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Markets, the State, and the Dynamics of Inequality in Brazil

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Brazilian income inequality has been the subject of a large number of studies[1] that for more than four decades 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 .9 and 43.5 percent, respectively.[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 a year and in 2007, income inequality reached its lowest level in more than 30 years (figure 6-1).[3]

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 a year, nearly three times the national average of 2.5 percent. As a result, Brazil has accomplished the first Mil-

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

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

3. As Alvaredo and Piketty show in chapter 4 of this volume, for other countries survey-based inequality measures underestimate the income share at the top, and Brazilian surveys are not exception. Thus, the "true" Gini is likely to be higher than the one reported in figure 6-1.

Figure 6-1. *Evolution of Income Inequality in Brazil, Measured by the Gini Coefficient, 1977–2007*
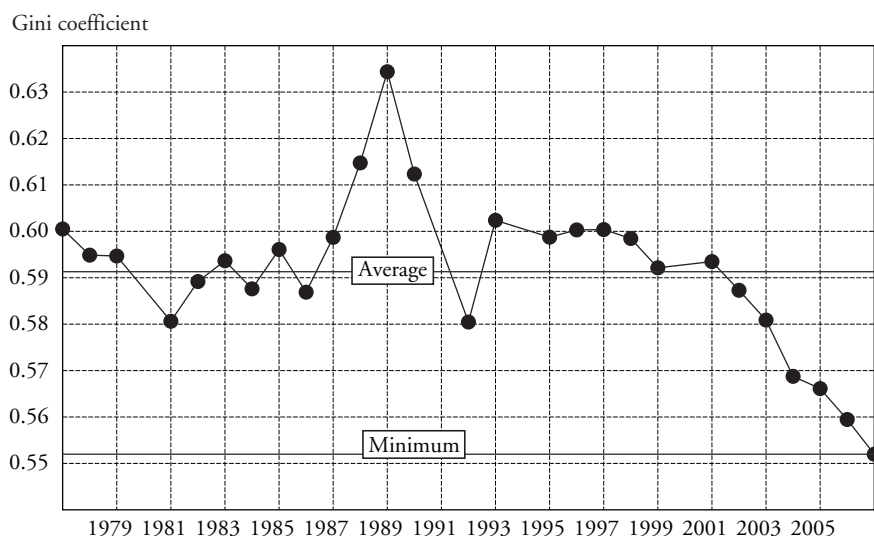
Gini coefficient

Source: Authors' estimations based on Pesquisa Nacional por Amostra de Domicílíos (PNAD), 1977 to 2007.

lennium Development Goal (MDG)—*to reduce by half the proportion of the population living in extreme poverty*—almost ten years in advance. Not only was the recent decline in extreme poverty three times faster than necessary to achieve the first MDG by 2015, but also, more than 60 percent of the decline was due to the reduction in inequality, demonstrating the importance of the recent decline in inequality for the extremely poor.

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 a consequence of neither a coherent set of government policies nor properly functioning markets. Indeed, Brazil's success in reducing income inequality is the net result of a social policy that still has serious inconsistencies and a mix of well-functioning markets and market failures. That 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 chapter 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: changes in government transfers; changes in wage differentials by skill level; changes in labor market segmentation; and changes in the minimum wage. Of the main proximate factors influencing the level of inequality (demography, nonlabor income, employment, and productivity), we identify which con-

tributed the most to the recent reduction in inequality. Finding that nonlabor income plays a central role in reducing inequality, we provide a detailed analysis of its various components, in particular public transfers. We then address the contribution of changes in labor income—in particular the connection between education expansion and the decline in wage inequality—and how and to what extent the growing integration of labor markets has contributed to the reduction in labor income inequality. Finally, we analyze the impact of changes in the minimum wage on income distribution and compare their impact with what could be achieved if the same amount of resources were allocated to an expansion of the conditional cash transfer program Bolsa Família.

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 a year (figure 6-1). Of the seventy-four countries for which we have data, less than one-fourth were able to reduce inequality faster than Brazil. For that period, there is "Lorenz dominance," meaning that the decline is unambiguous and that all inequality measures satisfying the Pigou-Dalton principle show a decline. The fall in inequality also is statistically significant: there is a 1 percent probability or less of having observed the decline in the Gini if the "true" change were no change (Barros and others 2009a).

However, if we break the 2001–07 period into subperiod 2001–04 and subperiod 2004–07, during the latter period 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. That change is especially clear when attention is focused on 2006–07. Even though the Gini coefficient held to its historical path in 2007 and overall per capita income increased almost 3 percent 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 a reduction in inequality. If inequality had not changed between 2001 and 2007, both the income of the rich and that of the poor would have grown at the national rate: 2.6 percent a year. Since the income of the poorest 10 percent actually grew 7.0 percent a 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 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)[4] declined between 25 percent and 40 percent from 2001 to 1007.[5]

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4. We used regionalized poverty and extreme poverty lines.

5. The 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, the reduction in extreme poverty is three times faster than would be necessary to comply with the first MDG. At the current pace, it would be pos-

As a result of the 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 did 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 (extremely 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 the reduction in the volume of resources necessary to alleviate poverty and the growth in overall income, alleviating poverty in Brazil has become an even more viable goal. While in 2001 at least 7 percent of total household income was needed to eliminate (extreme and moderate) poverty,[6] in 2007 only 4 percent was required. If inequality had not declined, the poverty headcount would have gone down by 5.3 percentage points; since the headcount declined by almost 11 percentage points, half of the reduction in the headcount can be attributed to the decline in inequality. The impact of inequality reduction on extreme poverty was greater: 62 percent of the decrease in extreme poverty was due to the reduction in inequality.

The faster income growth for the poor is characteristic of an equitable growth process. Whenever growth is accompanied by a reduction in inequality, the income of the poor grows above the average. Almost two-thirds of the income growth among the poorest 10 percent from 2001–07 resulted from the decline in inequality. That equitable growth process also led to a significant reduction in the level of absolute poverty. The proportion of people living in extreme poverty declined 7 percentage points from 2001 to 2007, a rapid pace of poverty reduction in Latin America that trails only Mexico's. Brazil has experienced previous episodes of poverty decline; however, declines were due solely to economic growth. In this recent episode, unlike in previous ones, at least half of the decrease in poverty and extreme poverty was due to the reduction 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. The results demonstrate that reductions in inequality can be an extremely effective instrument for reducing poverty. In fact, in order to achieve the same reduction in extreme poverty 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 a year. From the point of view of the extremely poor, a 1.0 percentage point reduction in the Gini coefficient is equivalent to 4.2 percentage points higher growth in per capita income.

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sible to reduce extreme poverty in Brazil by half in 8 years, while the MDGs establish a period of 25 years to reach that goal. Second, these reduction rates are greater than those observed in all Latin American countries for which information is available, with the exception of Mexico.

6. Total household income as recorded in the PNAD (Pesquisa Nacional por Amostra de Domicílios) surveys and not in the National Accounts.

Proximate Determinants of the Decline in Income Inequality

To identify and quantify the proximate determinants that contributed to Brazil's recent decline in inequality we relied on a series of counterfactual simulations. The proximate determinants considered in our analysis are ratio of adults to total number of members in the household; household nonlabor income (which includes government transfers) per adult; proportion of adults working to total number of adults in the household; and labor income per working adult. Attention is given to both changes in the distribution of each of those factors and changes in their association or correlation. It is worth emphasizing that here our analysis is limited to the proximate determinants of inequality. It is important to emphasize that although the analysis is limited to the identification of the proximate determinants, this is only a first step[7] to identify the factors that contributed the most to Brazil's decline in inequality and therefore deserve a more in-depth analysis. However, each proximate determinant is, in turn, the result of behavioral and external processes that are not modeled here.

