Discussion Paper

Markets, the State and the Dynamics of Inequality: The Case of Brazil

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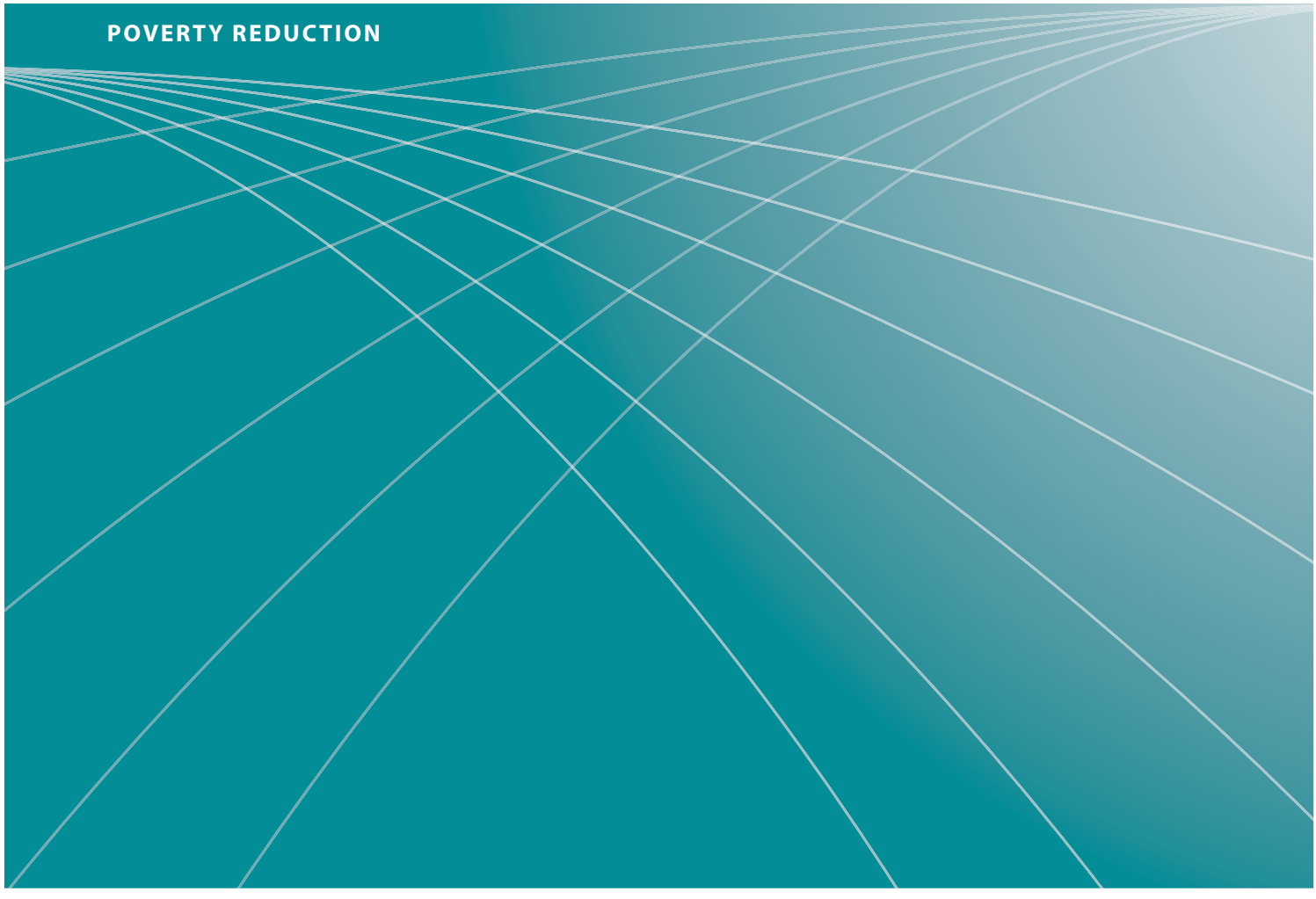

Markets, the State and the Dynamics of Inequality: The Case of Brazil

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Abstract

This study seeks to estimate the contribution of key aspects of Brazilian public policy and labour market performance in reducing income inequality. We focus on the following aspects: (1) government transfers, (2) earnings differentials per educational level, (3) spatial and sector labour market integration, and (4) minimum wage. After identifying non-labour income as a central contributor, we provide a detailed analysis of its various components, in particular, public transfers. We also find that a sizeable fraction of the recent decline in income inequality resulted particularly from a sharp fall in earnings inequality. We show that half of the decline in labour earnings inequality was caused by an acceleration of educational progress, which occurred over the last decade in Brazil. The other half of the decline in labour earnings inequality resulted from labour market integration.

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1. Introduction

Brazil's income inequality has been the subject of a large number of studies.[1] For more than four decades, these studies have shown that Brazil has an extremely high and persistent level of inequality: in 2007, the income shares of Brazil's poorest and richest 10 percent were equal to 0.9 and 56.5 percent, respectively (table 1).[2] However, between 2001 and 2007, the country experienced a sharp and continuous decline in income inequality: the Gini coefficient declined at an average rate of 1.2 percent per year and in 2007, income inequality reached its lowest level in over 30 years (figure 1).

Table 1, Indicators of income inequality in Brazil, 2007

Indicators	Value
Income share of the poorest tenths (%)	
First	0.9
Second	3.0
Third	5.9
Fourth	9.9
Fifth	15.0
Sixth	21.5
Seventh	29.6
Eight	40.5
Ninth	56.5
Income share of the richest 10%	43.5
Income share of the richest 1%	12.3
Gini Coefficient	0.552
Theil-T index	0.613
Ratio between the income of the richest 10% and the poorest 40%	17.7
Ratio between the income of the richest 20% and the poorest 20%	20.2

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD) 2007.

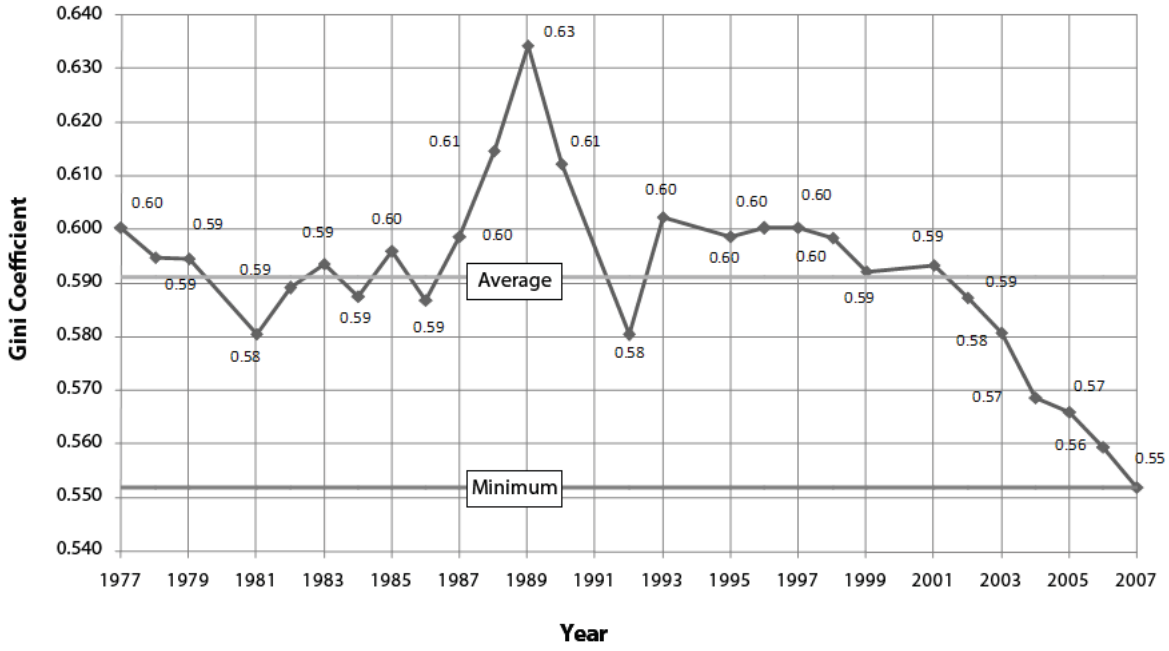
This reduction in income inequality has had significant impacts on the living conditions of the poorest groups in Brazil. From 2001 to 2007, the per capita income of the poorest 10 percent grew 7 percent per year, nearly three times the national average of 2.5 percent. As a result, Brazil has accomplished the first Millennium Development Goal (MDG) — to reduce by half the proportion of population living in extreme poverty — almost 10 years in advance. As shown by figure 1, not only was the recent decline in extreme poverty three times faster than what was necessary to achieve the first MDG by 2015, but also, more than 60 percent of

1 See, among others, Langoni (2005); Hoffmann (1989); Bonelli and Sedlacek (1989); Barros and *Mendonça* (1992); Ramos (1993); Barros, Henriques and *Mendonça* (2000a).

2 Income here is total current (no capital gains) monetary income before deductions of taxes and social security (i.e., gross income). It asks for a 'normally' received income, which means that short-run positive (i.e., working overtime) or negative (i.e., a furlough) shocks are not captured.

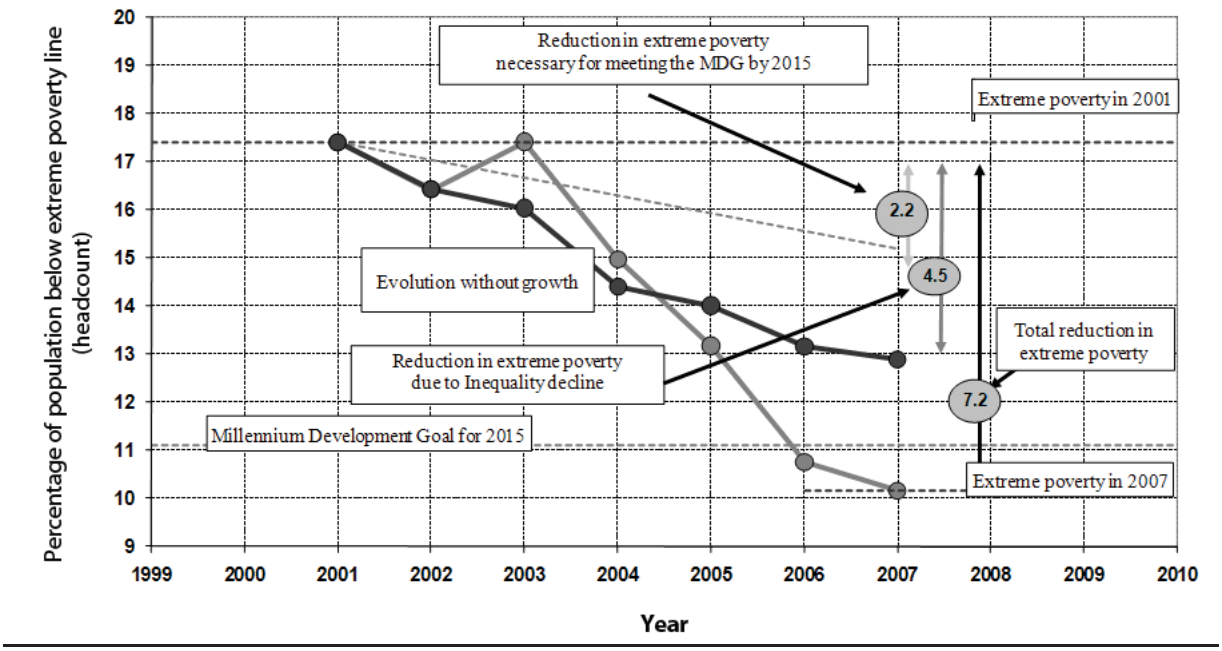
this decline was due to reductions in inequality, demonstrating the importance of the recent decline in inequality for the extremely poor (figure 2).

Figure 1, Evolution of income inequality in Brazil, measured by the Gini coefficient, 1977–2007



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 1977–2007.

Figure 2, Evolution of extreme poverty in Brazil, 2001–2007



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 1977–2007.

Despite the sharp decline in inequality, Brazil still has a level of income inequality well above the world average. Brazil's recent reductions in inequality remain limited because they are neither a consequence of a coherent set of government policies, nor the result of markets functioning properly. Indeed, Brazil's success in reducing income inequality is the net result of a social policy which still has serious inconsistencies, and a mixture of well-functioning markets and market failures. This indicates that there is plenty of room for improving social policy design and the functioning of markets, and thus, plenty of opportunities to further reduce inequality and poverty.

In this paper, we estimate the contribution of public policy and the performance of markets to the evolution of income inequality. In particular, we focus on four main issues: (1) changes in government transfers, (2) changes in wage differentials by skill level, (3) changes in labour market segmentation, and (4) changes in the minimum wage. Among the main proximate factors influencing the level of inequality (demography, non-labour income, employment and productivity) we identify which contributed the most to the recent reduction in inequality. Once we find that non-labour income plays a central role in reducing inequality, we provide a detailed analysis of its various components, in particular, public transfers. Next, we address the contribution of changes in labour income. In particular, the connection between education expansion and the decline in wage inequality, and how and to what extent the growing integration of labour markets has contributed to the reduction in labour income inequality. Finally, we analyse the impact of changes in the minimum wage on income distribution and compare its impact with what could be achieved if the same amount of resources were allocated to an expansion of the conditional cash transfer programme *Bolsa Família*.

The paper is organized as follows. It begins with a brief discussion of Brazil's fall in income inequality. It then goes on to review the various determinants that have led to the decline in income inequality in Brazil. Section 3 focuses on the contribution of changes in public transfers to the fall in inequality. Labour earnings inequality and education are discussed in section 4. Section 5 presents the relationship between earnings inequality and labour market segmentation. The relative effectiveness of the minimum wage and the *Bolsa Família* programme in reducing poverty are considered in section 6. Concluding remarks are made in section 7.

