
| Average rate of returns per year of schooling | 0.00 | 0.00 | 0.00 | 0.00 |
| Relative rate of returns per year of schooling | 0.61 | 0.77 | 0.81 | 5.85 |
| Labor income | 0.76 | 0.32 | 3.02 | 12.97 |

rate increased by 0.79%. This implies that the *per capita* employment rate (i.e., the sum of the labor force participation rate and the employment rate) increased by 1.85%. These observations show that the labor market turned around very strongly in the 2003–04 period. The rate of return from schooling declined at a much slower rate of only 2.63%, despite the fact that the years of schooling of the work force increased at a faster rate of 4.49%.

Table 6 presents the growth rates of money-metric social welfare. The growth rate of *per capita* social welfare was −0.97% in the first period (1995–2001), but increased to 0.97 in the second period (2001–02). The factors contributing positively to growth in the second period are labor force participation rate, employment rate, and productivity. The productivity growth rate of 0.56% is further decomposed into three factors: (i) years of schooling, which contributed to an increase in the growth rate of productivity by 6.47 percentage points; (ii) average rate of return, which contributed to a decline in productivity by 6.71 percentage points; and (iii) relative rate of return, which contributed to an increase in the growth rate of productivity by 0.81 percentage points.

Different households enjoy different rates of return from per year of schooling. These differences may be caused by a host of variables including age and gender of earners in the household, number of earners in the household, sectors of employment by workers in the household, educational levels of working members, and so on. Thus, relative rates of returns will also change due to a multitude of factors. The changes in relative rates of return will not affect the growth rate of the mean labor income, but they will affect the social welfare, which is sensitive to changes in relative distribution. The empirical results show that the changes in relative rates of return have contributed to the increase in the growth rate of social welfare by 0.81 percentage points. This is a small contribution compared to the decline in welfare that is caused by the average rate of return from schooling.

Table 7 presents gains (and losses) of growth rates due to pro-poor (and anti-poor) growth. The labor income became highly pro-poor in the 2001–04 period, contributing to gains in the growth rate of 3.02%. In 2003–04, the gain in growth rate increased to 12.97%, which indicates a large reduction in inequality. Thus, the Brazilian labor market became highly pro-poor in 2003–04. Productivity was the most important factor contributing to gains in the growth rate of 8.9%. Schooling contributed to gains in the growth rate of about 3 percentage points. The relative rates of returns from schooling became highly favorable to the poor, contributing to gains in the growth rate of 5.85 percentage points.

Apart from productivity, the other labor market characteristics such as the labor force participation rate, the employment rate, and work hours per employed person also contributed to a large reduction in inequality during 2001–04.

## 8. CONTRIBUTION OF LABOR AND NON-LABOR INCOMES TO PRO-POOR GROWTH

The previous section explained the growth rate in labor income in terms of labor market characteristics. This section attempts to explain the contributions of both labor and non-labor incomes to the pro-poor growth rate of *per capita* income. As pointed out earlier, for the 1995–2004 period, the average growth rate of the total income was −0.63% per annum, while labor income grew at an average rate of −1.49%, and non-labor income grew at an average rate of 2.64 per annum. However, in order to see the contribution of different income sources to total income—as we have done for the labor market components—it is not sufficient to gauge the growth rates of different component ratios; it is also neces-

sary to take into account the relative weights of each income source in total income. This point also applies to pro-poor growth and to the inequality aspects of social welfare. The interaction between the high non-linearity of these last two concepts and the additive nature of income sources create some difficulties. As a result, the Shapley decomposition was used to obtain each income source contribution to pro-poor growth. In general, the contribution of a given source to the total growth of a particular social welfare concept is positively related to its initial weight and to its relative rate of growth in the same period. Table 8 presents the rates of growth and the contributions of the labor and non-labor income components to the growth rate of total income.

In 1995, labor income amounted to 82.1% of total income, while the remaining 17.9% referred to non-labor. However, the main sources of growth, and in particular pro-poor growth sources, relied on the latter. As shown in Table 8, the fall of total income of −0.63% per year in the overall 1995–2004 period can be decomposed into the adverse labor income contribution of −1.17% per year and the contribution of non-labor income of 0.54% per year.