The empirical analysis presented here is based on the following sequence of identities:

$$(1) \qquad\qquad y = a.r$$
$$(2) \qquad\qquad r = o + t$$
and
$$(3) \qquad\qquad t = u.w$$
Hence,
$$(4) \qquad\qquad y = a.(o + u.w)$$

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 nonlabor income per adult, o, and household labor income per adult, t. Identity (3), labor income per adult, t, is expressed as the product of the proportion of working adults, u, and the labor income per working adult in the household, w. Identity (4) relates per capita household income, y, to its four proximate determinants: the proportion of adults in the household, a; household nonlabor income per adult, o; proportion of working adults, u; and labor income per working adult in the household, w. Visually, the identities are presented in figure 6-2.

It is important to point out that because the expression is an identity, any changes in the income distribution must be related to changes in the joint distribution of the four proximate determinants. Thus, here we identify all the proximate channels that lead to reductions in inequality.

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

Figure 6-2. *Household Per Capita Income and Its Determinants*
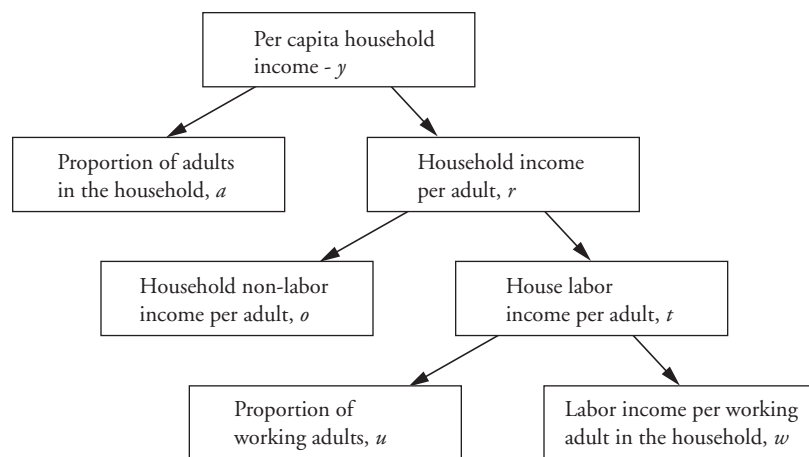
Source: A similar figure can be found in Barros, Foguel, and Ulyssea (2006) and Herrán (2005).

Barros and others (2006b) presents the methodology for decomposing varia-tions in the level of inequality due to variations in the marginal distribution of each determinant and its correlation with other determinants. The results can be found in tables 6-1a through 6-1c. 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 6-2 we present the evolution of each proximate determinant fac-tor's average and the level of inequality associated to its distribution.[8]

The importance of demographic factors and income per adult

Table 6-1a 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 to 2007. Its relatively small contribution can be explained by the nature of the demographic changes that occurred during that period. As shown in table 6-2, although the proportion of adults in the household increased by 5 per-cent between 2001 and 2007, the inequality in the distribution of the proportion of adults declined by only 5 percent to 6 percent. In contrast, the decline in income inequality was 4 to 5 times larger using the same inequality measure.[9]

8. 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 that measure because a large fraction of the population does not receive any income from nonlabor income. In this case, the average income for the bottom 20 per-cent or 40 percent is null and measures such as the ratio between the top and bottom 20 percent could not be obtained.

9. It is worthwhile to point out that this assessment takes into account only the direct contribution of demographic factors. Inasmuch 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.

Table 6-1a. *Contribution of the Proportion of Adults in the Household, Household Income per Adult, and Associations to Explain Income Inequality Reduction between 2001 and 2007*

Counterfactual simulations	*Inequality (Gini coefficient)*	*Contribution to the inequality reduction (percent)*	*Inequality (ratio 20+/20–)*	*Contribution to the inequality reduction (percent)*	*Determinants*
Original situation in 2001	59.3	...	26.9	...	
If the distribution of household income per adult and the proportion of adults were the same in 2007 as in 2001	59.5	–4	27.0	–1	Association between the proportion of adults in the household and household income per adult
If the distribution of household income per adult was the same in 2007 as in 2001	59.2	7	26.4	8	Proportion of adults in the house
Original situation in 2007	55.2	97	20.2	93	Distribution of household income per adult

Source: Authors' estimations based on the Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Table 6-1b. *Contribution of Labor and Nonlabor Income per Adult and Associations to Explain Income Inequality Reduction between 2001 and 2007*

Counterfactual simulations	Inequality (Gini coefficient)	Contribution to the inequality reduction (percent)	Inequality (ratio 20+/20–)	Contribution to the inequality reduction (percent)	Determinants
Original situation in 2001	59.3	...	26.9	...	
If the distribution of household income per adult and the proportion of adults were the same in 2007 as in 2001	59.5	–4	27.0	–1	Association between the proportion of adults in the household and household income per adult
If the distribution of household income per adult was the same in 2007 as in 2001	59.2	7	26.4	8	Proportion of adults in the household
If the distributions of labor income per adult and nonlabor income per adult were the same in 2007 as in 2001	58.8	10	25.7	11	Association between labor income per adult and nonlabor income per adult
If the distribution of labor income per adult was the same in 2007 as in 2001	57.1	40	22.3	51	Distribution of household nonlabor income per adult
Original situation in 2007	55.2	46	20.2	31	Distribution of household labor income per adult

Source: Authors' estimations based on the Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Table 6-1c. *Contribution of the Percentage of Working Adults, Labor Income per Adult Worker, and Associations to Explain Income Inequality Reduction between 2001 and 2007*

Counterfactual simulations	Inequality (Gini coefficient)	Contribution to the inequality reduction (percent)	Inequality (ratio 20+/20–)	Contribution to the inequality reduction (percent)	Determinants
Original situation in 2001	59.3	...	26.9	...	
If the distribution of household income per adult and the proportion of adults were the same in 2007 as in 2001	59.5	–4	27.0	–1	Association between the proportion of adults in the household and household income per adult
If the distribution of household income per adult was the same in 2007 as in 2001	59.2	7	26.4	8	Proportion of adults in the household
If the distributions of labor income per adult and nonlabor income per adult were the same in 2007 as in 2001	58.8	10	25.7	11	Association between household labor income per adult and household nonlabor income per adult
If the distribution of labor income per worker was the same in 2007 as in 2001	57.1	40	22.3	51	Distribution of household nonlabor income per adult
If the distribution of labor income per worker and the proportion of working adults were the same in 2007 as in 2001	57.4	–7	23.2	–13	Association between the proportion of working adults and household labor income per worker
If the distribution of labor income per workerwas the same in 2007 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 labor income per adult worker in the household

Source: Authors' estimations based on the Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Table 6-2. *Evolution of Per Capita Income Distribution and Its Determinants, Brazil, 2001 and 2007*

	2001			2007			Percent variation (2007–01)		
Determinant	*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
Nonlabor income per adult	122	. . .	214	146	. . .	26	19	. . .	–88
Labor 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
Labor income per working adult	829	21.0	2.1	862	17.3	1.7	4	–18	–17

Source: Authors' estimations based on the Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

a. Income is expressed in 2007 reais (R$).

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The association between proportion of adults in the household and household income per adult did not contribute to explaining the decline in income inequality from 2001 to 2007. In fact, the impact of the correlation on inequality was negative (table 6-1a), indicating that changes in this correlation were unequalizing. If the correlation between the proportion of adults and income per adult had been held constant, the decline in income inequality would have been greater. As table 6-1a reveals, practically all the recent decline in income inequality was caused by changes in the distribution of household income per adult. According to table 6-2, the recent changes in that 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 percent to 25 percent).