1.1 Brazil's fall in income inequality

In Brazil, inequality has declined sharply and continuously since 2001. From 2001 to 2007, the Gini coefficient declined from 0.593 to 0.552, an average rate of 1.2 percent per year (figure 1). Out of the 74 countries for which we have data, less than one fourth were able to reduce inequality faster than Brazil. For this period, there is 'Lorenz dominance', which means that the decline is unambiguous and all inequality measures satisfying the Pigou-Dalton principle will show a decline. The fall in inequality is also statistically significant: there is a 1 percent probability or less to have observed the decline in the Gini if the 'true' change was no change (Barros et al. 2009a).

However, if we break the 2001–07 period into sub-periods 2001–2004 and 2004–2007, during the latter the Lorenz curves cross so the fall in inequality is not unambiguous. The growth rate in income for the bottom 5 percent was below the overall average for all percentiles and less

than half of the growth rate corresponding to the second quintile. This change is particularly clear when attention is focused on 2006–2007. Even though the Gini coefficient held to its historical path in 2007, and despite an almost 3 percent increase in overall per capita income from 2006 to 2007, the average income of the bottom 5 percent declined by 14 percent and as a consequence, their income share declined.

Poverty reduction can occur when there is balanced economic growth and/or reductions in inequality. If inequality hadn't changed between 2001 and 2007, both the income of the rich and the poor would have grown at the national rate: 2.6 percent per year. Since the income of the poorest 10 percent actually grew 7.0 percent per year, that is, 4.4 percentage points above the overall average, almost two thirds of the income growth of this group came from declines in inequality. For the poorest 20 percent, 60 percent of the growth in their income also originated from declines in inequality. As a result, levels of poverty and extreme poverty, measured by all three basic indicators (headcount ratio, poverty gap and severity of poverty)[3] declined between 25 percent and 40 percent over the last six years.[4]

As a result of this sharp reduction in rates of poverty and extreme poverty, and despite population growth, the number of poor and extremely poor people in Brazil declined, as well as the amount of resources necessary to alleviate all poverty and extreme poverty. Indeed, the population living in extreme poverty declined by 11 million, and the number of poor people (extreme and moderately poor) was reduced by 13 million likewise. The resources needed to alleviate all poverty and extreme poverty in Brazil declined from R$63 to R$45 billion a year. Because of this reduction in the volume of resources necessary to alleviate poverty and the growth in overall income, alleviating poverty in Brazil has become even more viable. While in 2001, at least 7 percent of total household income was necessary to eliminate (extreme and moderate) poverty, in 2007, only 4 percent was required.[5] If inequality had not declined, the poverty headcount would have gone down by 5.3 percentage points. Since the poverty headcount actually declined by almost 11 percentage points, half of the reductions in the poverty headcount can be attributed to declines in inequality (figure 2). The impact of inequality reduction on extreme poverty is greater — 62 percent of the decrease in extreme poverty is due to reductions in inequality.

This faster income growth for the poor is characteristic of an equitable growth process. Whenever growth is accompanied by reductions in inequality, the income of the poor grows above the average. Almost two thirds of the income growth among the poorest 10 percent, from 2001–2007, resulted from declines in inequality. This equitable growth process also led to a significant reduction in the levels of absolute poverty. The proportion of people living in extreme poverty declined 7 percentage points from 2001 to 2007; this pace of poverty

3 To measure poverty and extreme poverty, we used regionalized lines.

4 These reductions in poverty and extreme poverty are robust regardless of the poverty line used, and may be considered substantial according to at least two criteria. First, this reduction in extreme poverty is three times faster than what would be necessary to comply with the first MDG. At the current pace, it would be possible to reduce extreme poverty in Brazil by one half in eight years, while the MDGs establish a period of 25 years to accomplish this goal. Secondly, these reduction rates are greater than those observed in all Latin American countries for which there is information available, with the exception of Mexico.

5 Total household income as recorded in the PNAD surveys and not in the National Accounts.

reduction, for Latin America, trails only Mexico's. This process was so fast that, in spite of population growth, the number of people in extreme poverty declined by 11 million. Brazil has experienced previous episodes of poverty decline; however, declines were solely due to economic growth. In this recent episode, unlike previous ones, at least half of the decrease in poverty and extreme poverty was due to reductions in inequality.

From these results we can extract two basic implications. First, the impressive rate at which poverty has been declining serves as evidence of the importance of Brazil's recent decline in inequality. These results demonstrate that reductions in inequality can be an extremely effective instrument to reduce poverty. In fact, for the same reduction in extreme poverty to be reached without the recent decline in inequality, it would have been necessary for Brazil's overall per capita income to have grown an extra 4 percentage points per year. From the extreme poor's point of view, a 1.0 percentage point reduction in the Gini coefficient is equivalent to 4.2 percentage points higher growth in per capita income.

2. Proximate determinants of the decline in income inequality

The purpose of this section is to identify and quantify the proximate determinants that contributed to Brazil's recent decline in inequality. To accomplish this goal, we rely on a series of counter-factual simulations. The proximate determinants considered in our analysis are: (1) ratio of adults to total number of members in the household, (2) household non-labour income (which includes government transfers) per adult, (3) proportion of adults working to total number of adults in the household and (4) labour income per working adult. Attention is given to both changes in the distribution of each of these factors, and changes in their association or correlation. It is worth emphasizing that in this section our analysis is limited to the proximate determinants of inequality. This is a required first step which serves as a necessary filter to identify the factors that most contributed to Brazil's decline in inequality and therefore deserve a more in-depth analysis.[6] However, each proximate determinant, in turn, is the result of behavioural and external processes which are not modelled here.

The empirical analysis contained in this section is based on the following sequence of identities:

$$y = a \bullet r \qquad (1)$$

$$r = o + t \qquad (2)$$

and

$$t = u \bullet w \qquad (3)$$

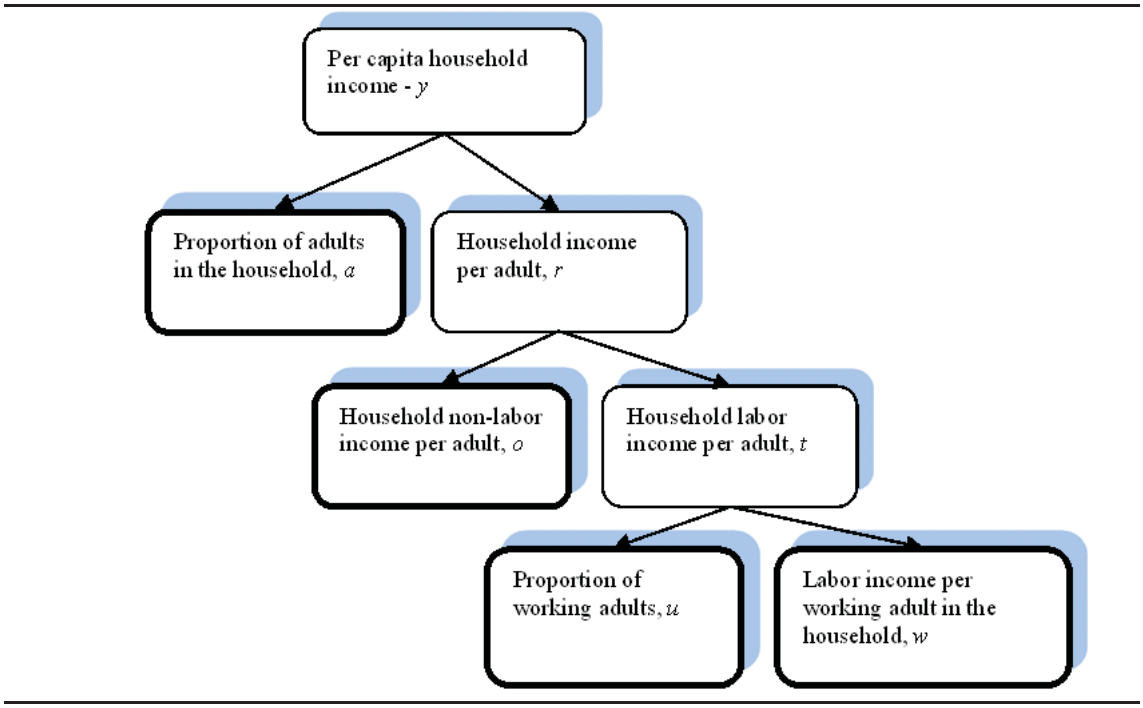
Hence,

$$y = a \bullet (o + u \bullet w) \qquad (4)$$

6 For a more detailed analysis on the role of demographic factors see Wajnman, Turra and Agostinho (2006); for an analysis of the contribution of changes in the distribution of non-labor income see Barros, Carvalho and Franco (2007) and Barros, Carvalho, Franco, and *Mendonça* (2006d); and for an analysis of the role of the changes in the distribution of labor income, see Barros, Franco and *Mendonça* (2007a, 2007b).

Identity (1) expresses household per capita income, y, as a product of the proportion of adults in the household, a, and household income per adult, r. Identity (2) expresses household income per adult, r, as the sum of household non-labour income per adult, o, and household labour income per adult, t. Identity (3), labour income per adult, t, is expressed as the product of the proportion of working adults, u, and the labour income per working adult in the household, w. Identity (4) relates per capita household income, y, to its four proximate determinants: (1) the proportion of adults in the household, a, (2) household non-labour income per adult, o, (3) proportion of working adults, u, and (4) labour income per working adult in the household, w. Visually, these identities are presented in figure 3.

Figure 3, household per capita income and its determinants



Source: A similar figure can be found in Barros, Foguel and Uylssea (2006) and Herran (2004)

It is important to point out that, as the expression $y = a \bullet (o + u \bullet w)$ is an identity, any changes in the income distribution must be related to changes in the joint distribution of the four proximate determinants (a, o, u, w). Thus, in this section, we identify all the proximate channels that lead to reductions in inequality.

Table 2a, Contribution of the proportion of adults in the household, household income per adult and associations to explain income inequality reduction between 2001 and 2007

Counter-factual simulations	Inequality (Gini coefficient)	Contribution for the inequality reduction (%)	Inequality (Ratio 20+/20-)	Contribution for the inequality reduction (%)	Determinants
Original situation in 2001	59.3	...	26.9	...	
If the distributions of household income per adult and the proportion of adults in 2007 were the same as in 2001	59.5	-4	27.0	-1	Association between the proportion of adults in the household and the household income per adult
If the distribution of household income per adult in 2007 were the same as in 2001	59.2	7	26.4	8	Proportion of adults in the household
Original situation in 2007	55.2	97	20.2	93	Distribution of household income per adult

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Barros et al. (2006b) present the methodology to decompose variations in the level of inequality into components due to variations in the marginal distribution of each determinant and its correlation with other determinants. The results obtained can be found in tables 2 a–c. Two inequality measures were used to assess the recent decline in inequality: the Gini coefficient and the ratio between the income of the richest 20 percent and the poorest 20 percent. To facilitate the interpretation of the results, in table 3 we present the evolution of each proximate determinant factor's average and the level of inequality associated to its distribution.[7]

7 In this table we use an additional inequality measure: the ratio between the top 10 percent and the bottom 60 percent. It was necessary to introduce this measure, since in the case of non-labor income, a large fraction of the population does not receive any income from this source. In this case, the average for the bottom 20 percent or 40 percent is null and measures as the ratio between the top and bottom 20 percent could not be obtained.

Table 2b, Contribution of labour and non-labour income per adult and associations to explain income inequality reduction between 2001 and 2007

Counter-factual simulations	Inequality (Gini coefficient)	Contribution for the inequality reduction (%)	Inequality (Ratio 20+/20-)	Contribution for the inequality reduction (%)	Determinants
Original situation in 2001	59.3	...	26.9	...	
If the distribution of household income per adult and the proportion of adults in 2007 were the same as in 2001	59.5	-4	27.0	-1	Association between the proportion of adults in the household and the household income per adult
If the distribution of household income per adult in 2007 were the same as in 2001	59.2	7	26.4	8	Proportion of adults in the household
If the distributions of labour income per adult and non-labour income per adult in 2007 were the same as in 2001	58.8	10	25.7	11	Association between labour income per adult and the non-labour income per adult
If the distribution of labour income per adult in 2007 were the same as in 2001	57.1	40	22.3	51	Distribution of household non-labour income per adult
Original situation in 2007	55.2	46	20.2	31	Distribution of household labour income per adult

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Table 2c, Contribution of the percentage of working adults, labour income per adult worker and associations to explain income inequality reduction between 2001 and 2007

Counter-factual simulations	Inequality (Gini coefficient)	Contribution for the inequality reduction (%)	Inequality (Ratio 20+/20-)	Contribution for the inequality reduction (%)	Determinants
Original situation in 2001	59.3	...	26.9	...	
If the distribution of household income per adult and the proportion of adults in 2007 were the same as in 2001	59.5	-4	27.0	-1	Association between the proportion of adults in the household and the household income per adult
If the distribution of household income per adult in 2007 were the same as in 2001	59.2	7	26.4	8	Proportion of adults in the household
If the distributions of labour income per adult and non-labour income per adult in 2007 were the same as in 2001	58.8	10	25.7	11	Association between labour income per adult and the non-labour income per adult
If the distribution of labour income per adult in 2007 were the same as in 2001	57.1	40	22.3	51	Distribution of household non-labour income per adult
If the distributions of labour income per worker and the proportion of working adults in 2007 were the same as in 2001	57.4	-7	23.2	-13	Association between the proportion of working adults and the household labour income per worker
If the distribution of labour income per worker in 2007 were the same as in 2001	57.3	2	23.0	3	Proportion of working adults
Original situation in 2007	55.2	52	20.2	41	Distribution of labour income per adult worker in the household

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Table 3, Evolution of per capita income distribution and its determinant factors in Brazil, 2001 and 2007

Determinant factors	2001			2007			Variation (%) 2007-2001		
	Average	Inequality (Ratio 20+/20-)	Inequality (Ratio 10+/60-)	Average	Inequality (Ratio 20+/20-)	Inequality (Ratio 10+/60-)	Average	Inequality (Ratio 20+/20-)	Inequality (Ratio 10+/60-)
Per capita household income[a]	459	26.9	2.5	533	20.2	2.0	16	-25	-20
Proportion of adults in the household (15 years and more)	71	2.5	0.3	75	2.4	0.3	5	-5	-6
Household income per adult	617	19.4	2.1	687	14.6	1.7	11	-25	-20
Non-labour income per adult	122	-	214	146	-	26	19	-	-88
Labour income per adult	494	59.4	2.8	541	55.6	2.3	9	-6	-15
Proportion of working adults	62	6.1	0.4	64	5.9	0.4	4	-4	-5
Labour income per working adult	829	21.0	2.1	862	17.3	1.7	4	-18	-17

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Note: a. The incomes are expressed in Reais from 2007.