In turn, differences in pro-poor average annual growth rates are somewhat smaller as can be seen from Table 8: total social welfare increased by 0.73%; labor income declined by 0.73% and non-labor income increased by 6.30%. The weight of labor income in social welfare in the initial period 1995 was 83.9%, which is even higher than in the case of average total incomes. Its contribution to total social welfare growth in the whole period was −0.60% per annum, that is, about half of its contribution to average income growth. Conversely, non-labor income's share of the social welfare growth was 1.33% per year, making it an important factor in determining the positive social welfare trend assumed in the 1995–2004 period.

Focusing on individual periods, the contribution of labor income to average annual growth changed from −1.02% in 1995–2001 to −1.59% in 2001–04. The track record of labor income's contribution to pro-poor growth is better than its contribution to growth *per se*: −0.74% in 1995–2001 and 0.61% in 2001–04. Likewise, non-labor's income share of pro-poor growth also surpasses its effects on average income growth in both periods. Note that from 1995 to 2001, non-labor's income impact on pro-poor growth rose from 0.84% per year to 2.46% per year in the 2001–04 period.

Both labor and non-labor incomes have contributed to a decline in total inequality. During the 1995–2001 period, it was the labor income that had a higher contribution to the inequality reduction: 0.28% and 0.12% due to the labor and non-labor income, respectively. In total, the reduction in inequality amounts to a gain in growth rate by only 0.40%. In the second period (2001–04), the gain in growth rate due to a fall in inequality was 4.42%, which is substantially greater than the corresponding figure for the first period (1995–2001). Of the gain of 4.42%, 2.20% was contributed by the labor income and 2.22% by the non-labor income. Thus, the contribution of non-labor income to the inequality reduction was slightly higher than that of labor income, despite the fact that the share of labor in total income was much higher than that of non-labor income. This suggests that the non-labor income has been more pro-poor than the labor income in the second period.

## 9. DECOMPOSING THE CONTRIBUTION OF NON-LABOR INCOMES

This section aims to assess the contribution of different types of non-labor income sources to the total growth of different welfare concepts, through a decomposition scheme of these income sources impacts.

Special attention is paid to incomes mostly directly affected by social policies, such as social security benefits and other non-labor income sources that include cash transfers from social programs and capital income—which turns out to be underestimated in PNAD data. The remaining sources of non-labor income such as rents and private transfers (remittances, donations, child maintenance support, *etc.*) are part of what is called non-social income.

Table 9 presents trends in growth rates by non-labor income components. The results reveal that while social security has contributed to a rise in inequality during the 1995–2004 period, the others—including other non-labor income and non-social income—have been attributed to a fall in inequality during the same period. Interestingly, in the 2001–04 period, all three non-labor income components made a positive contribution to the reduction in inequality.

Table 10 explains the net contributions of each non-labor income component to growth patterns and inequality reduction. The results are obtained from the Shapley decomposition method. According to the table, other non-labor income has been the dominant net contributor to a reduction in inequality over the decade 1995–2004. Its net contribution is particularly high in the latter period 2001–04. While non-social income appears to play a smaller role in reducing inequality, the net impact of social security has been quite important. During the

Table 8. *Growth rates and contributions to growth rates by income components. Source: Authors' calculation based on PNAD*

| Period | Growth rates | | | Contributions to growth rates | | |
|---|---|---|---|---|---|---|
| | Labor income | Non-labor income | Total income | Labor income | Non-labor income | Total income |
| *Actual growth* | | | | | | |
| 1995–2004 | −1.49 | 2.64 | −0.63 | −1.17 | 0.54 | −0.63 |
| 1995–2001 | −1.30 | 3.69 | −0.30 | −1.02 | 0.72 | −0.30 |
| 2001–04 | −2.05 | 1.02 | −1.35 | −1.59 | 0.24 | −1.35 |
| *Pro-poor growth* | | | | | | |
| 1995–2004 | −0.73 | 6.30 | 0.73 | −0.60 | 1.33 | 0.73 |
| 1995–2001 | −0.97 | 5.20 | 0.10 | −0.74 | 0.84 | 0.10 |
| 2001–04 | 0.97 | 9.14 | 3.07 | 0.61 | 2.46 | 3.07 |
| *Inequality* | | | | | | |
| 1995–2004 | 0.76 | 3.66 | 1.36 | 0.57 | 0.79 | 1.36 |
| 1995–2001 | 0.32 | 1.51 | 0.40 | 0.28 | 0.12 | 0.40 |
| 2001–04 | 3.02 | 8.12 | 4.42 | 2.20 | 2.22 | 4.42 |