The relative importance of labor income and nonlabor income

Given the importance of changes in the distribution of income per adult, the next step is to decompose its contribution. As already mentioned, household income per adult can be expressed as the sum of nonlabor and labor income per adult, . 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 6-1b show that depending on the measure of inequality, between 40 and 50 percent of the recent decline in income inequality was due to changes in the distribution of nonlabor income per adult. The impact of its distribution on income inequality resulted from both a large reduction in the level of inequality and growth in its share in the total household income[10] (see table 6-2).[11]

Changes in the distribution of labor income per adult can explain 31 percent to 46 percent of the decline in inequality (see table 6-1b). Table 6-2 shows that this contribution resulted from both considerable growth in labor income per adult (9 percent in the period) and a moderate reduction in the level of inequality (6 percent to 15 percent). The change in the association between labor and nonlabor income per adult also was of some importance, explaining 11 percent of the recent reduction in inequality.[12]

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

11. We investigate this contribution and the role of expansions in government transfers in particular in greater detail later in the chapter.

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

The importance of the proportion of working adults and the labor income per worker

As shown, almost half of the recent decline in income inequality resulted from changes in the distribution of labor income per adult. Because labor income per adult is the product of the proportion of working adults and the labor income per working adult in the household ($t = u.w$), its overall contribution is derived from changes in the marginal distribution of those two factors or from changes in the correlation between them.

As shown in table 6-2, from 2001 to 2007, despite the sizable increase (4 percent) in the proportion of working adults, the reduction in inequality of access to jobs was very limited: between 4 to 6 times smaller than the corresponding reduction in overall income inequality. Consequently, changes in the distribution of the proportion of working adults (with a contribution of below 5 percent) were not important in explaining the decline in income inequality (see table 6-1c).

Changes in labor income per working adult in the household, however, were significant, showing important effects 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 labor income per working adult. That important contribution came, essentially, from a substantial reduction in inequality of labor income among workers. According to table 6-2, between 2001 and 2007, the decline in labor 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 of income to the bottom 20 percent of income, inequality in labor income per worker declined by 18 percent; using the same measure of inequality, per capita income inequality declined by 25 percent. In contrast, changes in the correlation between the proportion of working adults and household labor income per worker were unequalizing. The fact that changes in the correlation between those two determinants had negative impacts on overall inequality, despite the recent large employment increase, indicates that workers from relatively poor households were not among those who benefited the most from job creation during 2001–07.

The Contribution of Changes in Public Transfers to the Fall in Income Inequality

As shown, at least half of the recent sharp decline in inequality is related to changes in the distribution of nonlabor income.[13] Between 2001 and 2007, the proportion of Brazilians living in households receiving some nonlabor income rose from

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13. See Barros and others (2006a, 2006d); Hoffman (2006a, 2006d); Soares and others (2007), among others.

42 percent to 52 percent (see table 6-3). It is worth mentioning that despite the sharp increase in coverage, the share of nonlabor 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,[14] there is consensus that a sizable fraction of the recent decline in inequality originated from changes in nonlabor income.[15] In chapter 3 of this volume, James Robinson argues that the "surge" in public transfers is associated with the PT (a Social Democratic leftist party) winning the presidential elections. However, regardless of the political economy dynamics that produced this result, the first thing to know is the extent to which expansion of the coverage and benefits of programs targeting the poor accounted for the observed decline in inequality. Here we decompose the impact of nonlabor income by source in order to isolate the contribution of changes in the distribution of income from the following nonlabor income sources: assets (rents, interest, and dividends); private transfers (for example, remittances); and public transfers. Since public transfers account for more than 80 percent of households' nonlabor income (see table 6-4)[16] and the percentage of the population in households with at least one beneficiary has increased by 10 percentage points since 2001 (see table 6-3), public transfers will receive priority in our analysis. We use a procedure proposed by Barros and others (2007) to decompose the contribution of changes in nonlabor income by source.

We decomposed nonlabor income into seven sources. Two are from assets (rents; interest and dividends); two from private transfers (transfers from nonresidents; other pensions); and three from public transfers (pensions and other standard contributory social security benefits; Benefício de Prestação Continuada; Bolsa Família and similar programs (see figure 6-3).[17] Benefício de Prestação Continuada (BPC) is a transfer based on the constitutional right of people age 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

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

15. The impact estimates for the 2001–05 period vary from 20 percent, according to Hoffmann (2006d), to 50 percent, according to Barros and others (2006a, 2006d). For the 2001–04 period, Hoffman (2006a) finds a contribution of 25 percent and Soares and others (2007) finds 27 percent.

16. The composition of household income varies according to the source of information. Given the PNAD's larger underestimation of income from assets, the contribution of public transfers tends to be larger in this source than in Pesquisa de Orçamentos Familiares (POF). For a comparative analysis of the composition of nonlabor income using these two surveys and the National Accounts, see Barros, Cury, and Ulyssea (2006).

17. Among similar programs are Bolsa Escola, Bolsa Alimentação, Cartão Alimentação, Auxílio Gás, and Programa de Erradicação do Trabalho Infantil (PETI). Unfortunately, this breakdown of nonlabor income does not follow immediately from the PNAD data set. The methodology used to construct this income aggregate is adapted from the one proposed by Barros, Carvalho, and Franco (2007)

(FNAS).[18] Bolsa Família, managed by the same ministry, is a conditional cash trans-
fer provided to poor families on condition that they ensure that children and ado-
lescents attend school and that they meet basic health care requirements, such as
having children under the age of 6 years vaccinated and, in the case of pregnant
women and lactating mothers, attending pre- and postnatal care sessions. The pro-
gram attempts both to reduce short-term poverty by direct cash transfer and to
fight long-term poverty by investing in the human capital of the poor. The bene-
fits paid by the program range from R$20 to R$182, depending on monthly
income per person in the family and the number of children and adolescents up to
the age of 17 years. It reaches 11 million families, more than 46 million people, a
large proportion of the country's low-income population.[19]

Table 6-3 shows that according to PNAD (Pesquisa Nacional por Amostra de
Domicílios) (2007), almost 25 percent of total household income comes from non-
labor sources, of which transfers, especially public transfers, are the most impor-
tant.[20] Indeed, as table 6-4 shows, public and private transfers together represent
90 percent of all nonlabor income. The remaining nonlabor income is constituted
by rents (6 percent) and interests and dividends (3 percent).[21]

Analyzing transfers in more detail (see tables 6-3 and 6-4), we find that 90 per-
cent are public. Pensions and retirements represent 95 percent of all public trans-
fers; Bolsa Família and Benefício de Prestação Continuada 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]

Identifying recent changes in nonlabor income

As already mentioned, about half of the recent decline in income inequality was
due to changes in the distribution of nonlabor income. Later in the discussion we
estimate and analyze the individual contribution of each of the seven nonlabor
income sources in reducing inequality. Meanwhile, in order to make the outcome

18. For more information, see Benefício de Prestação Continuada de Assistência Social (BPC) (www.
mds.gov.br/programas/rede-suas/protecao-social-basica/beneficio-de-prestacao-continuada-bpc).

19. For more information, see Programa Bolsa Família (www.mds.gov.br/bolsafamilia/o_programa_
bolsa_familia). In 2007, the number of extremely poor people was 18.4 million (10.2 percent) and the total
number of poor people (extremely plus moderately poor) was 50.6 million (28 percent). Poverty figures
were estimated using an extreme poverty line equal to R$87.6 a month and a moderate poverty line equal
to R$175.1 a month. Brazil does not have official poverty lines. Barros and others (2009b).

20. According to Pesquisa de Orçamento Familiar (POF) and Contas Nacionais (National Accounts),
the contribution of labor income is smaller. A significant fraction, however, is due to imputed rents for
households living in houses that they own. See Barros, Cury, and Ulyssea (2006).

21. The income from assets is clearly underestimated in PNAD. Barros, Cury, and Ulyssea (2006) esti-
mated that the aggregate value of asset income is four times larger in according to National Accounts than
according to PNAD.