2.1 The importance of demographic factors and income per adult

Table 2a shows that recent changes in the distribution of the proportion of adults in the household were responsible for 8 percent of the overall reduction in income inequality from 2001–2007. Its relatively small contribution can be explained by the nature of the demographic changes that occurred during this period. As shown in table 3, although the proportion of adults increased by 5 percent between 2001 and 2007, the inequality in its distribution declined by only 5 percent to 6 percent. In contrast, the decline in income inequality was four to five times larger using the same inequality measure.[8]

The association between the proportion of adults in the household and household income per adult did not contribute to explaining the decline in income inequality from 2001–2007. In fact, the impact of the correlation on inequality was negative (table 2a), indicating that changes in this correlation were unequalizing. If the correlation between the proportion of

8 It is worthwhile to point out that this assessment takes into account only the direct contribution of demographic factors. In so much as the changes in the distribution of income per adult could also result from demographic factors, the total contribution (direct and indirect) of these factors may be higher.

adults and income per adult had been held constant, the decline in income inequality would have been greater. As table 2a reveals, practically all the recent decline in income inequality was caused by changes in the distribution of household income per adult. According to table 3, the recent changes in this distribution were profound. Between 2001 and 2007, the household income per adult increased by 11 percent, and the inequality in its distribution was reduced by the same magnitude as the inequality in per capita household income (20 to 25 percent).

2.2 The relative importance of labour income and non-labour income

Given the importance of changes in the income per adult distribution, the next step is to decompose their contribution. As already mentioned, household income per adult can be expressed as the sum of non-labour and labour income per adult, $r = o + t$. Thus, the total contribution of income per adult results from changes in the distribution of o and t, as well as from changes in the correlation between them.

The estimates presented in table 2b show that, depending on the measure of inequality, between 40 to 50 percent of the recent decline in income inequality was due to changes in the distribution of non-labour income per adult. The impact of this distribution on income inequality resulted from both a large reduction in the level of inequality and a growth of its share in the total household income[9] (see table 3).[10]

Changes in the distribution of labour income per adult can explain 31 percent to 46 percent of the decline in inequality (see table 2b). Table 3 shows that this contribution resulted from both a considerable growth in labour income per adult (9 percent in the period) and a moderate reduction in the level of inequality (6 to 15 percent). The change in the association between labour and non-labour income per adult was also of some importance in explaining the recent decline in income inequality: it explains 11 percent of the reduction in inequality.[11]

2.3 The importance of the proportion of working adults and labour income per worker

In section 2.2 we show that almost one half of the recent decline in income inequality resulted from changes in the distribution of labour income per adult. Since labour income per adult is the product of the proportion of working adults and the labour income per working adult in the household ($t = u \bullet w$) its overall contribution is derived from changes in the marginal distribution of these two factors, or from changes in the correlation between them.

9 This high contribution is also found in Barros, Carvalho and Franco (2007). Meanwhile, other authors, as Hoffmann (2006a, 2006b, 2006c) and Soares et al. (2007), find much smaller contributions. The difference is due to corresponding differences in methodology. As Barros, Carvalho and Franco (2007) argue, the methodology we use has a number of advantages over the one used by Hoffmann, and by Soares et al., and so should produce more reliable results.

10 In section 3 we'll investigate in greater detail this contribution and, in particular, the role of expansions in government transfers.

11 See Barros, Carvalho, and Franco (2007) for a more detailed analysis on the reduction in this association and its contribution to the decline in inequality.

As shown in table 3, from 2001 to 2007, despite the sizeable increase (4 percent) in the proportion of working adults, the reduction in the inequality of access to jobs was very limited: four to six times smaller than the corresponding reduction in overall income inequality. As a consequence, changes in the distribution of the proportion of working adults (with a contribution below 5 percent) were not important in explaining the decline in income inequality (see table 2c).

Changes in the labour income per working adult in the household, however, were significant, showing important consequences on overall income inequality. Depending on the inequality measure, 40 to 50 percent of the recent decline in income inequality resulted from changes in the distribution of labour income per working adult. This important contribution came, essentially, from a substantial reduction in inequality of labour income among workers. According to table 3, between 2001 and 2007, the decline in labour income inequality among workers was very similar to the one observed for per capita income. Indeed, measured by the ratio of the top 20 percent income and bottom 20 percent income, inequality in labour income per worker declined by 18 percent; using the same measure of inequality, per capita income inequality declined by 25 percent. Changes in the correlation between the proportion of working adults and household labour income per worker, in contrast, were unequalizing. The fact that changes in the correlation between these two determinants had a negative impact on overall inequality, despite the recent large employment increase, indicates that workers from relatively poor households were not among those that benefited the most from job creation during 2001–2007.

3. The contribution of changes in public transfers to the fall in inequality

As shown in the previous section, at least one half of the recent sharp decline in inequality is related to changes in the distribution of non-labour income.[12] Between 2001 and 2007, the proportion of Brazilians living in households receiving some non-labour income rose from 42 percent to 52 percent (see table 4). It is worth mentioning that despite this sharp increase in coverage, the share of non-labour income in total household income increased only slightly, from 22 percent (in 2001) to 23 percent (in 2007).

Although methodological differences generate some disagreement in the literature about the magnitude of the impact of these changes,[13] there is consensus that a sizeable fraction of the recent decline in inequality originated from changes in non-labour income.[14] The purpose of this section is to decompose the impact of non-labour income by source. Our aim is to isolate the contribution of changes in the distribution of income from the following non-labour income sources: assets (rents, interest and dividends), private transfers

12 See Barros et al. (2006a, 2006d); Hoffman (2006a, 2006d); Soares et al. (2007) among others.

13 See Barros, Carvalho and Franco (2007) for a discussion regarding these methodological differences.

14 The impact estimates for the 2001-2005 period vary from 20 percent, according to Hoffmann (2006d), to 50 percent, according the results presented in Barros et al (2006a, 2006d). For the 2001-2004 period, Hoffman (2006a) finds a contribution of 25 percent and Soares et al. (2007) finds 27 percent.

(e.g., remittances), and public transfers. Since public transfers account for over 80 percent of households' non-labour income (see table 5),[15] and the percentage of the population in households with at least one beneficiary has increased by 10 percentage points since 2001 (see table 4), public transfers will receive priority in our analysis. We use a procedure proposed by Barros et al. (2007) to decompose the contribution of changes in non-labour income by source.

Table 4, Decomposition of household per capita income by source in Brazil, 2001 and 2007

Sources of income	Per capita income (in reais per month)		Variation (%) (2007-2001)	Share of total household income (%)		Variation (%) (2007-2001)	Percentage of people in households that receive non-labour income		Variation (%) (2007-2001)
	2001	2007		2001	2007		2001	2007	
Total income	458.8	532.6	16	100	100	-	-	-	-
Labour income	357.3	409.7	15	77.9	76.9	-1.0	-	-	-
Non-labour income	101.4	122.9	21	22.1	23.1	1.0	42.4	52.1	9.7
Income from assets	11.8	11.4	-4	2.6	2.1	-0.4	5.7	5.7	0.1
Rents	8.8	7.7	-13	1.9	1.4	-0.5	3.7	3.3	-0.4
Interest and dividends	3.0	3.7	26	0.6	0.7	0.1	2.2	2.6	0.4
Transfers	89.6	111.5	24	19.5	20.9	1.4	39.3	48.8	9.5
Private	9.8	10.5	7	2.1	2.0	-0.2	7.2	7.5	0.3
Aid from non-residents	3.1	2.9	-8	0.7	0.5	-0.1	3.0	2.5	-0.5
Pensions and retirements	6.7	7.6	13	1.5	1.4	0.0	4.4	5.2	0.8
Public	79.8	101.0	27	17.4	19.0	1.6	34.5	44.5	10.0
Pensions and retirements	78.5	95.6	22	17.1	17.9	0.8	29.3	29.5	0.2
Benefício de Prestação Continuada (BPC)	0.3	2.7	715	0.1	0.5	0.4	0.5	2.5	2.0
Bolsa Família and related	0.9	2.8	195	0.2	0.5	0.3	6.5	16.9	10.4

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

15 The composition of the household income varies according to the source of information. Given the PNAD larger underestimating of the income from assets, the participation of public transfers tends to be larger according to this source than when information from *Pesquisa de Orçamentos Familiares* (POF) is used. For a comparative analysis of the composition of non-labour income using these two surveys and the National Account System, see Barros, Cury and Ulyssea (2006).

Table 5, Decomposition of household non-labour income in Brazil by source, 2001 and 2007

Income sources	Non-labour per capita income			Per capita income from transfers			Per capita income from public transfers		
	2001	2007	Variation (%) (2007 - 2001)	2001	2007	Variation (%) (2007 - 2001)	2001	2007	Variation (%) (2007 - 2001)
Non-labour income	100	100	-	-	-	-	-	-	-
Income from assets	11.6	9.3	-2.4	-	-	-	-	-	-
Rents	8.7	6.2	-2.5	-	-	-	-	-	-
Interest and dividends	2.9	3.0	0.1	-	-	-	-	-	-
Transfers	88.4	90.7	2.4	100	100	-	-	-	-
Private	9.7	8.6	-1.2	11.0	9.4	-1.6	-	-	-
Aid from non-residents	3.1	2.3	-0.7	3.5	2.6	-0.9	-	-	-
Pensions and retirements	6.6	6.2	-0.4	7.5	6.8	-0.7	-	-	-
Public	78.6	82.2	3.5	89.0	90.6	1.6	100	100	-
Pensions and retirements	77.4	77.8	0.4	87.6	85.7	-1.9	98.4	94.6	-3.8
Benefício de Prestação Continuada (BPC)	0.3	2.2	1.8	0.4	2.4	2.0	0.4	2.6	2.2
Bolsa Família and related	0.9	2.3	1.3	1.1	2.5	1.4	1.2	2.8	1.6

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

We decomposed non-labour income into seven sources: two from assets — rents, and interest and dividends; two from private transfers — transfers from non residents, and other pensions; and three from public transfers — pensions and other standard contributory social security benefits, *Benefício de Prestação Continuada*, and *Programa Bolsa Família* and similar programmes[16] (see figure 4).[17] *Benefício de Prestação Continuada* (BPC) is a transfer based on a constitutional right for the elderly, aged 65 or older, and disabled people to independent living. The benefit, equal to a monthly payment of one minimum wage, is managed by the Ministry of Social Development and Combating Hunger (MDS) and is fully funded by the National Fund of Social Assistance (FNAS).[18] *Bolsa Família*, managed by the same Ministry, is a conditional cash transfer provided to poor families on condition that the children and adolescents attend school

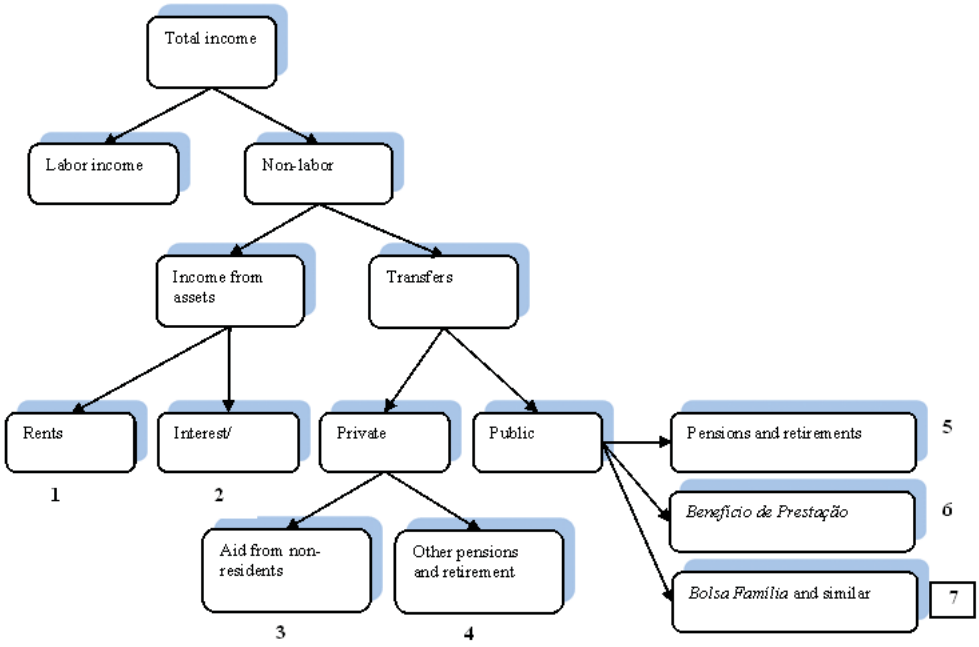
16 Among similar programmes we can find *Bolsa Escola*, *Bolsa Alimentação*, *Cartão Alimentação*, *Auxílio Gás* and *Programa de Erradicação do Trabalho Infantil* (PETI).

17 Unfortunately, this breakdown of non-labour income does not follow immediately from the PNAD data set. The methodology used to construct this income aggregates is adapted from the one proposed by Barros, Carvalho and Franco (2007).

18 For more information, see *http://www.mds.gov.br/programas/rede-suas/protecao-social-basica/beneficio-de-prestacao-continuada-bpc*.

and meet the basic health care requirements such as being vaccinated in the case of children between zero and six years of age, and expectant women and lactating mothers attend pre- and post-natal care. The programme attempts to both reduce short-term poverty by direct cash transfer and fight long-term poverty by investing in the human capital of the poor. The benefits paid by the programme range from R$20 to R$182, according to monthly income per person of the family and the number of children and adolescents up to 17 years. It reaches 11 million families, more than 46 million people, a large proportion of the country's low-income population.[19]

Figure 4, Sources of total income



Source: A similar figure can be found in Barros, Foguel and Uylssea (2006) and Herran (2004).