Table 9. *Growth rates by non-labor components. Source: Authors' calculation based on PNAD*

| Period | Labor income | Non-labor income | | | Total income |
|---|---|---|---|---|---|
| | | Social security | Other non-labor | Non-social income | |
| *Actual growth* | | | | | |
| 1995–2004 | −1.49 | 3.25 | 5.77 | −2.43 | −0.63 |
| 1995–2001 | −1.30 | 4.69 | 0.73 | −1.23 | −0.30 |
| 2001–04 | −2.05 | 0.86 | 13.26 | −3.69 | −1.35 |
| *Pro-poor growth* | | | | | |
| 1995–2004 | −0.73 | 3.12 | 29.94 | 1.43 | 0.73 |
| 1995–2001 | −0.97 | 2.56 | 25.50 | 4.41 | 0.10 |
| 2001–04 | 0.97 | 3.90 | 35.21 | −1.97 | 3.07 |
| *Inequality* | | | | | |
| 1995–2004 | 0.76 | −0.13 | 24.17 | 3.86 | 1.36 |
| 1995–2001 | 0.32 | −2.13 | 24.77 | 5.64 | 0.40 |
| 2001–04 | 3.02 | 3.04 | 21.94 | 1.72 | 4.42 |

Table 10. *Explaining contributions of growth rates by non-labor income components (based on Shapely decomposition). Source: Authors' calculation based on PNAD*

| Period | Labor income | Non-labor income | | | Total income |
|---|---|---|---|---|---|
| | | Social security | Other non-labor | Non-social income | |
| *Actual growth* | | | | | |
| 1995–2004 | −1.17 | 0.54 | 0.06 | −0.07 | −0.63 |
| 1995–2001 | −1.02 | 0.75 | 0.01 | −0.04 | −0.30 |
| 2001–04 | −1.59 | 0.17 | 0.16 | −0.10 | −1.35 |
| *Pro-poor growth* | | | | | |
| 1995–2004 | −0.60 | 0.40 | 0.88 | 0.04 | 0.73 |
| 1995–2001 | −0.74 | 0.34 | 0.38 | 0.12 | 0.10 |
| 2001–04 | 0.61 | 0.48 | 2.00 | −0.03 | 3.07 |
| *Inequality* | | | | | |
| 1995–2004 | 0.57 | −0.14 | 0.82 | 0.11 | 1.36 |
| 1995–2001 | 0.28 | −0.41 | 0.37 | 0.16 | 0.40 |
| 2001–04 | 2.20 | 0.31 | 1.84 | 0.07 | 4.42 |

first period (1995–2001), the net effect of social security resulted in an increase in inequality. Its net contribution on inequality was greater than the net contributions by the other two components. Nevertheless, the sum of the net contributions by the other two sources had offset the net contribution by social security. As a result, inequality of the non-labor income in the first period showed a slight fall of 0.12%.

(a) *Non-social income*

Non-social income fell at an average rate of −2.43% per year in the 1995–2004 period, but it had a sharper decrease in the second period (−3.69%) than the rate of −1.23% per year observed in the first period (Table 10). In spite of the negative growth, non-social income contributed to a fall in inequality over the decade. Its effect on the inequality reduction had been much greater in the first period as compared to the second period; 5.64% (in 1995–2001) against 1.72% (in 2001–04).

Nevertheless, the net contribution of non-social income to overall growth performance was rather small given its growth rates. As shown in Table 10, the net effect of non-social income on inequality reduction was just 0.11% during 1995–2004; its magnitude fell to 0.07% in the 2001–04 period from 0.16% in the 1995–2001 period.

(b) *Social security benefits*

Social security is the main component of social income in Brazil, second only to labor earnings among all income sources collected by PNAD. In 2004, it amounted to 19.55% of all income sources and 92.5% of social income. Social security benefits information includes a contributory Pay-as-you-go system and non-contributory benefits, both of which are subject to discretionary income policies from the government. The average growth rate of *per capita* social security benefits was 3.25% per year from 1995 to 2004 (Table 9). The average growth rate of social security in the first period was much higher than in the second period, 4.69% against 0.86%. However, rapid growth in social security has resulted in an increase in inequality in Brazil over the 1995–2004 period. Its adverse impact amounted to an increase of inequality of 2.13% in the first period. Yet the impact of social security income on inequality was reversed when its growth slowed down: it led to a reduction in inequality of 3.04% in the second period. A similar story emerges from the results reported in Table 10.