22. It is worth emphasizing that because PNAD does not take sporadic sources of income into con-
sideration, it also ends up not capturing some important public transfers, such as Seguro Desemprego and
Abono Salarial. PNAD therefore underestimates the total value of public transfers.

Table 6-3. *Decomposition of Household Per Capita Income by Source, Brazil, 2001 and 2007*

Source of income	Per capita income (in R$ per month)		Percent variation (2007–01)	Percent of total household income			Percentage of people in households that receive nonlabor income		
	2001	2007		2001	2007	Variation (2007–01, in percentage points)	2001	2007	Variation (2007–01, in percentage points)
Total income	458.8	532.6	16	100	100	…	…	…	…
Labor income	357.3	409.7	15	77.9	76.9	–1.0	…	…	…
Nonlabor 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 nonresidents	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	0.3	2.7	715	0.1	0.5	0.4	0.5	2.5	2.0
Bolsa Família and related programs	0.9	2.8	195	0.2	0.5	0.3	6.5	16.9	10.4

Source: Authors' estimations based on the Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Table 6-4. *Decomposition of Household Nonlabor Income by Source, Brazil, 2001 and 2007*
Percent

Income source	Nonlabor per capita income			Per capita income from transfers			Per capita income from public transfers		
	2001	2007	Variation (2007–01, in percentage points)	2001	2007	Variation (2007–01, in percentage points)	2001	2007	Variation (2007–01, in percentage points)
Nonlabor 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	...	...	...
Transfers from nonresidents	3.1	2.3	−0.7	3.5	2.6	−0.9	...	...	...
Pensions	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	77.4	77.8	0.4	87.6	85.7	−1.9	98.4	94.6	−3.8
Benefício de Prestação Continuada	0.3	2.2	1.8	0.4	2.4	2.0	0.4	2.6	2.2
Bolsa Família and related programs	0.9	2.3	1.3	1.1	2.5	1.4	1.2	2.8	1.6

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

Figure 6-3. *Source of Total Income*
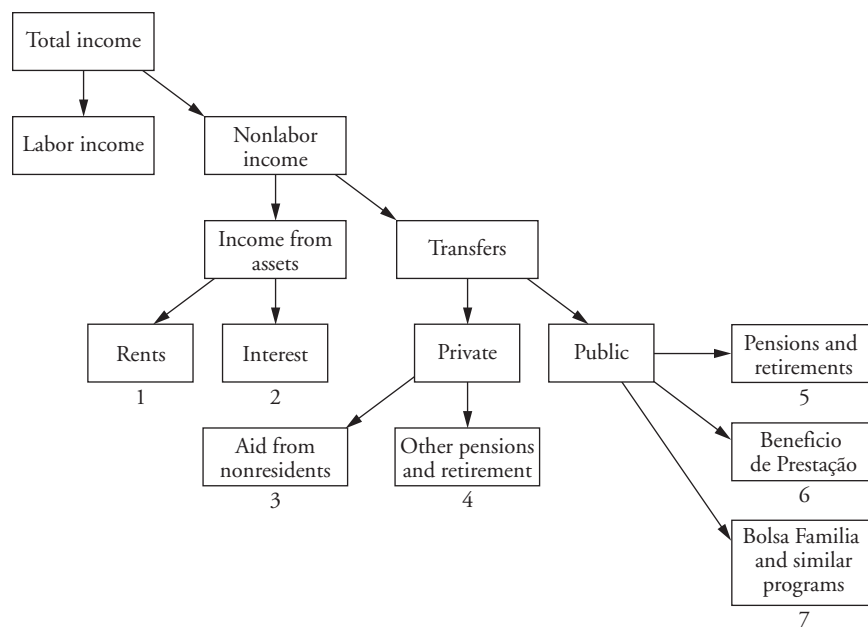
of this decomposition more transparent, and facilitate its interpretation, we present a short description of the changes that took place in the distribution of each one of these seven nonlabor income sources since 2001.

—*Coverage.* Despite the fact that nonlabor income represents only one-fourth of total household income, it is not concentrated in a few households. On the contrary, more than half of all Brazilians (52 percent) live in households that receive some sort of nonlabor income. Public transfers are the main factor in that broad coverage: 45 percent of all Brazilians live in households that receive some sort of public transfer (see table 6-3).

Of 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 noncontributory benefit) increased steadily, reaching 17 percent in 2007. Although the amount of resources transferred through BPC is similar to the amount transferred by Bolsa Família, the number of Brazilians in households that benefit from Bolsa Família is 7 times greater than the number in households that receive BPC (table 6-3). From 2001 to 2007, the coverage rate of nonlabor income grew 10 percentage points, increasing 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 6-3).

—*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 that source) and the average benefit among those receiving it. We previously reviewed the recent evolution of coverage of contributory social security, BPC, and Bolsa Família; here we analyze the average benefit among recipients of income from each of those sources.

As table 6-5 shows, contributory social security or pensions (R$324 per capita) is the nonlabor income source with the highest per capita value among households with at least one recipient. Bolsa Família (R$15–R$16 per capita) is the nonlabor income source with the lowest per capita value. The average benefit from Bolsa Família is much smaller even when compared with other noncontributory transfers, like BPC. As a matter of fact, the per capita BPC benefit among households with at least one recipient is 6 times greater than the corresponding benefit from Bolsa Família.

During the 2001–07 period, the amount of all public transfers increased, particularly among those indexed to the minimum wage (BPC and contributory social security benefits). As table 6-5 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, per capita income among households with at least one recipient did not increase significantly for all other nonlabor income sources. Transfers from nonresidents were an exception; they increased 10 percent.

—*Income share.* All nonlabor 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 nonlabor 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. Table 6-5 presents this decomposition for each nonlabor income source.

The table reveals that from 2001 to 2007 most nonlabor income sources increased their share of total income by expanding coverage. In fact, the increase in the share of overall nonlabor 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 noncontributory public transfers (like BPC and Bolsa Família) in total income was caused by expanding

Table 6-5. *Evolution of Nonlabor Income (Average and Share), Brazil, 2001–07*

	Per capita value of nonlabor income sources among households with at least one recipient			Decomposing the share evolution of each nonlabor income source		
Income source	*2001*	*2007*	*Percent variation (2007–01)*	*Due to coverage*	*Due to average benefit*	*Total*
Nonlabor 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 nonresidents	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	69	107	55	79.1	20.9	100
Bolsa Família and related programs	15	16	13	88.6	11.4	100

Source: Authors' estimations based on the Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

Table 6-6. *Contribution of Nonlabor Income Sources to Overall Income Inequality Decline, Brazil, 2001–07*

Income source	2007 Gini coefficient	2007 Gini with the distribution of the source complement of 2001Gini	2001 Gini coefficient	Percent contribution of each income source
Total income	0.552		0.593	
Labor income		0.568		62
Nonlabor 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 nonresidents		0.594		−1
Pensions and retirements		0.593		2
Public		0.573		49
Pensions and retirements		0.582		28
Benefício de Prestação Continuada		0.589		10
Bolsa Família and related programs		0.588		13

Source: Authors' estimations based on the Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

coverage. The only important exception to this rule was 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.

Contribution from nonlabor sources to the fall in income inequality

Here we analyze the impact that changes in each component of nonlabor income had on the recent decline in inequality.[23] We compare the Gini coefficients for 2001 and 2007 with counterfactual simulations designed to capture what would have happened if the distribution of each nonlabor income source had not changed during that time. From the difference between the actual decline in inequality and the decline in the counterfactual scenarios, we obtain estimates of the impact of each nonlabor income source on the reduction in overall inequality. The results are presented in table 6-6.