Table 4 shows that according to PNAD (2007), almost 25 percent of total household income comes from non-labour sources. Among these non-labour income sources, transfers are the most important, especially public transfers.[20] Indeed, as table 5 shows, public and private

19 For more information see *http://www.mds.gov.br/bolsafamilia/o_programa_bolsa_familia*. In 2007, the total number of extreme and total (extreme plus moderate) poor were 18.4 million (10.2 percent) and 50.6 million (28 percent), respectively. Poverty figures were estimated using an extreme poverty line equal to 87.6 reales per month and a moderate poverty line equal to 175.1 reales per month. Brazil does not have official poverty lines. (Barros et al.,2009b).

20 According to *Pesquisa de Orçamento Familiar* (POF) and *Contas Nacionais* (National Accouts), the participation of labour income is smaller. A significant fraction, however, is due to imputed rents for households living in houses they own (see Barros, Cury and Ulyssea 2006).

transfers, together represent 90 percent of all non-labour income. The remaining non-labour income is constituted by rents (6 percent) along with interests and dividends (3 percent).[21]

Analysing transfers in more detail (see tables 4 and 5), we find that 90 percent of them are public. Pensions and retirements represent 95 percent of all public transfers; *Bolsa Família* and BPC benefits each represent less than 0.5 percent of total household income and around 3 percent of all public transfers. Together, BPC and *Bolsa Família* benefits account for only 1 percent of total household income and 5 percent of public transfers.[22]

3.1 Identifying the recent changes in non-labour income

As already mentioned, about half of the recent decline in income inequality was due to changes in the distribution of non-labour income. In section 3.2, we estimate and analyse the individual contribution of each of the seven non-labour income sources in reducing inequality. Meanwhile, in order to make the outcome of this decomposition more transparent, and facilitate its interpretation, we present a short description of the changes that took place in the distribution of each one of these seven non-labour income sources since 2001.

3.1.1 Coverage

Despite the fact that non-labour income represents only one fourth of the total household income, it is not concentrated in a few households. On the contrary, more than one half of all Brazilians (52 percent) live in households that receive some sort of non-labour income. Public transfers are the main factor responsible for this wide coverage; 45 percent of all Brazilians live in households that receive some sort of public transfer (see table 4).

Among public transfers, contributory social security has the largest coverage — about 30 percent of the Brazilian population lives in households receiving contributory social security benefits. However, since 2001, the percentage of the population living in households benefiting from *Bolsa Família* (a non-contributory benefit) increased steadily, reaching 17 percent in 2007. In comparison with BPC, although the amount of resources transferred via BPC is similar to the amount transferred by *Bolsa Família*, the number of Brazilians in households that benefit from *Bolsa Família* is seven times greater than the number of Brazilians in households that receive BPC (table 4). From 2001 to 2007, the coverage rate of non-labour income grew 10 percentage points, going from 42 percent to 52 percent. Essentially, all growth came from *Bolsa Família*. The percentage of population in households receiving BPC increased only slightly, by 2 percentage points, and the coverage of contributory social security benefits remained virtually unchanged (table 4).

21 The income from assets is clearly underestimated in PNAD. Barros, Cury and Ulyssea (2006) estimated that the aggregated value of these incomes, according to the national accounts, is four times larger than according to PNAD.

22 It is worth emphasizing that, since PNAD does not take into consideration sporadic sources of income, it also ends up not capturing some important public transfers, such as *Seguro Desemprego* and *Abono Salarial*. Through this channel, PNAD underestimates the total of public transfers.

3.1.2 Average value of the benefit income among recipients

The impact of a change in an income source on total inequality strongly depends on its share in total income. Indeed, changes in income sources with a relatively small share in total income do not generate significant impacts on total inequality.

A given income source's share in total income depends on its coverage (percentage of households with some income from this source), and its average benefit among those receiving it. In the previous section we reviewed the recent evolution of coverage of contributory social security, BPC and *Bolsa Família*. Here we analyse the average benefit among recipients of each of these sources.

As table 6 shows, contributory social security (R$324 per capita) is the non-labour income source with the highest per capita value among households with at least one recipient. *Bolsa Família* (R$17 per capita) is the non-labour income source with the lowest per capita value. The average benefit from *Bolsa Família* is much smaller even when compared to other non-contributory transfers, like BPC. As a matter of fact, the per capita BPC benefit among households with at least one recipient is six times greater than the corresponding benefit from *Bolsa Família*.

Table 6, Evolution of non-labour income (average and share) in Brazil, 2001–2007

Income sources	Per capita value of non-labour income sources among households with at least one recipient			Decomposing the share evolution of each non-labour income source		
	2001	2007	Variation (%) (2007 - 2001)	Due to coverage	Due to average benefit	Total
Non-labour income	239	236	-1	> 100	< 0	100
Income from assets	208	198	-5	< 0	> 100	100
Rents	236	232	-2	88	12.4	100
Interest and dividends	136	142	4	81	18.8	100
Transfers	228	229	0	99	0.8	100
Private	137	139	2	72	28.1	100
Transfers from non-residents	104	115	10	> 100	< 0	100
Pensions	153	147	-4	> 100	< 0	100
Public	231	227	-2	> 100	< 0	100
Pensions	268	324	21	4.00	96.0	100
Benefício de Prestação Continuada (BPC)	69	107	55	79.1	20.9	100
Bolsa Família and related	15	16	13	88.6	11.4	100

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

During the 2001–2007 period, there has been an increase in the amount of all public transfers, particularly among those indexed to the minimum wage (BPC and contributory social security benefits). As table 6 reveals, per capita BPC and per capita social security benefits among households with at least one beneficiary increased by 55 percent and 21 percent, respectively. The per capita benefits from *Bolsa Família* also increased, but by only 13 percent. In contrast to public transfers, per capita income among households with at least one recipient did not increase significantly for all other non-labour income sources. Transfers from non-residents were an exception; they experienced a 10 percent increase.

3.1.3 Income share

All non-labour income sources, particularly public transfers, increased as shares of total income, except for rents and private transfers. Since the share of an income source is determined by its average value per beneficiary and its coverage rate, any increase in its share in total non-labour income can be decomposed into two components: one component due to the increase in coverage, and a second component due to the increase in the average value of the benefit/income received per beneficiary. In table 6 we present this decomposition for each non-labour income source.

This table reveals that from 2001–2007 most non-labour income sources increased their share of total income by expanding coverage. In fact, the increase in the share of overall non-labour income in total income, and particularly the share of public transfers in total income, was generated by expanding coverage. Between 80 percent and 90 percent of the increase of the share of non-contributory public transfers (like BPC and *Bolsa Família*) in total income was caused by expanding coverage. The only important exception to this rule is the pensions and retirements. Almost the entire increase in social security's share of total income was a consequence of greater benefit generosity. Social security coverage remained essentially the same, but the real value of benefits increased by 20 percent.

3.2 Contribution from non-labour sources to the fall in income inequality

In this section, we analyse the impact that changes in each component of non-labour income have on the recent decline in inequality.[23] We compare the Gini coefficients for 2001 and 2007 with counter-factual simulations designed to capture what would have happened if the distribution of each non-labour income source had not changed during this time. From the difference between the actual decline in inequality and the decline in inequality in the counter-factual scenarios, we obtain estimates of the impact of each non-labour income source on the reduction in overall inequality. The results are presented in table 7.

23 All estimates are based on the methodology described in Barros, Carvalho and Franco (2007).

Table 7, Contribution of non-labour income sources to overall income inequality decline in Brazil, 2001–2007

Income sources	2007 Gini coefficient	2007 with the distribution of the source compliment of 2001	2001 Gini coefficient	Contribution of each income source (%)
Total income	0.552		0.593	
Labour income		0.568		62
Non-labour income		0.572		51
Income from assets		0.592		4
Rents		0.593		1
Interest and dividends		0.592		3
Transfers		0.573		49
Private		0.593		1
Aid from non-residents		0.594		-1
Pensions and retirements		0.593		2
Public		0.573		49
Pensions and retirements		0.582		28
Benefício de Prestação Continuada (BPC)		0.589		10
Bolsa Família and related		0.588		13

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Confirming the results obtained in section 2, the estimates reveal that half of the recent decline in inequality (2001–2007) was due to changes in the distribution of non-labour income. This is a very significant result, considering that non-labour income represents only one fourth of total household income. The decomposition by type of non-labour income source is even more revealing.

As expected, impacts of changes in the distribution of income from assets (rents, interest and dividends) and private transfers were limited. Most of the impact of non-labour income on the reduction of overall income inequality was due to changes in the distribution of public transfers. The recent changes in public transfers alone explain 49 percent of the total decline in inequality. Although both contributory and non-contributory transfers were important factors, the role of contributory transfers was predominant. The recent changes in social security benefits explain almost 30 percent of the overall reduction in income inequality. The increasing coverage of non-contributory benefits like BPC and *Bolsa Família* were also important. Despite representing just a tiny fraction of total household income (0.5 percent), each of these non-contributory benefits explains about 10 percent of the overall decline in income inequality.

4. Labour earning inequality and education

As we saw in section 2, the fall in labour income inequality accounted for about half of the reduction in overall income inequality. The fall in labour income inequality, in turn, was primarily due to the fall in inequality in the distribution of labour income per working adult. One factor that may explain this trend could be changes in access to education. The last decade was marked by an accelerated expansion of education in Brazil, more than twice as fast as the one that occurred in the 1980s.[24] In this section, we analyse the relationship between the expansion of education in Brazil and the recent decline in income inequality.[25]

An expansion in education may influence income inequality through the following mechanisms: a decline in fertility, an increase in female labour force participation, and reductions in labour earnings inequality. In this section we focus only on the impact of the expansion in education on the distribution of labour earnings.[26] As we have shown in section 2, half of the recent decline in inequality is due to changes in the distribution of labour earnings.[27] Hence, the accelerated expansion of education over the last decade may have played an important role in reducing overall inequality.

A large amount of literature emphasizes that education affects the distribution of labour earnings through two channels: **quantity effect** and **price effect**.[28] First, earnings (returns to education) tend to increase as workers' education increases; thus, the greater the inequality in education, the greater the inequality in labour earnings (quantity effect). Moreover, given a level of inequality in education, the larger the earnings differentials by education, the greater the inequality in labour income (price effect). In other words, labour markets 'translate' educational inequality into labour earnings inequality, depending on the shape of the curve of returns to education. The magnitude of the inequality translated from education to labour earnings is determined by two factors: (1) the magnitude of the inequality in education, and (2) the sensitivity of the 'translator' used to transform education inequality into labour earnings inequality. The sensitivity of this translator is the steepness of the correlation between earnings and education. The more sensitive earnings are to workers' education level, the greater the eventual labour earnings inequality. In this section, we evaluate both the joint and the individual contribution of these two channels.

Evidently, the magnitude and nature of changes in the education distribution (quantity effects), and changes in the steepness of the earnings–education correlation (price effects) determine their impact on overall inequality. Thus, over the next two sections we describe the

24 Estimates from PNAD show that in the last decade the average schooling of the Brazilian labour force increased by almost two completed grades, while in the previous decade the increase was of 0.7 completed grades.

25 Foguel and Azevedo (2007) and Menezes-Filho, Fernandes and Picchetti (2007) also investigate this issue. We wish to investigate the causes of inequality that is associated with the distribution of the population according to household per capita income. Foguel and Azevedo (2007) and Menezes-Filho, Fernandes and Picchetti (2007) investigate the impact only on the labor earnings inequality.

26 For an analysis on the impact of demographic changes see Wajnman, Turra and Agostinho (2006).

27 See also Hoffmann (2006c, 2006d); Soares et al. (2007); Barros et al. (2006c, 2006d) and Barros, Carvalho and Franco (2007).

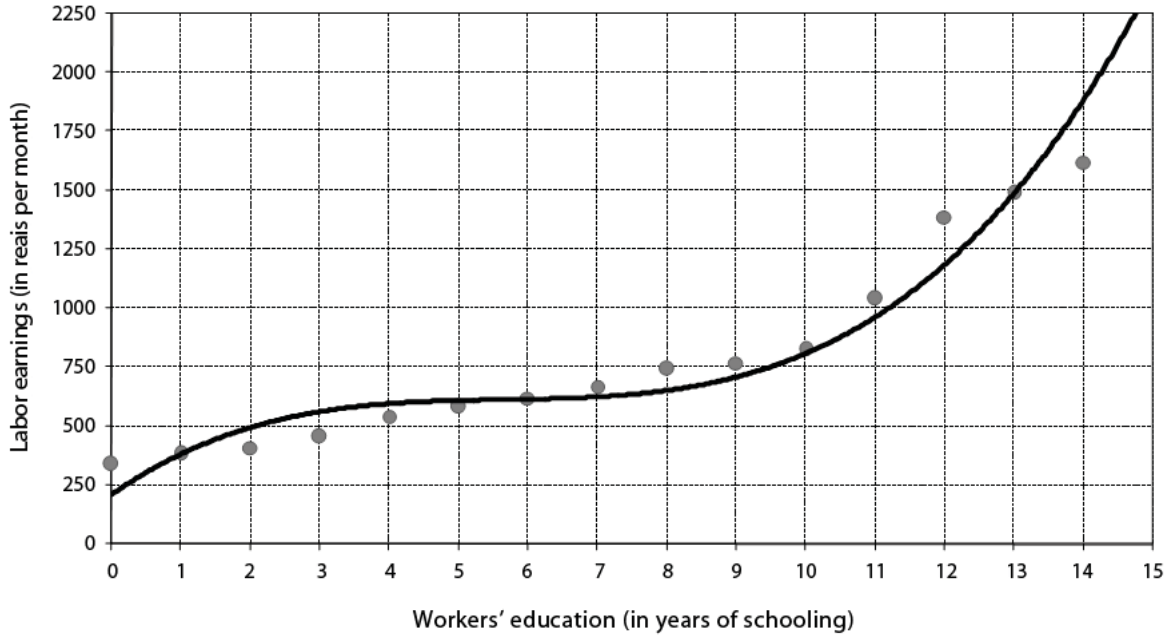
28 See Langoni (2005); Tinbergen (1956, 1975); Becker and Chiswick (1966); Sattinger (1993) and Barros and *Mendonça* (1993, 1996), among others.

magnitude and nature of changes in quantity effects and price effects of education before estimating their impact on overall inequality. The next two sections may be considerably useful for the interpretation of results.[29]

4.1 The relation between labour earnings and education

The typical form of the correlation between educational attainment and monthly labour earnings in Brazil is presented in figure 5. As the figure shows, the correlation is initially concave then becomes convex. Hence, the first years of schooling (literacy) and the last (higher education) have the greatest impact on labour earnings. The impact of in-between years of schooling is particularly limited.