Given the dominance of the public transfer aspect in this income aggregate, it is useful to observe the ratio of pro-poor growth to total growth contribution. This can be interpreted as an elasticity that shows how many public resources (mea-

sured by their share of total income) are translated into social welfare, a type of cost-benefit analysis. The corresponding elasticity of pro-poor growth with respect to total growth (i.e., its fiscal cost), both explained by social security, rose from 0.45 in the 1995–2001 period to 2.82 in 2001–04, demonstrating a marked improvement in the ability of social security benefits in targeting the poorest segments of Brazilian society. [14] After 1998, the government adopted the new policy of setting higher adjustment rates to lower social security benefits. In the entire 1995–2004 period, this elasticity amounted to 0.74. This elasticity allows comparing to what extent different types of public transfers reach the poor.

### (c) *Other non-labor income*

Other non-labor income sources include very different types of incomes, ranging from cash transfer programs such as the *Bolsa-Família* to capital income such as flows derived from interest rates paid on government debt. The pro-poorness aspects of these items are expected to be very different, despite the fact that both are not only subject to public policy choices but are mostly mediated by the State [15] as well. Interest income is largely underestimated by PNAD data, hence this income concept is largely explained by public cash transfer programs such as *Bolsa-Família*.

According to Table 9, the other sources of non-labor income aggregate have grown at an annual rate of 5.77% in the whole period from 1995 to 2004, presenting very diverse patterns across sub-periods. They increased, on average, 0.73% in the first period 1995–2001, but this growth accelerated considerably in the 2001–04 period to 13.26%, reflecting the expansion of the conditional cash transfer programs.

Table 9 also assesses the impact of other non-labor income source on inequality reduction. This income source has attributed to gain in growth rate of 24.17% per year in the 1995–2004 period. This is due to a huge reduction in inequality, which can be explained by the fact that cash transfers were targeted to the poorest sectors of the population. The magnitude of inequality reduction of this income component reduced to some extent in the subsequent period as is indicated by falling the magnitude of gain in growth rate from 24.77% in the 1995–2001 period to 21.95% in the 2001–04 period. This suggests that the impact of cash transfers became slightly less pro-poor in the second period.

As we have seen, to measure the contribution of the expansion of cash transfer programs from 2001 onwards, it is not sufficient to gauge its relatively high growth rates. Instead, its relative weight among different non-labor income sources must also be considered. In Table 10, the net contribution of other non-labor income to total growth per year during the 1995–2004, 1995–2001, and 2001–04 periods was 0.06, 0.01, and 0.16, respectively. This means that the role of cash transfers to explain income growth is quite small. But by the same token, the impacts of other income sources on the fiscal budget deficit were also relatively mild.

According to Table 10, the net contribution of other non-labor income source to inequality reduction outweighs the contributions made by the other two income components. In the overall 1995–2004 period, it was responsible for 0.82% of the fall in inequality. Similarly, its net contribution was 0.37% of the fall in inequality in the 1995–2001 period, and then increased to 1.84% of the inequality fall. This indicates that other non-labor income sources constitute a key determinant of the reduction in inequality in Brazil over the period.

The elasticity of the contribution to pro-poor growth of a particular income transfer with respect to its contribution to total growth is useful to guide policies aimed at the poorest groups in the Brazilian society. The corresponding other non-labor income sources elasticity was 14.66 during the 1995–2004 period, which is much higher than the one found for social security benefits. Each percentage point in the share of government transfers in this item bought 19.8 times more pro poor growth in other non-labor income than in social security benefits, this result is consistent with the evaluation of conditional cash transfers done in Brazil and elsewhere (Barros, 2005; Bourguignon, Ferreira, & Leite, 2003; Coady & Skoufias, 2004; Hoffman, 2005; Lindert, Skoufias, & Shapiro, 2005; Neri, 2009; Skoufias, Davis, & de la Vega, 2001; Soares, 2006; Suplicy, 2002). [16]

In sum, other non-labor income sources have played a dominant role in achieving the pro-poor pattern of growth in Brazil, while having a minor contribution to total growth and to the Brazilian fiscal accounts. It seems that government cash transfers programs are so well targeted that even with relatively small costs they had a large impact on the poor people's living conditions.