Confirming the results obtained previously, the estimates reveal that half of the recent decline in inequality (over the 2001–07 period) was due to changes in the

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

distribution of nonlabor income. That is a very significant result, considering that nonlabor income represents only one-fourth of total household income.

The decomposition by type of nonlabor income source is even more revealing. As expected, the impacts of changes in the distribution of income from assets (rents; interest and dividends) and private transfers were limited. Most of the impact of nonlabor income on the reduction of overall income inequality was due to the recent changes in the distribution of public transfers, which explain 49 percent of the total decline in inequality. Although both contributory and noncontributory 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 noncontributory benefits like BPC and Bolsa Família also were important. Despite representing just a tiny fraction of total household income (0.5 percent), each of these noncontributory benefits explains about 10 percent of the overall decline in income inequality.

Labor Earnings Inequality and Education

As shown, the fall in labor income inequality accounted for about half of the reduction in overall income inequality. The fall in labor income inequality, in turn, was due primarily to the fall in inequality in the distribution of labor income per working adult. One factor that may explain that trend could be changes in access to education. The last decade was marked by the accelerated expansion of access to education in Brazil, an expansion that occurred more than twice as fast as the one that occurred in the 1980s.[24] In chapter 3 in this volume, James Robinson argues that the massive expansion of education is related to the restoration of democracy in 1985.

Here we analyze the relationship between the expansion of education in Brazil and the recent decline in income inequality.[25] Expansion in education may influence income inequality through the following mechanisms: a decline in fertility; an increase in female labor force participation; and a reduction in labor earnings inequality. We focus here only on the impact of the expansion in education on the distribution of labor earnings.[26] As shown previously, half of the recent decline in inequality is due to changes in the distribution of labor earnings.[27] Hence, the

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24. Estimates from PNAD show that in the last decade average schooling of the Brazilian labor force increased by almost two completed grades, while in the previous decade it increased by only 0.7 of a completed grade.

25. Foguel and Azevedo (2007) and Menezes-Filho, Fernandes, and Picchetti (2007) also investigate this issue. However, we wish to investigate the causes of inequality associated with the distribution of the population according to household per capita income, and those studies investigate only the impact on 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 and others (2007); Barros and others (2006c, 2006d), and Barros, Carvalho, and Franco (2007).

accelerated expansion of education over the last decade may have played an important role in reducing overall inequality.[28]

A large literature[29] emphasizes that education affects the distribution of labor earnings through two channels: *quantity effect* and *price effect*. First, earnings (returns to education) tend to increase as workers' education increases; thus, the greater the inequality in education, the greater the inequality in labor earnings (quantity effect). Moreover, given a level of inequality in education, the larger the earnings differentials by education, the greater the inequality in labor income (price effect). In other words, labor markets "translate" educational inequality into labor earnings inequality depending on the shape of the curve of returns to education. The magnitude of the inequality translated from education to labor earnings is determined by two factors: the magnitude of the inequality in education and the sensitivity of the "translator" used to transform education inequality into labor earnings inequality. The sensitivity of the translator is the steepness of the correlation between earnings and education; the more sensitive earnings are to workers' education level, the greater the eventual labor earnings inequality. Here 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 earnings-education correlation (price effects) determine the impact of those changes on overall inequality. Therefore we describe the magnitude and nature of changes in quantity effects and price effects of education before estimating their impact on overall inequality. The following discussion may be of considerable use in interpreting the results.[30]

## The relation between labor earnings and education

The typical form of the correlation between educational attainment and monthly labor earnings in Brazil initially is concave and then becomes convex. Hence, the first years of schooling (literacy) and the last (higher education) have the greatest

28. See the theoretical discussion on the role of educational expansion on the supply of skills and its impact on labor earnings inequality in chapter 2, by Jaime Kahhat.

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

30. The methodology used here to estimate the contribution of educational expansion to reducing income inequality is based on Barros, Franco, and Mendonça (2007a). It extends the available literature in three dimensions. First, this methodology, similar to that in Bourguignon and Ferreira (2004) and Barros, Ganuza, and Vos (2002), investigates the impact on inequality in household per capita income, while most of the others procedures are limited to investigating the impact on earnings inequality; see Menezes-Filho, Fernandes, and Picchetti (2007); Foguel and Azevedo (2007); and Cortez and Firpo (2007). Second, it isolates the impact of education from the impact of other human capital dimensions. Other methodologies allow us to obtain only 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 us to isolate for each type of human capital 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).

Figure 6-4. *Evolution of the Differentials in Labor Earnings between
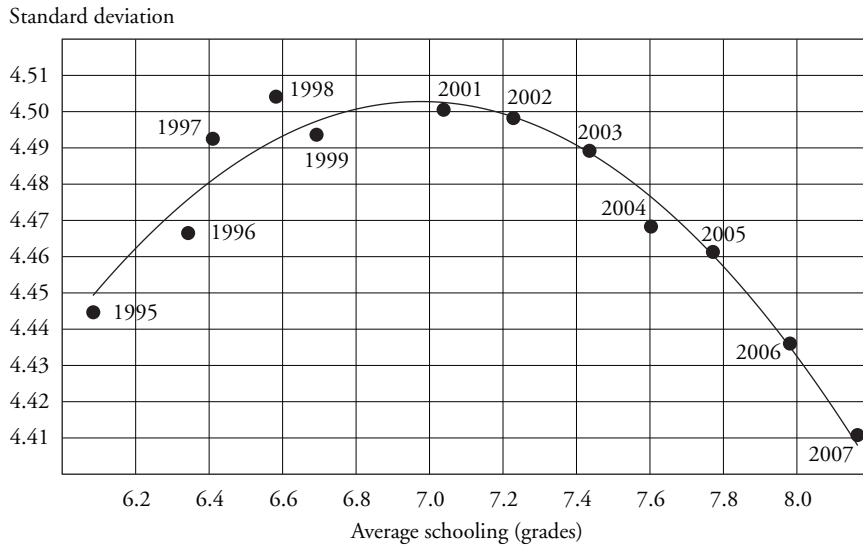Education Levels, Brazil, 1995–2007*[a]
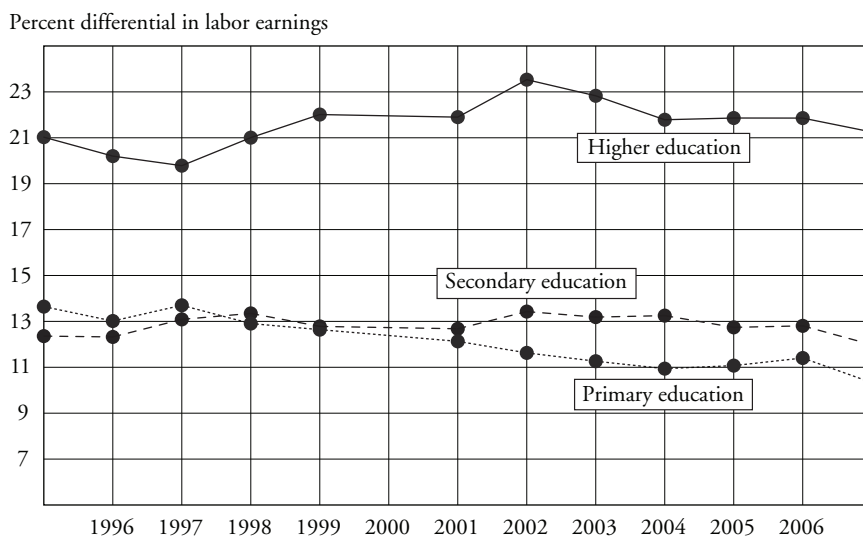
Percent differential in labor earnings

Source: Authors' estimations based on Pesquisa Nacional por Amostra de Domicílíos (PNAD), 1977
to 2007.

a. The y-axis equals {Exp [(average of the logarithmic of labor earnings of workers with X years of edu-
cation) – (average of the logarithmic of labor earnings of workers with Y years of education) / (X – Y)]} – 1.
The returns are estimated controlling for age, sex, race, and location of residence.

impact on labor earnings. The impact of in-between years of schooling is especially
limited. Since 1995 labor earnings differentials by education level have declined at
all levels.[31] As shown in figure 6-4 that reduction is much clearer after 2002, par-
ticularly for secondary and higher education. The decrease in the labor earnings dif-
ferential by education level has been, unquestionably, one of the factors contribut-
ing to the recent decline in inequality in Brazil.