Figure 5, Relation between education and labor earnings in Brazil, 2007

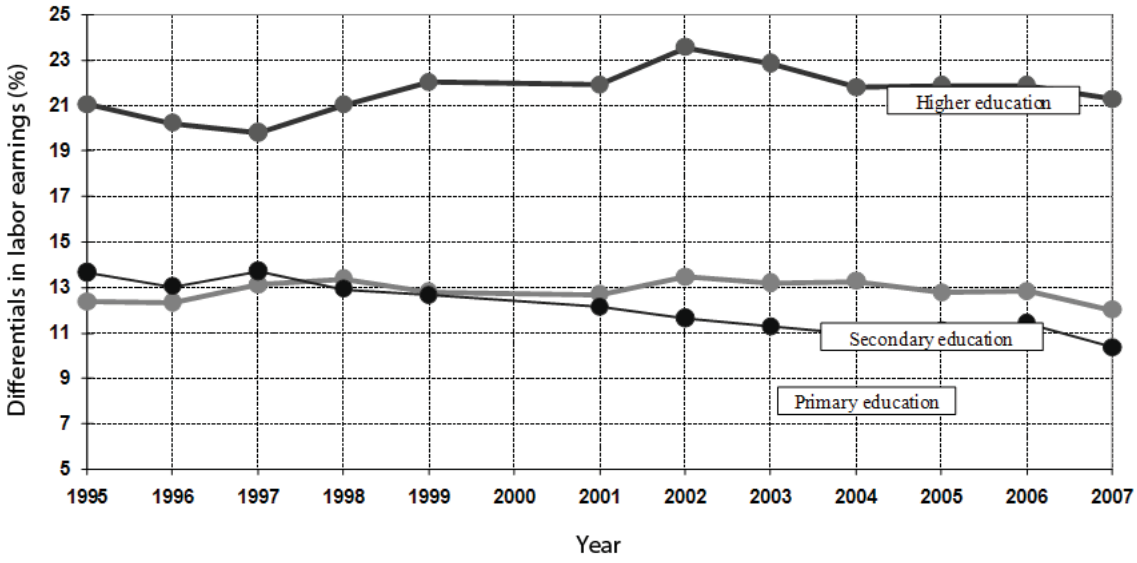


Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2007.

29 The methodology used throughout this section to estimate the contribution of educational expansions to reduce income inequality is based on Barros, Franco and *Mendonça* (2007a). It extends the available literature in three dimensions. First, similar to Bourguignon and Ferreira (2004) and Barros, Ganuza and Vos (2002), this methodology investigates the impact on the inequality in household per capita income, while most of the others procedures are limited to investigate the impact on earnings inequality (see Menezes-Filho, Fernandes and Picchetti (2007); Foguel and Azevedo (2007); Cortez and Firpo (2007)). Second, it isolates the impact of education from the impact of other human capital dimensions. Other methodologies allow us only to obtain the joint impact of changes in all dimensions of human capital (see Menezes-Filho, Fernandes and Picchetti (2007); Foguel and Azevedo (2007). Finally, it allows, for each type of human capital, to isolate the contribution of changes in the distribution of human capital (quantity effect) from the impact of changes in the sensitivity of earnings to human capital (price effect). All the other available methodologies allow isolating the price and quantity effects only for all changes in the distribution of human capital combined (see, again, Menezes-Filho, Fernandes and Picchetti (2007) and Foguel and Azevedo (2007).

Since 1995, labour earnings differentials by education level have declined at all levels.[30] As shown in figure 6, this reduction is much clearer after 2002, particularly for secondary and higher education. The decrease of the labour earnings differential by education level has been, unquestionably, one of the factors contributing to the recent decline in inequality in Brazil.

Figure 6, Evolution of the differentials in labor earnings between education levels, in Brazil, 1995–2007



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 1995–2007.

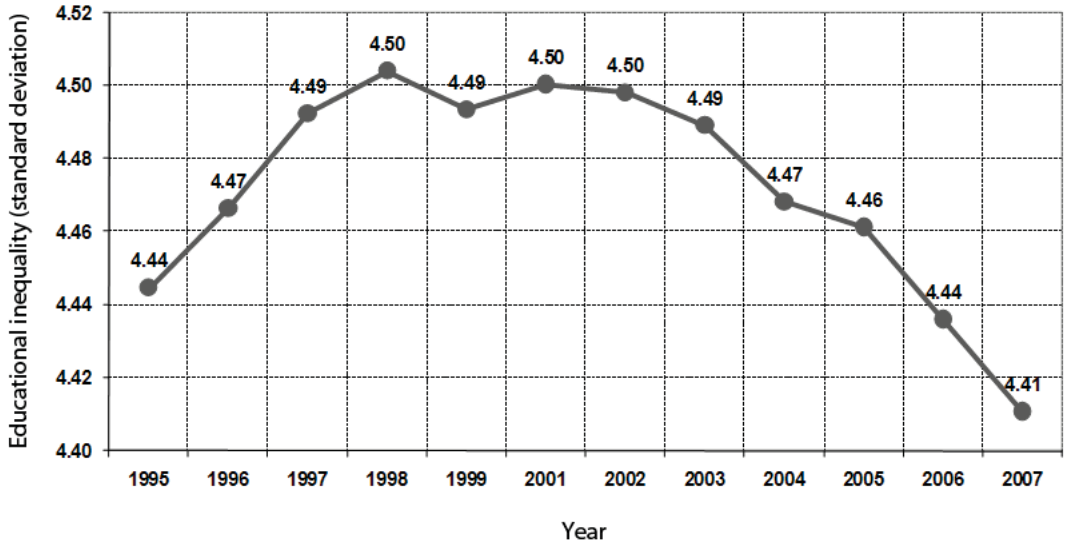
The correlation between earnings and education is responsible for translating education inequality into labour earnings inequality. Indeed, if all workers had the same education level, we wouldn't have education inequality to translate into labour earnings inequality in the first place. In this case, education would not contribute to labour earnings inequality, regardless of the steepness of the correlation between earnings and education. The level of education inequality among workers can be measured in several ways, and the standard deviation of years of schooling is the most common one. Figure 7 presents the evolution of education inequality, using this measure, over the last decade. It shows an inverted-U shape. Education inequality increased until the end of the 20th Century, and has continuously declined since then. This recent decline in education inequality is one of the factors responsible for the decline in overall income inequality.

It is worth pointing out that this inverted-U shaped evolution of education inequality was not unexpected. On the contrary, it is the natural consequence of the corresponding inverted-U shaped correlation between average education and inequality, known as the Kuznets curve (see figure 8). According to this rule, education inequality begins to decline whenever

30 In order to facilitate their interpretation, they all have been transformed into percentage changes per additional grade completed successfully.

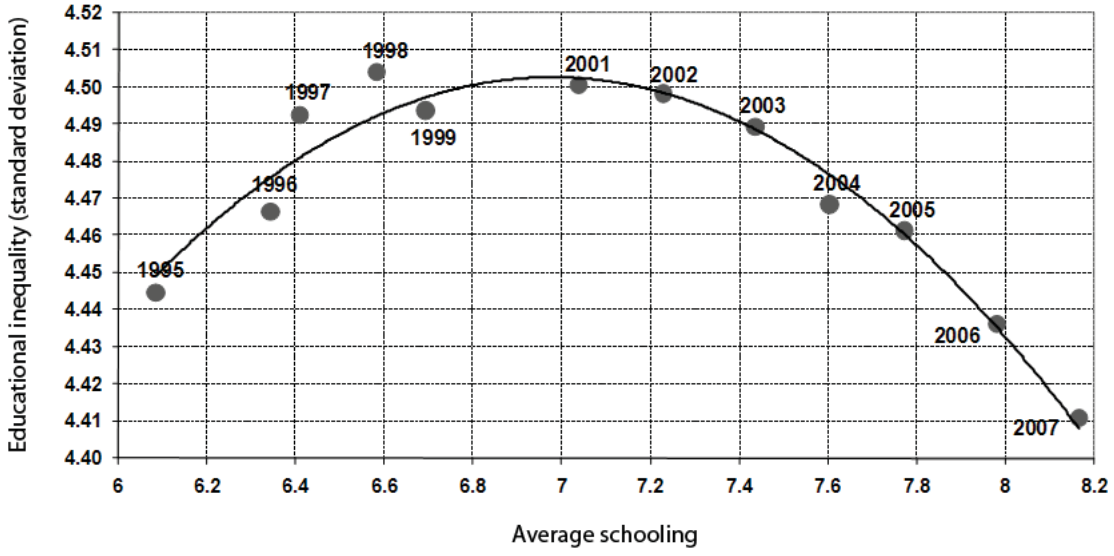
average schooling exceeds some threshold level; the threshold level is typically around seven completed grades. As shown in figure 8, education inequality in Brazil starts to decline precisely when average schooling reaches seven completed grades.

Figure 7, Education inequality among workers in Brazil, 1995–2007



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 1995–2007.

Figure 8, Education inequality among workers in Brazil, 1995–2007



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 1995–2007.

This figure brings up important implications for the future impact of education on income inequality. The concavity implies that, from now on, education inequality should be declining at increasing rates. Moreover, the inverse correlation implies that the faster education expands, the faster education inequality and, consequently, income inequality, will decline.

But labour income inequality is not determined only by the magnitude of education inequality. It also depends on how labour markets translate educational differences into labour earnings differences (price effects). In some markets, small educational differences lead to small differences in earnings, while in other markets small educational differences lead to substantial earnings differentials. Given two labour markets with equal education inequality, the one with the flatter correlation between education and earnings will reveal less income inequality. Conversely, given two labour markets with equally steep earnings–education correlations, the market with lower education inequality will reveal less income inequality.

As a consequence, for education to contribute to reducing income inequality, it is necessary to have either a decline in the inequality of education, or a flattening of the correlation between labour earnings and education, or both. As we have already seen in this section, throughout the period of 2001–2007, both a decline in education inequality and a flattening of the correlation between labour earnings and education have occurred. Thus, both have contributed to the recent decline in income inequality. Their contributions are presented in table 8.[31]

Table 8, Contribution of changes in the distribution of education to the recent income inequality decline in Brazil, 2001–2007

Simulations/ contribution	Labour income	Per capita income
Simulations		
2001	0.564	0.593
Inequality in 2007 with the earnings differential by educational level and the distribution of education from 2001	0.546	0.564
Inequality in 2007 with the earnings differential by educational level from 2001	0.540	0.561
Inequality in 2007 with distribution of education of 2001	0.532	0.553
2007	0.528	0.552
Contributions		
Price and quantity	50	29
Price	35	23
Quantity	11	3

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

31 The methodology used is the one proposed by Barros, Franco and *Mendonça* (2007a).

4.2 Contributions of quantity and price effects

According to table 8, education (i.e., changes in earnings differential by educational level and the distribution of education) was responsible for 50 percent of the recent decline in labour earnings inequality, and for almost 30 percent of the decline in household per capita income inequality.

The breakdown of this contribution reveals that the reduction in the steepness in the returns to education (price effect) was by far the most important factor. It constituted 35 percent of the decline in labour earnings inequality and 23 percent of the decline per capita income inequality. The direct contribution of changes in the distribution of education (quantity effect) was smaller, representing 11 percent of the decline in earnings inequality and only 3 percent of the decline in per capita income inequality.

5. Earnings inequality and labour market segmentation

As shown in section 2, a sizeable fraction of the recent decline in income inequality came from changes in the distribution of labour earnings, in particular, from a sharp decline in labour market earnings inequality. In the previous section, we showed that half of the decline in labour earnings inequality was caused by the combined effect of a fall in the inequality of education and a fall in the returns to education.[32] The former was the result of the large expansion in educational access which took place in Brazil over the last decade.[33] Now, what remains to be explained are the causes of the other half of the decline in labour earnings inequality.

As emphasized in Barros and Mendonça (1993, 1996), there are essentially two basic sources of differences in labour income. On one hand, earnings differentials may just reflect preexisting intrinsic differences in productivity among workers and, therefore, they are not generated, but just revealed, by labour markets. This was the source of inequality treated in the previous section (that is, more educated workers have higher productivity, and thus command higher wages). On the other hand, some earnings differentials result from labour market imperfections, such as discrimination and segmentation. In this case, earning differences among equally productive workers are created by the market failures in the labour market. Indeed, not all differences in earnings result from intrinsic differences in workers' productivity. A sizeable fraction of earnings inequality is found among workers perfectly substitutable in production. These are workers whose productivity does not change even when interchanged in their jobs. In this case, the labour market rewards workers with the same intrinsic productivity differently, and therefore it will certainly be generating new inequalities.

The labour market generates inequality both when it unequally remunerates men and women, or whites and blacks with the same productivity, as well as when there are earning differences between perfectly substitutable workers from different labour market segments

32 See Hoffmann (2006a, 2006b); Barros, Carvalho and Franco (2007); Soares et al. (2007); Rocha (2007); Lavinas, Matijascic and Nicoll (2007); Cury and Leme (2007); Bourguignon, Ferreira and Leite (2007); Camargo and Cortez (2007).

33 See, for example, *Hérran* (2005).

(e.g., geographic location, formal/informal economic sectors). In the first case, we say that the differentials come from discrimination; in the second, we say that they come from labour market segmentation.