## 10. CONCLUSIONS

This paper makes two important contributions to the literature. One contribution is its proposal for a new measure of pro-poor growth. This new measure provides the linkage between growth rates in the mean income and income inequality. In this sense, growth is defined as pro-poor (or anti-poor) if there is a gain (or loss) in growth rate due to a decrease (or increase) in inequality. The other contribution is to develop a decomposition methodology exploring linkages between three dimensions; growth patterns, labor market performances, and social policies. Through this decomposition, the growth in *per capita* labor income is explained in terms of four components: the employment rate, hours of work in the labor market, the labor force participation rate, and productivity. Using the Shapely decomposition methodology, the paper first assesses the relative contributions of labor and non-labor incomes to pro-poor pattern of growth in *per capita* income. The non-labor income consists of social and non-social incomes so the paper demonstrates how the Shapely decomposition can be utilized to capture the contributions of social security income and governments targeted cash transfers on the pro-poor patterns of growth.

For empirical analysis, the study has used the Brazilian National Household Survey (PNAD) from 1995 to 2004. The paper has analyzed the evolution of Brazilian social indicators based on *per capita* income exploring links with adverse labor market performance and social policy changes, in particular the expansion of targeted cash transfers and devising more pro-poor social security benefits. The description of these social indicators depends on two main dimensions: (i) who was affected by shocks perceived in the labor market and changes observed in social policies? In particular, to what extent did these innovations affect the poorest segments of the Brazilian society more? and (ii) to what extent did the crisis affect labor income *versus* other income sources such as official cash transfers, social security benefits, or private incomes?

The general answer to these questions is that the labor earnings of the upper segments of Brazilian society were the epicentre of the economic crisis. Although *per capita* income fell during the 1995–2004 period, it cannot be referred to as a "poverty crisis". While labor markets were quite adversely affected, incomes derived from social security and other government transfers played a crucial role in cushioning the

consequences of macro shocks observed, specifically among the poorest segments of the Brazilian society.

Globalization can make a significant contribution to productivity increase and hence economic growth, but it also makes economies more vulnerable to external shocks. The Brazilian experience presented in the paper shows that government social policies can play an important role in protecting the poor from external shocks which otherwise can have a devastating impact on the living conditions of the poor.

## NOTES

1. The real income is the nominal income adjusted for prices. The prices can vary across regions and over time. The determination of real income will depend on both regional price indices and consumer prices indices, which vary over time.

2. Pro-poor growth can also be defined in a stronger absolute sense: growth is pro-poor if the poor enjoy greater absolute benefits than the non-poor. When growth is negative, growth is absolute pro-poor if the absolute loss from growth is less for the poor than for the non-poor. Absolute pro-poor (anti-poor) growth reduces (increases) absolute inequality. See Grosse, Harttgen, and Klasen (2008) and Kakwani and Son (2008) for a detailed discussion of absolute pro-poor growth, in this paper, our focus will be on relative pro-poor growth.

3. One can also measure the pattern of growth by means of poverty measures instead of a social welfare function. Kakwani and Son (2008) have used the entire class of additive decomposable poverty measures to describe the pattern of growth. Ravallion and Chen (2003) focused on a particular member of this class, that is, the Watts poverty measure. Thus, the proposed measure of pro-poor growth does not require a poverty line; it is a distribution-weighted growth measure where increases (decreases) in inequality involve loss (gain) in growth rate.

4. Note that this weighting scheme is also implicit in the Gini index, which is the most popular measure of inequality.

5. See Dasgupta, Sen, and Starrett (1973) and Rothschild and Stiglitz (1973).

6. The idea of calculating growth rates of money-metric social welfare is not new. Klasen (1994) has analyzed US Post-War economic performance based on growth rates calculated from Dagum's (1990) and Sen's (1974) social welfare functions. Gruen and Klasen (2008) and Kakwani (1981) have used Sen's (1974) social welfare function to compare welfare across countries. In this study we could not utilize Sen's social welfare function because it did not provide a linkage of pattern of growth with the changes in labor force characteristics. Our proposed social welfare function has basic characteristics of both Sen's and Atkinson's social welfare functions.

7. See Klasen (1994) for a discussion of this point.

8. This equation makes a continuity correction, which is estimated by obtaining an unbiased estimate of $F(x)$.

9. Productivity is defined here as labor earning per hour of work. This is a restricted definition and is valid only under the assumption that workers are always and every where paid their marginal product. Although this assumption is not strictly valid, the workers with higher productivity tend to have higher hourly wage rates. Thus, the hourly earnings can be used as proxy for productivity. Moreover, since our purpose is to evaluate the standards of living of households, this restricted definition is more relevant because it is directly related to households' standard of living.