The correlation between earnings and education is responsible for translating
education inequality into labor earnings inequality. Indeed, if all workers had the
same level of education, there would be no education inequality to translate into
labor earnings inequality and education would not contribute to labor earnings
inequality, regardless of the steepness of the correlation between earnings and edu-
cation. Over the last decade education inequality shows an inverted U shape. It
increased until the end of the twentieth century and has continuously declined
since then. This recent decline in education inequality is one of the factors respon-
sible for the decline in overall income inequality.

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

Figure 6-5. *Education Inequality among Workers, Brazil, 1995–2007*

Standard deviation

Source: Authors' estimations based on Pesquisa Nacional por Amostra de Domicílíos (PNAD), 1977 to 2007.

It is worth pointing out that the inverted U shape of the evolution of education inequality was not unexpected. On the contrary, it is the natural consequence of the corresponding inverted U shape of the correlation between average education and inequality, which is known as the Kuznets curve (see figure 6-5). According to the behavior of Kuznets' curve, education inequality begins to decline whenever average schooling exceeds some threshold level, which typically is around seven completed grades. As shown in figure 6-5, education inequality in Brazil starts to decline precisely when average schooling reaches seven completed grades.

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

But labor income inequality is not determined only by the magnitude of education inequality. It also depends on how labor markets translate educational differences into labor 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 labor markets with equal education inequality, the one with the flatter correlation between education and earnings will reveal less income inequality. Conversely,

given two labor 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 labor earnings and education, or both. As already seen, throughout the 2001–07 period, both a decline in education inequality and a flattening of the correlation between labor earnings and education have occurred; thus, both have contributed to the recent decline in income inequality. According to Barros, Franco, and Mendonca (2007a), quantity (price) effects together contributed to 50 (29) percent of the decline in total labor income inequality between 2001 and 2007; the price effect was larger, accounting for 35 (23) percentage points of the 50 (29) percent.

Contributions of quantity and price effects

Education (that is, changes in earnings differential by educational level and the distribution of education) was responsible for 50 percent of the recent decline in labor earnings inequality and for almost 30 percent of the decline in household per capita income inequality. The breakdown of its contribution reveals that the reduction in the steepness in the returns to education (price effect) was by far the more important factor, constituting 35 percent of the decline in labor earnings inequality and 23 percent of the decline in 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.

Earnings Inequality and Labor Market Segmentation

As shown previously, a sizable fraction of the recent decline in income inequality came from changes in the distribution of labor earnings, in particular from a sharp decline in labor market earnings inequality.[32] Half of the decline in labor earnings inequality was caused by the combined effect of a fall in the inequality of education and a fall in the returns to education; the former was a result of the large expansion in educational access that took place in Brazil over the last decade.[33] What remains to be explained is the cause of the other half of the decline in labor earnings inequality.

As emphasized in Barros and Mendonça (1993, 1996), there are essentially two basic sources of differences in labor income. On one hand, earnings differentials may simply reflect preexisting intrinsic differences in productivity among workers;

32. See Hoffmann (2006a, 2006b); Barros, Carvalho, and Franco (2007); Soares and others (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, Herrán (2005).

if so, they are not generated but only revealed by labor markets. Those intrinsic differences were the source of inequality treated previously (that is, more educated workers have higher productivity and therefore command higher wages). On the other hand, some earnings differentials result from labor market imperfections, such as discrimination and segmentation. In that case, earning differences among equally productive workers are created by the failures in the labor market. Indeed, not all differences in earnings result from intrinsic differences in workers' productivity. A sizable fraction of earnings inequality is found among workers perfectly substitutable in production—workers whose productivity does not change even when they switch jobs with one another. In that case, the labor market rewards workers with the same intrinsic productivity differently and therefore certainly generates new inequalities.

The labor market generates inequality both when it unequally remunerates men and women or whites and blacks with the same productivity and when there are earning differences between perfectly substitutable workers from different labor market segments (for example, from markets in different geographic locations or from formal and informal labor markets). In the first case, the differentials are said to come from discrimination; in the second, they are said to come from labor market segmentation.

We focus here on the relationship between labor market segmentation and income inequality in order to evaluate the degree of segmentation of the Brazilian labor market, to analyze the extent to which it has become more integrated over the last decade, and to identify the impacts of its increasing integration on the recent decline in income inequality. Specifically, we analyze the contribution of three types of segmentation: spatial segmentation;[34] segmentation between the formal and informal segments of the labor market; and segmentation between economic sectors.

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

34. In this analysis we focus on the contribution of changes in the degree of labor market segmentation to the decline in overall income inequality. For an analysis of the relation between the level of regional disparities and the level of income inequality in Brazil, see Savedoff (1995) and the extensive literature reviewed there.

between inequality revealed by the labor market and inequality generated by the labor market.

Given the interaction between revealed and generated inequalities, we must be cautious when aggregating contributions. It is not possible simply to add the contribution of a segmentation decrease and the contribution of 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 labor 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.

Spatial segmentation

Here we consider three types of spatial segmentation: differentials among federal states; differentials between metropolitan areas and nonmetropolitan municipalities;[35] and differentials between urban and rural areas. In order to evaluate the degree of labor market segmentation among federal states, we divided the country into twenty-one territories, of which nineteen represent federal states and two represent conglomerates of smaller states in the Amazon region.[36] Since the twenty-one territories lead to 210 earnings differentials, we simplify the analysis of their evolution by using their average.[37] Since 1995 labor earnings differentials among states have shown a declining trend that undoubtedly contributed to Brazil's recent income inequality decline.

The PNAD does not identify the 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 nonmetropolitan area (including both small and medium municipalities), or in a small or medium municipality. The evolution of the level of labor market segmentation among these three geographical areas is presented in figure 6-6.

Figure 6-6 shows a continuous reduction in earnings differentials among these three segments of the labor market over the entire period. The reduction was especially sharp over the 2001–07 period, throughout which the differential between metropolitan areas and nonmetropolitan medium-size municipalities declined by 4 percentage points. The differential between metropolitan areas and nonmetropolitan small municipalities declined even more, about 6 percentage points. Also, the increasing integration of metropolitan and nonmetropolitan labor markets is certainly among the factors that have contributed to the country's recent decline in income inequality.

35. In the case of nonmetropolitan municipalities we work with two groups: self-representative nonmetropolitan municipalities (medium municipalities) and small municipalities. To simplify the analysis, we refer throughout the text only to the differential between metropolitan and nonmetropolitan areas.