In this section, we focus on the relationship between labour market segmentation and income inequality. The purpose is to evaluate the degree of segmentation of the Brazilian labour market, to analyse to what extent it has become more integrated over the last decade, and to identify the impacts of this increasing integration on the recent declines in income inequality. Specifically, we shall analyse the contribution of three types of segmentation: (i) spatial segmentation, (ii) segmentation between the formal and informal segments of the labour market, and (iii) segmentation between economic sectors.

Before we begin the analysis, it is important to recognize that there is a strong interaction between inequality revealed by labour markets and inequality generated by labour markets. In general, it is not possible to add these components without incurring some double counting. When workers and jobs are heterogeneous and their allocation is not random, it may occur that the best jobs are assigned to workers with higher educational levels. In this case, there are two gains from education. First, a higher educational level elevates intrinsic productivity, and hence it elevates earnings, regardless of the kind of job a worker may end up with. Secondly, a higher education level leads to higher earnings whenever it gives priority access to better jobs. This second advantage will only exist as long as: (a) the labour market is segmented (generating better and worse jobs), (b) workers are educationally heterogeneous, and (c) those with higher educational levels have priority access to better jobs. Thus, by nature, labour earnings inequality is an interaction between inequality revealed by the labour market and inequality generated by the labour market.

Given this interaction between revealed and generated inequalities, we must be cautious when aggregating contributions. It is not possible just to add the contribution of a segmentation decrease and the one resulting from a reduction in earnings differentials by education level. There are overlaps. Part of the decline in earnings differentials by educational level comes from the decrease in labour market segmentation. When jobs become more homogeneous (similar earnings for similar jobs in different locations, for example), the benefits of a higher educational level decline.

5.1 Spatial segmentation

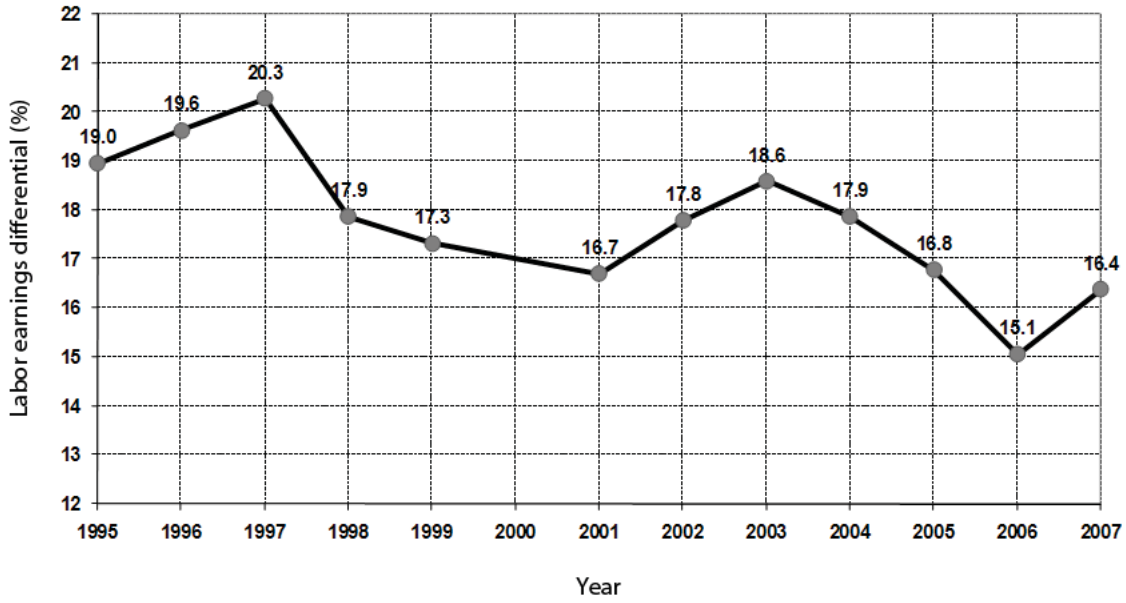
Here we shall consider three types of spatial segmentation: (1) differentials among Federal States, (2) differentials between metropolitan areas and non-metropolitan municipalities and (3) differentials between urban and rural areas.[34] In order to evaluate the degree of labour market segmentation among Federal states, we divided the country into 21 territories, of which 19 actually represent Federal states and 2 represent conglomerates of smaller states in the

34 In the case of non-metropolitan municipalities we are working with two groups: self-representative non-metropolitan municipalities and small metropolitan municipalities. To simplify the analysis, we'll be referring throughout the text only to the differential between metropolitan and non-metropolitan areas.

Amazon region.[35] Since these 21 territories lead to 210 earnings differentials we simplify the analysis of their evolution by using their average.[36]

Figure 9 presents the evolution of labour market spatial segmentation since 1995; it shows that there is a trend towards greater integration. Hence, integration must have contributed to Brazil's recent income inequality decline.

Figure 9, evolution of labour earnings differential among Federal States in Brazil, 1995–2007



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 1995–2007.

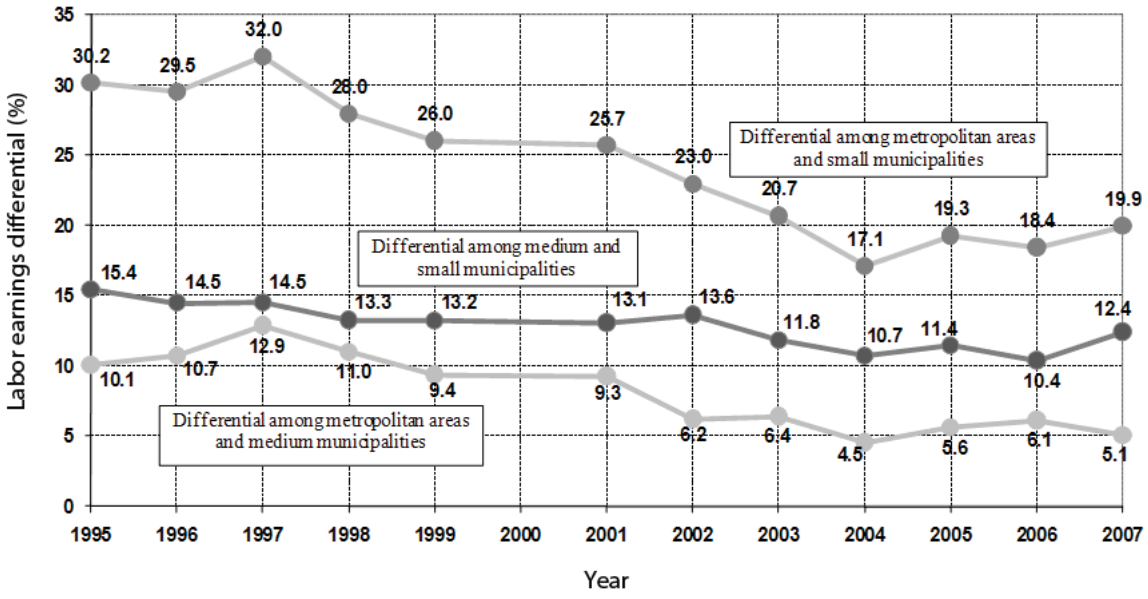
The PNAD does not identify the exact municipality where each of the workers in the sample resides or works, but it does identify whether workers live in a metropolitan area, in a non-metropolitan, or in a small or medium-sized municipality. The evolution of the level of labour market segmentation among these three geographical areas is presented in figure 10.

This figure shows a continuous reduction of the earnings differentials among these three segments of the labour market over the entire period. This reduction has been particularly sharp over the last six years. Throughout this period (2001–2007), the differential between metropolitan areas and non-metropolitan medium size municipalities has declined by 4 percentage points. The differential between metropolitan areas and non-metropolitan small municipalities declined even more, about 6 percentage points. Also, this increasing integration of metropolitan and non-metropolitan labour markets is certainly among the factors that have contributed to the country's recent decline in income inequality.

35 See Barros, Franco and *Mendonça* (2007b).

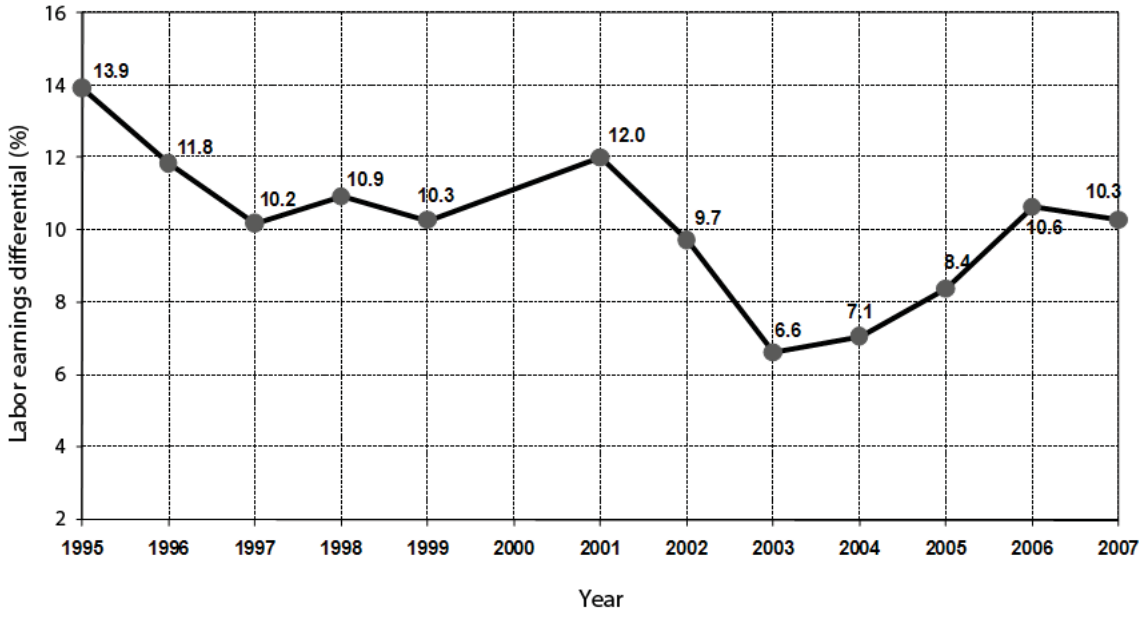
36 Obtained from the formula: $C_{21;2} = \frac{21!}{2!(21-2)!} = \frac{21 \cdot 20 \cdot 19!}{2! \cdot 19!} = \frac{21 \cdot 20}{2} = 210$

Figure 10, Evolution of labor earnings differential among metropolitan and non-metropolitan areas in Brazil, 1995–2007



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 1995–2007.

Figure 11, Evolution in urban–rural labor earnings differential in Brazil, 1995–2007



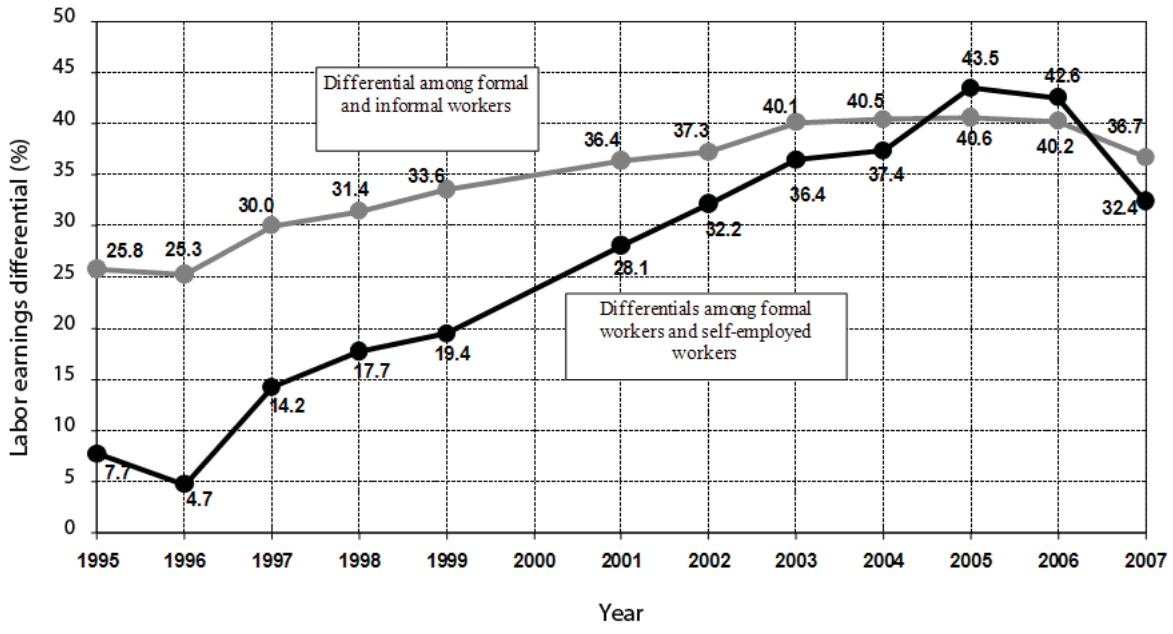
Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 1995–2007.

Within municipalities, earnings disparities persist among workers with similar productive characteristics. The most salient disparity is the earnings gap between workers in urban and rural areas. As figure 11 shows, in 2007, urban workers' labour earnings were 10 percent above earnings for rural workers in similar jobs and with similar observed characteristics. The level of integration between urban and rural labour markets increased since 2001. Despite the significant increase of urban–rural differentials between 2003 and 2006, the urban–rural earnings gap for the entire period (2001–2007) declined 2 percentage points, contributing to the recent decline in income inequality.

5.2 Segmentation between the formal and informal sectors

The segmentation between formal and informal employees, and between formal employees and self-employed workers are among the most visible forms of segmentation in the Brazilian labour market.[37] Typically, informal and self-employed workers receive lower wages than those received by formal workers with the same productive characteristics.

Figure 12, Evolution of formal–informal labor earnings differential in Brazil, 1995–2007



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 1995–2007.