10. Note that the pro-poorness of labor income is measured with respect to the total *per capita* income.

11. A gain in growth rate implies a decrease in inequality and a loss in growth rate indicates an increase in inequality.

12. Changes in relative rates of returns from schooling do not affect the growth rate of productivity but will have an impact on the pro-poor growth rate of productivity through changes in the distribution.

13. Barros and Camargo (1992) and Barros, Carvalho, Franco, and Mendonça (2004) develop an alternative decomposition methodology also applied to Brazilian data. Amadeo and Camargo (1997) and Amadeo, Camargo, and Barros (1993) discuss the characteristics of Brazilian labor markets.

14. One possibility is to divide the information on social security benefits in two regimes: one with benefits equal to one minimum wage, the constitutional floor, and the rest. Neri (1998, 2001) followed this approach and showed that around 60% of social security benefits amounted to one minimum wage, while 80% of social security income accrued to benefits above this level. Each additional Real spent adjusting for the social security benefits floor resulted in 4.5 times more poverty reduction than a uniform adjustment for all benefits.

15. The public debt is the main source of interest gains earned by Brazilian households.

16. The cash transfer elasticity of pro-poor growth decreased from 38 in the 1995–2001 period to 12.5% in 2001–04, showing a loss in the pro-poorness of cash transfers but in the last period it is still 4.43% higher than the value the elasticity found for social security benefits.

17. Neri, Gonzaga, and Camargo (2001) showed using panel data that the post-stabilization fall in inequality measures on a monthly basis is up to four times higher than on a four-month mean earnings basis and the difference is exactly due to the reduction on the temporal variation of each individual incomes. Inflation stabilization brought more income stability than income equity according to this decomposition.

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## ANNEX. PESQUISA NACIONAL DE AMOSTRAS A DOMICILIO—PNAD

We describe here PNAD characteristics, the deflation procedures used and compare PNAD *per capita* incomes with GDP *per capita* trends. PNAD is an annual household survey performed in the third quarter that interviews 100,000 households every year. It has been conducted by the Instituto Brasileiro de Geografia e Estatística—IBGE since 1967. This survey has extensive information on personal and occupational characteristics of individuals. The PNAD has detailed information on the possession of durable goods and on housing conditions since its start. It underwent a major revision during 1990–92 increasing the size of the questionnaire from 60 to 130 questions. The new questionnaire, available from 1992 onwards, has information on the value spend in rent and ten separate questions on income sources were included and kept constant in the questionnaire. In Sections 8 and 9 of income decomposition we have labeled these items as follows: (i) labor income, that is, main labor income and other labor income. The non-labor components are arranged in three additional groups. (ii) Social security income, which includes main retirement benefit, other retirement benefits, main pension, and other pensions. (iii) Non-social income, it includes private transfers and rents. (iv) Other non-labor incomes, this is the residual that includes mainly public transfers associated with conditional cash transfers (Bolsa Familia, Bolsa Escola, *etc*.), unemployment insurance but also financial incomes that are underestimated.

We have used here the Consumer Price Index in the deflation procedures adopted. Although there are year to year differences between PNAD *per capita* incomes and GDP growth rates, the trends in the 1995–2006 period are basically the same. 1.16% for the former and 1.00% for the latter. We decided to restrict the analysis to the post 1994 period in order to avoid the imprecision associated with the deflation process during the sharp inflationary transitions often observed before this period. The problem is not only that the choice of a specific price index involves arbitrary decisions that affect the average level of real incomes. Fluctuations in inflation also introduce problems in the measurement of inequality firstly,

because nominal incomes are received at different time periods. Secondly, since real incomes are not all spent at payments dates, it involves the incidence of inflation tax paid on cash holdings specifically by the poor who do not have access to indexed financial accounts, yet this effect is not captured in standard household surveys. Finally, and most importantly, when nominal income adjustments are not synchronized, inequality of monthly earnings (an indicator traditionally used in Brazil) is biased upward in an inflationary spiral.[17] In sum, the advantage of using the post 1994 period is to avoid any questionnaire changes, second is to avoid sharp inflationary movements and currency changes. We have also shown that PNAD *per capita* incomes and GDP *per capita* present the same long run trends.