36. See Barros, Franco, and Mendonça (2007b).

37. Obtained from the formula $C_{21;2} = \dfrac{21!}{2!(21-2)!} = \dfrac{21.20.19!}{2!19!} = \dfrac{21.20}{2} = 210$

Figure 6-6. *Evolution of Labor Earnings Differential among Metropolitan and Nonmetropolitan Areas, Brazil,1995–2007*
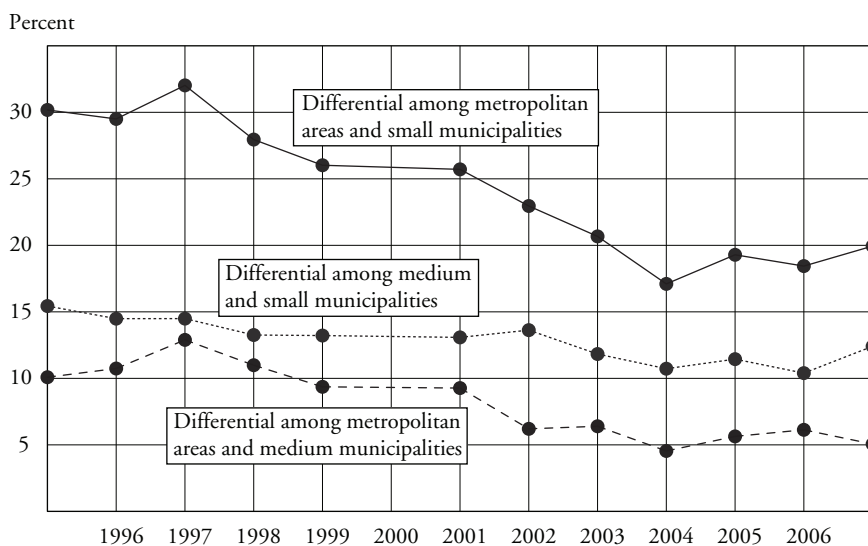
Percent

Source: Authors' estimations based on Pesquisa Nacional por Amostra de Domicílíos (PNAD), 1977 to 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. In 2007, urban workers' labor earnings were 10 percent above earning for rural workers in similar jobs and with similar observed characteristics. The level of integration between urban and rural labor markets increased since 2001. Despite the significant increase of urban-rural differentials between 2003 and 2006, the urban-rural earnings gap for the entire 2001–07 period declined 2 percentage points, contributing to the recent decline in income inequality.

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 labor market.[38] Typically, informal and self-employed workers receive lower wages than those received by formal workers with the same productive characteristics.

38. Informal employees are those who do not have a formal labor contract (*carteira de trabalho assinada*). Formal employees are those who have a formal labor contract or are public employees.

Figure 6-7. *Evolution of Formal-Informal Labor Earnings Differentials, Brazil, 1995–2007*
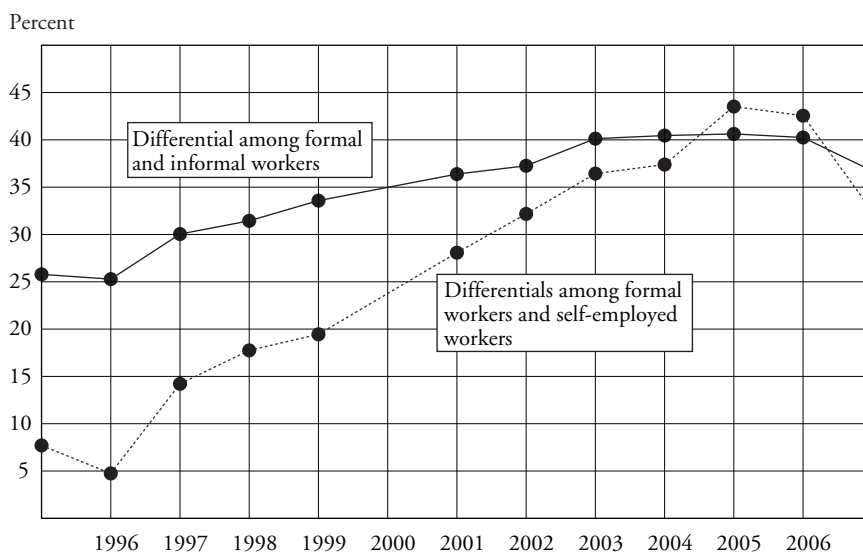
Percent

Source: Authors' estimations based on Pesquisa Nacional por Amostra de Domicílíos (PNAD), 1977 to 2007.

Despite the decline in the degree of informality over the last decade, wage differentials between formal employees and self-employed workers increased significantly.[39] As figure 6-7 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, labor market segmentation between formal and informal workers cannot have been a positive force in the recent decline in income inequality.

Segmentation by economic sector

To evaluate the degree of labor market segmentation by economic sector, we consider twelve economic sectors, leading to sixty-six intersectoral earnings differentials. Again, to simplify the analysis of the evolution of these differentials, we compute a synthetic measure that represents the average intersectoral differential. Over the last decade, the differentials between economic sectors declined by 2 percentage points, with half of the decline occurring after 2001. Hence, the reduction in

39. The degree of informality is defined as the proportion of the labor 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).

the level of sectoral segmentation is among the factors that contributed to the recent decline in income inequality.

Integration and inequality reduction

We previously described how labor market segmentation in Brazil evolved over the last decade along several dimensions, demonstrating that the Brazilian labor market—with the exception of the formal-informal sectors—became increasingly integrated. That growing integration certainly contributed to the recent reduction in income inequality.

To evaluate the magnitude and importance of its contributions, we apply a procedure, similar to that proposed in Langoni (2005),[40] that consists in predicting what each worker's labor income would have been in 2007 if the level of labor market segmentation were the same as in 2001. The results are presented in tables 6-7a and 6-7b.

We calculated the Ginis under the 2007 column by assuming that labor market segmentation for the corresponding dimensions remained as it was in 2001. These simulated Ginis are calculated by replacing the 2007 coefficients with the corresponding ones in 2001 in the earnings regressions.[41] The contribution is calculated by taking the difference between the 2007 Gini and the Gini that we assumed had no change in the particular source of segmentation and dividing it by the difference between the actual Ginis in the two points in time. So, for example, the contribution of labor market segmentation due to variations in labor earnings by economic sector is calculated as $(.528 - .531)/(.528 - .564) = .08$.[42]

As shown previously, all three types of spatial segmentation (among federal states, between metropolitan and nonmetropolitan areas, and between urban and rural areas) have declined from 2001 to 2007. The combined impact of those decreases in segmentation (geographic location) on the declines in labor earnings inequality and per capita household income inequality was 10 percent and 5 percent, respectively. Although all three types of spatial segmentation contributed to declines in earnings and per capita household income inequality, the contribution of the decline in the metropolitan-nonmetropolitan areas differential was especially important.[43] The reduction of the metropolitan-nonmetropolitan differential explains 6 percent of the decline in labor earnings inequality and 4 percent of the decline in per capita income inequality. The differentials among federal states were

40. See also Barros, Courseuil, and Leite (1999).

41. To keep the average wage in 2007 the same as the actual wage after the coefficients are replaced, one adjusts the intercept.

42. For example, to calculate the contribution of labor market segmentation: $.036 - .032/.036 = 11$ percent.

43. See also Ulyssea (2007) for additional evidence on the contribution of reductions in wage disparities between workers in small towns, in medium metropolitan areas, and in large metropolitan areas. The author shows that this process had a positive contribution for the reduction of inequality, which has become especially stronger in recent years.

Table 6-7a. *Contribution of Labor Market Segmentation to the Recent Decline in Labor Earnings Inequality*[a]

Counterfactual simulations	Inequality measured by the Gini coefficient		Reduction (Gini in 2007 −0.564)	Percent contribution to the reduction in inequality
	2001	2007		
Original distribution	0.564	0.528	0.036	100
Labor 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
Labor market segments		0.528	0.036	1
Formal-informal		0.525	0.039	−7
Economic sector		0.531	0.033	8

Source: Authors' estimations based on the Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

a. Table estimates do not include income from imputed rent and adjustments in transfers.

b. Nonmetropolitan 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 nonmetropolitan.