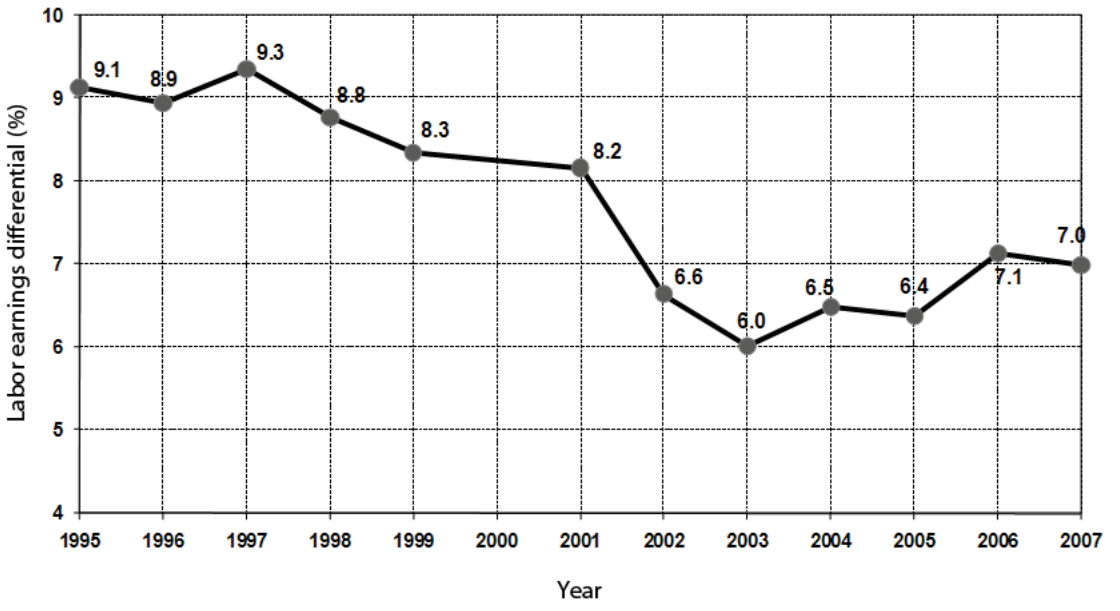
37 Informal employees are those that don't have a formal labour contract (carteira de trabalho assinada). Formal employees are those that have a formal labour contract or are public employees.

Despite the decline in the degree of informality over the last decade, wage differentials between formal employees and self-employed workers increased significantly.[38] As figure 12 shows, despite a sharp decline in 2007, the differential between formal employees and self-employed workers is still 4 percentage points higher than in 2001 while the differential between formal and informal wage-earners has remained relatively stable since 2001. Given the lack of progress, labour market segmentation between formal and informal workers cannot have been a positive force in the recent decline in income inequality.

5.3 Segmentation by economic sector

With the purpose of evaluating the degree of labour market segmentation by economic sector, we consider 12 economic sectors, leading to 66 inter-sectoral earnings differentials. Again, to simplify the analysis of the evolution of these differentials, we compute a synthetic measure that represents the average inter-sectoral differential. As figure 13 shows, over the last decade, the differentials between economic sectors declined by 2 percentage points, with half of this decline occurring after 2001. Hence, the reduction in the level of sectoral segmentation is among the factors that contributed to the recent decline in income inequality.

Figure 13, Evolution of labor earnings differentials among sectors of economic activity in Brazil, 1995–2007



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 1995–2007.

38 The degree of informality is defined as the proportion of the labour force that can be found in the informal sector (informal employees and self-employed workers). According to the PNAD, the degree of informality decreased 4 percentage points (from 50 percent in 1995 to 46 percent in 2007).

5.4 Integration and inequality reduction

In the previous subsections, we described how labour market segmentation in Brazil evolved over the last decade along several dimensions. This analysis demonstrated that, with the exception of the formal–informal sectors, the Brazilian labour market became increasingly integrated along all the other dimensions. This growing integration certainly contributed to the recent reduction in income inequality.

To evaluate the magnitude and importance of these contributions, we apply a procedure similar to that proposed by Langoni (2005).[39] The procedure consists in predicting what would have been each worker's labour income in 2007 if the level of labour market segmentation were the same as in 2001. The results are presented in tables 9a and 9b.

Table 9a, The contribution of labour market segmentation to the recent labour earnings inequality decline[a]

Counter-factual simulations	Inequality measured by the Gini coefficient		Reduction (Gini in 2007 - 0.564)	Contribution to the reduction in level of inequality (%)
	2001	2007		
Original distribution	0.564	0.528	0.036	100
Labour market segmentation		0.532	0.032	11
Geographic location		0.532	0.033	10
Federal States		0.529	0.035	4
Urban–rural areas		0.528	0.036	1
Municipality size[b]		0.530	0.034	6
Labour market segments		0.528	0.036	1
Formal–informal		0.525	0.039	-7
Economic sector		0.531	0.033	8

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Note: (a) This table's estimates do not include the income from imputed rent and adjustments in the transfers; (b) Non-metropolitan municipalities are divided into two groups: self-representative municipalities and small municipalities. To simplify the analysis we refer throughout the text only to the differential between metropolitan and non-metropolitan.

The Ginis under the 2007 column are calculated assuming that labour market segmentation for the corresponding dimensions remained as it was in 2001. These simulated Ginis are calculated by replacing the 2007 coefficient/s with the corresponding ones in 2001 in the earnings regressions.[40] The contribution is calculated by taking the difference between the 2007 Gini and the Gini that has assumed no change in the particular source of segmentation divided by the difference between the actual Ginis in the two points in time. So, for example, the

39 See also Barros, Corseuil and Leite (1999).

40 To keep the average wage in 2007 the same as the actual wage after you have replaced the coefficients, one adjusts the intercept.

contribution of labour market segmentation due to variations in labour earnings by economic sector is calculated as (0.528 - 0.531)/(0.528 - 0.564) = 0.08.[41]

As shown in section 5.1, all three types of spatial segmentation (among Federal States, between metropolitan and non-metropolitan areas, and between urban and rural areas) have declined from 2001 to 2007. The combined impact of these decreases in segmentation (geographic location) on the decline in labour earnings inequality and per capita household income inequality was 10 percent and 5 percent, respectively. Although all three types of spatial segmentation had contributed to declines in earnings and per capita household income inequality, the contribution of the decline in the metropolitan–non-metropolitan areas differential was particularly important. The reduction of the metropolitan–non-metropolitan differential explains 6 percent of the decline in labour earnings inequality and 4 percent of the decline in per capita income inequality. The differentials among Federal States were responsible for almost 4 percent of the decline in earnings inequality but for only 1 percent of the decline in per capita income inequality. Finally, the reduction of the urban-rural earnings gap was responsible for only 1 percent of the reduction in both earnings and per capita income inequality.

Table 9b, The contribution of labour market segmentation to the recent per capita income inequality decline[a]

Counter-factual simulations	Inequality measured by the Gini coefficient		Reduction (Gini in 2007 - 0.593)	Contribution to the reduction in level of inequality (%)
	2001	2007		
Original distribution	0.593	0.552	0.042	100
Labour market segmentation		0.555	0.039	7
Geographic location		0.554	0.039	5
Federal States		0.552	0.041	1
Urban-rural areas		0.552	0.041	1
Municipality size[b]		0.553	0.040	4
Labour market segments		0.553	0.041	1
Formal-informal		0.550	0.043	-4
Economic sector		0.554	0.039	6

Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Note: (a) This table's estimates do not include the income from imputed rent and adjustments in the transfers.

In section 5.2, we show that, over the last decade, there has been an increase in the wage gap between formal and informal workers. Hence, this increasing segmentation could not possibly explain the recent decline in income inequality in the country. Indeed, the simulation results indicate that, if the formal-informal earnings gap hadn't increased over the last six years, the decline in earnings and per capita income inequality would have been 7 percent and 4 percent greater, respectively (see table 9b).

41 For example, to calculate the contribution of labour market segmentation: (0.036 - 0.032) / 0.036 = 11 percent.

Finally, we have shown in section 5.3 that, over the last six years, inter-sectoral earning differentials have declined sharply, contributing to the overall decline in income inequality. Indeed, this reduction in segmentation was responsible for 8 percent of the decline in earnings inequality and for 6 percent of the decline in per capita income inequality.

6. The relative effectiveness of the minimum wage and *Programa Bolsa Família*

Previously in this study we have shown that a sizeable fraction of the recent decline in income inequality came from increases in the generosity of social security benefits, as well as from reductions in earning differentials by skill level, location and economic sectors.[42] The increase in social security benefits is linked to increases in the minimum wage. In Brazil, the minimum wage has a double function: it establishes a floor for social security benefits and for unskilled workers wages, especially in more traditional sectors. From 2001 to 2007, the minimum wage in real terms increased by 35 percent.[43] It is therefore natural to consider the minimum wage as one of the factors responsible for the greater generosity of government transfers and for the decrease of several earning differentials that, together, have contributed so much to the recent decline in income inequality. Indeed, several studies have argued that the recent increase in the real value of the minimum wage was responsible for a significant portion of the recent income inequality decline.[44]

There seems to be no doubt that marginal increases in the minimum wage reduce income inequality and, therefore, that the real increase in the minimum wage that occurred between 2001 and 2007 must have contributed to overall inequality decline during this period.[45] However, for the design of social policy, it is not enough to recognize that increases in the minimum wage can reduce inequality. It is also necessary to determine whether the minimum wage is, among the available instruments, the most effective.

In order to shed some light on this issue, this section presents an assessment of the effectiveness of the minimum wage when compared to one of its main alternatives: the *Programa Bolsa Família*.[46] More specifically, we contrast the impact that a 10 percent increase in the minimum wage would have on income inequality, with the corresponding impact that

42 On the association between the recent decline in inequality and the reduction in inter-sectoral wage differentials, as well as between metropolitan and non-metropolitan areas, see Ulyssea and Foguel (2006) and Barros, Franco and *Mendonça* (2007b).

43 This gain refers to the variation between May 1st 2001 and May 1st 2007.

44 In the case of the impact through government transfers, see Soares et al. (2007). In the case of the contribution through the labor market, see Cortez and Firpo (2007).

45 Among the studies of the impact of the minimum wage on Brazilian income distribution, it is worth mentioning Drobny and Wells (1983); Ramos and Almeida Reis (1995); Barros, Corseuil, Foguel and Leite (2000, 2001); Neri (2000); Fajnzylber (2001); Soares (2002); Neumark, Cunningham and Siga (2004) and Lemos (2005).

46 Barros and Carvalho (2006) also consider the comparisons of an increase in minimum wage with an expansion of *salário família* benefits.

would be achieved if the same amount of resources were allocated to increase the value of *Bolsa Família* benefits.[47]

The methodology used is based on counter-factual simulations, and it corresponds to an attempt to have an ex-ante evaluation of what would be the impact on income inequality of increasing the minimum wage and of increasing the value of *Bolsa Família* benefits. This methodology, by its counter-factual nature, has the advantage of allowing a perfect identification of the impact, but has the disadvantage of being able to consider only a few channels through which the minimum wage and *Bolsa Família* benefits may influence income inequality. Empirical studies, such as Barros et al. (2001), Fajnzylber (2001), and Neumark, Cunningham and Siga (2004), have the advantage of taking into consideration a much wider set of channels through which the minimum wage may operate. These studies, however, have greater difficulty in isolating the impact of the minimum wage from all other economic factors, such as economic growth and exchange rate devaluation, among others.

6.1 Standardizing the magnitude of interventions

At first, nothing prevents us from comparing the cost effectiveness of programmes with different costs and impacts. The existence of economies and diseconomies of scale may, however, make this comparison misleading. If there are diseconomies of scale, the impact of the programme will not grow proportionally to the resources allocated to it. In this case, the programme with more resources might seem less cost effective, just because of its scale. The opposite event can also occur if there are economies of scale. For this reason, we only compare the cost effectiveness of the minimum wage and the *Bolsa Família* programme in situations where they each receive an identical volume of resources. In such cases, since the two alternatives have the same cost, the most cost effective instrument will be the one with the greatest impact.

Once ensured that the amount of resources devoted to an increase in the minimum wage and *Bolsa Família* benefits are comparable, the relative effectiveness of the two instruments should not depend much on the chosen scale.[48] Thus, in order to facilitate our exposition, we established a 10 percent increase in the minimum wage and we increased the *Bolsa Família* benefits using the same exact amount of resources. We then simulated what would be each instrument's impact on income inequality.

Admittedly, the minimum wage influences the distribution of income through a variety of channels, some favourable (such as the increase in unskilled workers wages), and others unfavourable (such as the reduction in employment opportunities for unskilled workers or an increase in informality). At the risk of overestimating the effectiveness of the minimum wage, we ignore its negative impact on employment and informality, and assume that it is capable of raising wages near its value in both formal and informal sectors. Since, in Brazil, the minimum

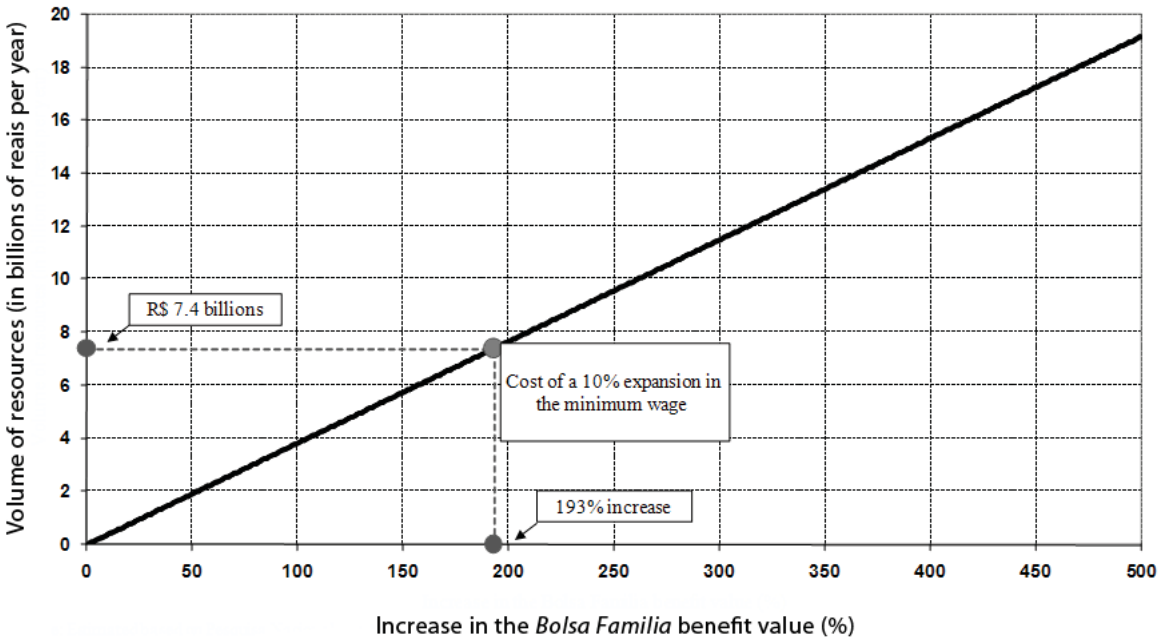
47 Per beneficiary.

48 If the importance of economies of scale is very distinct for the two instruments, the choice of scale can influence their relative effectiveness. In theory, *Programa Bolsa Família* could be more effective than the minimum wage for the same scale and less effective for others. In this study, we do not investigate the relative scale sensitivity of these two instruments.

social security benefit is also tied to the minimum wage, we take into account that increases in the minimum wage will raise the social security floor too by the same amount.

We estimate that a 10 percent increase in the minimum wage would have an annual cost of R$7.4 billion.[49] Of this total, more than half the additional costs are in social security (R$3.9 billion). In order to standardize the amount of resources used, we identified the increase in *Bolsa Família* benefits that would require the same amount of resources. The correlation between increases in *Bolsa Família* benefits and the volume of resources required is presented in figure 14. This figure shows that the same R$7.4 billion that is needed to raise the minimum wage by 10 percent would allow an increase in *Bolsa Família* benefits by three times their current value. Such an increase in *Bolsa Família* benefits would certainly have a variety of direct and indirect effects on income inequality. In this study, however, we'll only be considering its direct impact.[50]

Figure 14, Correspondent increase in the *Bolsa Família* benefit value



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2005.

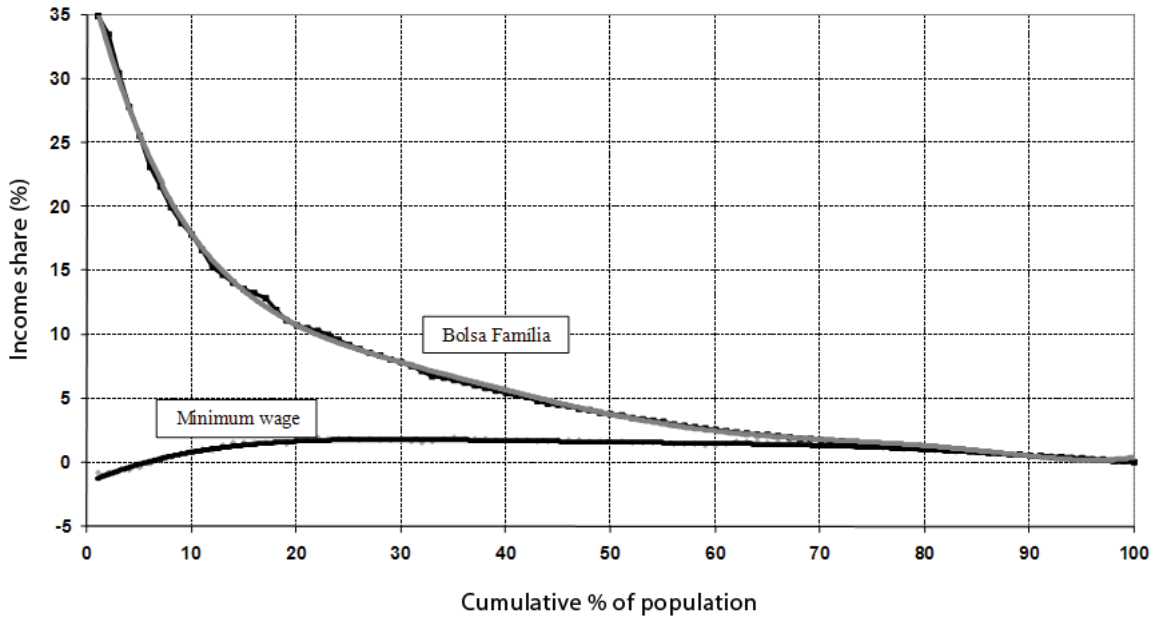
49 This includes the cost to the federal government and private sector employers.

50 To calculate this, one asumes an increase in the minimum wage and knowing by assumption who will be benefited by this (e.g., pensioners receiving around the minimum wage, workers earning a wage around the minimum wage, and so on) one estimates by how much total income will increase. A 10 percent increase in the minimum wage will increase family income by 7.4 billion Reales. Dividing this by the total value of *Bolsa Família* transers, we estimate by how much the benefit of *Bolsa Família* must increase to generate the same increase in family income. (The number of people who actually receive *Bolsa Família* (the latter is obtained by checking which households receive an amount of 'other income' which is typical of the size of the *Bolsa Família* transfer (15, 30, 45, etc., Reales per month)).

6.2 *Comparing the effectiveness of the minimum wage with Programa Bolsa Família*

Figure 15 presents the impact on the income share of the poorest α% (Lorenz Curve), of (1) a 10 percent increase in the minimum wage, and (2) the equivalent increase in *Bolsa Família* benefits if the same amount of total resources needed to support an increase of 10 percent in the minimum wage were devoted to this programme. Since the amount of resources being used is identical, this figure allows us to directly evaluate the relative effectiveness of the two instruments. The most effective will be the one with the greatest impact.

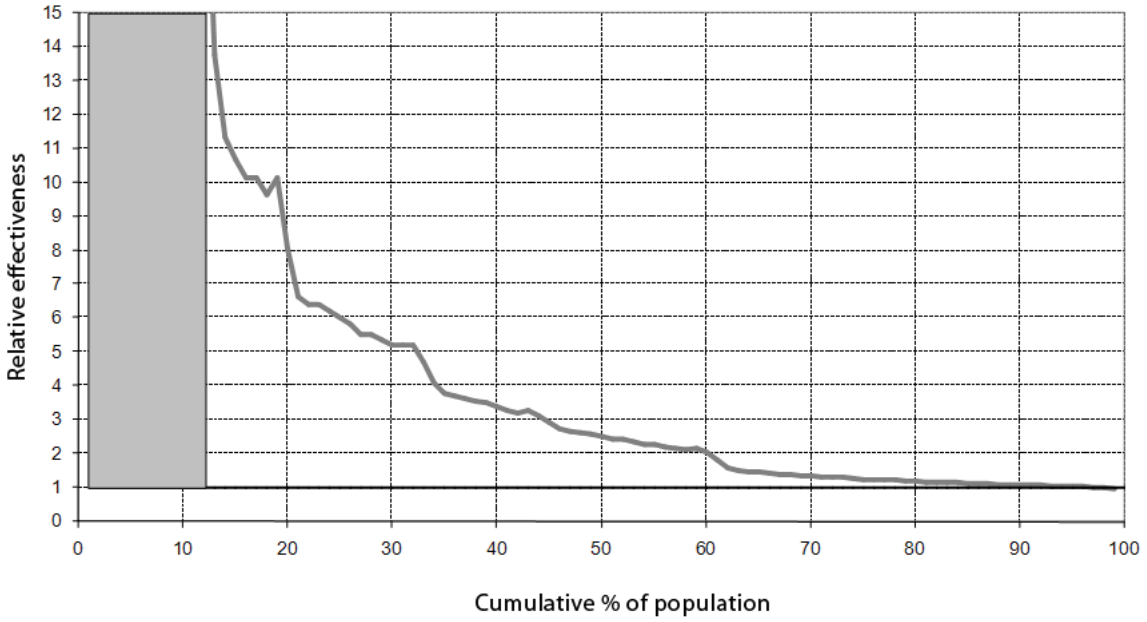
Figure 15, The impact of increasing minimum wage and benefits from the *Bolsa Família* program on the income share of the poorest percentiles



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2005.

The increase in *Bolsa Família* benefits leads to an overall increase in the income share of the poorest α%, regardless of the point chosen in the distribution (α). Therefore, it unambiguously reduces inequality. The increase in the minimum wage, however, has an ambiguous impact on inequality. Indeed, an increase in the minimum wage reduces the income share of the poorest percentiles. Hence, not every measure of inequality will decline as a result of an increase in the minimum wage. For example, a 10 percent increase in the minimum wage would reduce the income share of the poorest 5 percent by 0.7 percentage points.

Figure 16, Relative effectiveness of increasing the minimum wage and the benefits of *Bolsa Família* program to increase in the income share of the poorest



Source: Estimates based on Pesquisa Nacional por Amostra de Domicílios (PNAD), 2005.

In order to compare the effectiveness of the instruments, figure 16 presents their relative effectiveness.[51] As this figure shows, increasing *Bolsa Família* benefits is more effective than increasing the minimum wage, in raising the income share of the poorest α%, regardless of the point chosen in the distribution. Therefore, *Bolsa Família* is unambiguously more effective than the minimum wage in reducing inequality.

51 The effectiveness is calculated as the ratio between the two curves in figure 15 for the corresponding centile.

7. Conclusion

Since 2000, income inequality in Brazil has been declining steadily and sharply. As a consequence, per capita income of the bottom 10 percent of the population has been increasing at very high rates (7 percent per year), well above national average. Extreme poverty has been declining at three times the necessary pace to meet the first MDG, and more than one half of this decline originated from reductions in income inequality. Never have reductions in inequality played such an important role in fighting poverty. Brazil has experienced two previous episodes of large reductions in poverty.[52] In both cases, however, poverty reduction was entirely due to balanced economic growth. The decline in inequality in both these previous episodes was minimal. This study has sought to identify the factors responsible for the recent decline in inequality, in particular the role of market forces, public policy and institutions.

The analysis suggests that the recent decline in inequality resulted from three main factors: (1) an increase in contributory and non-contributory government transfers, (2) a decline in wage differentials by educational level and reductions in the inequality in education caused by an accelerated expansion of labour force educational level, and (3) an improvement in spatial and sectoral integration of labour markets, in particular among metropolitan and non-metropolitan areas.

The greater generosity of government transfers and the fast expansion of education were certainly a direct consequence of public policies implemented over the last 15 years. The reductions in the labour earnings differentials and the greater spatial and sectoral integration of labour markets are clearly market responses. It remains debatable, nevertheless, whether or not these reductions in labour earnings differentials were also influenced by increases in the real value of the minimum wage.

Regardless of the contribution attributed to the increase in the minimum wage, it is undeniable that a shift in the pattern of economic growth towards more balanced regional and sectoral growth must also have contributed to the greater integration of Brazilian labour markets. Indeed, over the last decade, probably as a response to the opening up of the Brazilian economy, and facilitated by the increase in workers' educational level outside large metropolitan areas, a sizeable fraction of Brazil's economic activity moved towards non-metropolitan areas. According to IPEA, IBGE, and UNICAMP (2002), while the metropolitan areas and large cities (over 500,000 inhabitants) lost share in GDP between 2002 and 2005, the medium cities (between 100 and 500 inhabitants) had the best performance by increasing their participation in GDP by more than 1 percentage point.

In addition, government expenditures have likely become less concentrated in the country's more developed areas, particularly due to the increasing importance of targeted government transfers. This shift in government expenditure towards less developed and remote areas fostered local labour markets, hence promoting regional integration.

Brazil's recent success in effectively reducing inequality and poverty is undeniable. However, despite this progress, the magnitude of inequality in the country is still high. According to this study, almost two additional decades of similar progress would be necessary for Brazil's

52 The 'Brazilian miracle' in the 1970s and more recently the 'Real Plan' are important examples.

level of inequality to align with the world average. As a result, these recent declines in poverty and inequality can only be perceived as a very important first step in a long journey.

The sustainability of this unprecedented equalization process should be of serious concern for Brazilian society and policy makers. Up to this point, income inequality reductions were accomplished alongside increases in government expenditure. Actually, very few hard policy choices had to be faced. For instance, Brazil substantially increased the real value of the minimum wage and basic social security benefits and, at the same time, had to implement a bold non-contributory social assistance programme (*Bolsa Família*). It remains to be seen, therefore, what Brazil's capacity is for making the hard choices necessary to keep equalization going over periods of serious fiscal constraints.

Moreover, the very policies that have been so effective in reducing inequality are now beginning to show increasing signs of exhaustion. Major evidence of this is the decline in the absolute income of the poorest 5 percent in 2007, a year with an otherwise significant increase in overall per capita income and a substantial reduction in the Gini coefficient. Hence, to ensure the sustainability of the equalization process, Brazilian social policy also needs to adjust quickly to challenges posed by the ever changing face of poverty in the country.

The design of Brazilian social policy is still far from optimum. A very active minimum wage policy continues to be pursued, despite the fact that increases in the minimum wage are much less effective in reducing inequality than expansions in *Bolsa Família* benefits (as we have shown in section 6). Moreover, poverty is still 10 times greater among children than among the elderly, but the average non-contributory public transfer for an elderly person is at least 20 times greater than the average non-contributory public transfer for a child.[53] This suboptimum nature of Brazilian social policy has two interrelated implications. On one hand, it is one cause of the persistent high levels of inequality and poverty. On the other hand, optimizing social policy design gives Brazilian policy makers plenty of room to further reduce inequality, without the need of additional resources.

Maintaining the recent fast pace of equalization is certainly a major challenge for Brazilian public policy. Hard choices, leading to a better allocation of resources, will have to be made if the increase in government expenditures is to be contained. Equally important, policy makers will need to redesign existing policies to take into consideration the changing face of poverty, and thus keep policy effective in fighting inequality.

53 In Brazil, households with elderly members in general have no children and households with children have no elderly members, so the transfers to grandchildren are already taken into account in the households with children.

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