Table 6-7b. *Contribution of Labor Market Segmentation to the Recent Decline in Per Capita Income Inequality*[a]

Counterfactual simulations	Inequality measured by the Gini coefficient		Reduction (Gini in 2007 −0.593)	Percent contribution to the reduction in inequality
	2001	2007		
Original distribution	0.593	0.552	0.042	100
Labor 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
Labor market segments		0.553	0.041	1
Formal-informal		0.550	0.043	−4
Economic sector		0.554	0.039	6

Source: Authors' estimations based on the Pesquisa Nacional por Amostra de Domicílios (PNAD), 2001 and 2007.

a. Table estimates do not include income from imputed rent and adjustments in transfers.

b. Nonmetropolitan 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 nonmetropolitan.

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.[44]

As shown, over the last decade there has been an increase in the wage gap between formal and informal workers. Hence, that 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 had not increased over the 2001–07 period, the decline in earnings and per capita income inequality would have been 7 percent and 4 percent greater, respectively (see table 6-7b).

Finally, as shown, intersectoral earning differentials have declined sharply over the last six years, contributing to the overall decline in income inequality. Indeed, that 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.

The Relative Effectiveness of the Minimum Wage and the Bolsa Família Program

As shown previously, a sizable 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 sector.[45] 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 the wages of unskilled workers, especially in more traditional sectors. From 2001 to 2007 the minimum wage increased by 35 percent in real terms.[46] It therefore is 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 decline in income inequality.[47]

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

44. It is important to mention that we did not take into consideration spatial disparities in the cost of living (mainly because the information is not available). As a consequence, if the previous decade was marked by a significant spatial convergence in the cost of living, our results are overestimating both the real decline in income inequality and the contribution of increasing spatial labor markets integration to the decline in income inequality.

45. On the association between the recent decline in inequality and the reduction in intersectoral wage differentials as well as between metropolitan and nonmetropolitan areas, see Ulyssea and Foguel (2006) and Barros, Franco, and Mendonça (2007b).

46. This gain refers to the variation between May 1, 2001, and May 1, 2007.

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

that occurred between 2001 and 2007 must have contributed to overall inequality decline during that period.[48] However, in designing social policy it is not enough to recognize that increases in the minimum wage can reduce inequality; it also is necessary to determine whether the minimum wage is, among the available instruments, the most effective.

To shed some light on this issue, we compare the effectiveness of the minimum wage and one of its main alternatives, the Bolsa Família program.[49] More specifically, we compare the impact that a 10 percent increase in the minimum wage would have on income inequality with the corresponding impact if the same amount of resources were allocated to increase the value of Bolsa Família benefits.[50]

The methodology used is based on counterfactual simulations, and it corresponds to an attempt to have an ex ante evaluation of the impact on income inequality of increasing the minimum wage and of increasing the value of Bolsa Família benefits. This methodology, by its counterfactual nature, has the advantage of allowing a perfect identification of the impact but 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 and others (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. Those 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.

Standardizing the magnitude of interventions

At first, nothing prevents us from comparing the cost-effectiveness of programs with different costs and impacts. The existence of economies and diseconomies of scale may, however, make the comparison misleading. If there are diseconomies of scale, the impact of the program will not grow in proportion to the resources allocated to it. In that case, the program 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 that reason, we compare only the cost-effectiveness of the minimum wage and the Bolsa Família program in situations in which each receives 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.

48. Of 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 and others (2000, 2001); Neri (2000); Fajnzylber (2001); Soares (2002); Neumark, Cunningham, and Siga (2004); and Lemos (2005).

49. Barros and Carvalho (2006) also considers the comparison of an increase in minimum wage with an expansion of salário-família benefits.

50. Per beneficiary.

Once we have ensured that comparable amounts of resources have been devoted to an increase in the minimum wage and to Bolsa Família benefits, the relative effectiveness of the two instruments should not depend much on the chosen scale.[51] Thus, in order to facilitate our exposition, we established a 10 percent increase in the minimum wage and increased the Bolsa Família benefits using exactly the same amount of resources. We then simulate what each instrument's impact on income inequality would be.

Admittedly, the minimum wage influences the distribution of income through a variety of channels, some favorable (such as the increase in unskilled workers wages) and others unfavorable (such as a 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 close to its value in both formal and informal sectors. Since in Brazil the minimum social security benefit is tied to the minimum wage, we take into account that increases in the minimum wage will raise the social security floor 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.[52] Of that 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 same R$7.4 billion needed to raise the minimum wage by 10 percent would allow an increase in Bolsa Família benefits of three times their current value. Such an increase would certainly have a variety of direct and indirect effects on income inequality. In this analysis, however, we consider only its direct impact.[53]

Comparing the effectiveness of the minimum wage with that of the Bolsa Família program

Figure 6-8 presents the impact on the income share of the poorest α% (Lorenz curve) of a 10 percent increase in the minimum wage and the equivalent increase

51. 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, 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 the two instruments.

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

53. To calculate direct impact, we assume an increase in the minimum wage, and, knowing by assumption who will benefit from that (for example, pensioners receiving about the minimum wage, workers earning about the minimum wage, and so on), we estimate how much total income will increase. A 10 percent increase in the minimum wage will increase family income by 7.4 billion reales. Dividing that by the total value of Bolsa Familia transers, we estimate how much the Bolsa Familia benefit must increase to generate the same increase in family income. The number of people who actually receive Bolsa Familia is obtained by checking which households receive an amount of "other income" that is typical of the size of the Bolsa Familia transfer (15, 30, 45, and so forth reales per month).

Cumulative percent of population
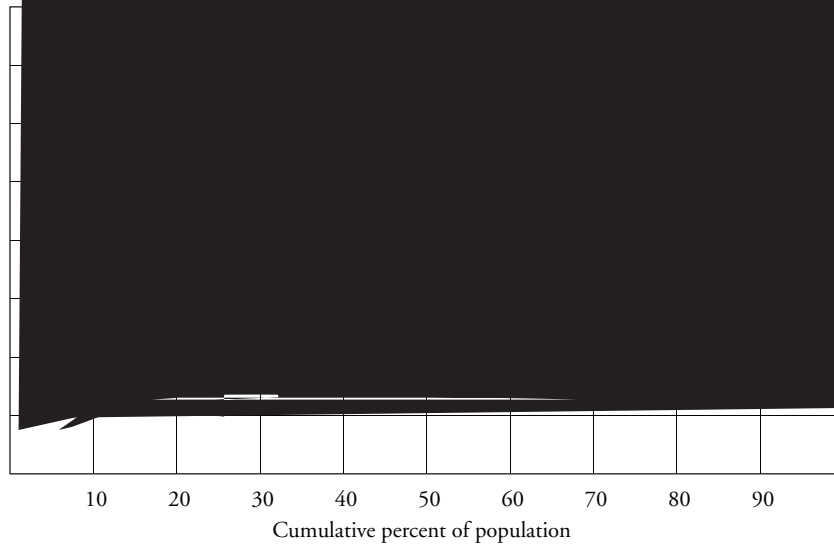
in Bolsa Família benefits. Since the amount of resources being used is identical, this figure allows us to directly evaluate the two instruments' relative effectiveness. The most effective will be the one with the greatest impact.

The increase in Bolsa Família benefits leads to an overall increase in the income share of the poorest $\alpha\%$, 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. Increasing Bolsa Família benefits is more effective[54] than increasing the minimum wage in raising the income share of the poorest 50 percent, regardless of the point chosen in the distribution. Therefore *Bolsa Família* is unambiguously more effective than the minimum wage in reducing inequality.

54. The effectiveness is calculated as the ratio between the impact on the income share of Bolsa Familia and an increase in the minimum wage for the corresponding centile.

Conclusion

Since 2000, income inequality in Brazil has been declining steadily and sharply. As a consequence, the per capita income of the bottom 10 percent of the population has been increasing at very high rates (7 percent a year), well above the national average. Extreme poverty has been declining at three times the pace necessary to meet the first Millennium Development Goal, and more than half of the decline came from reductions in income inequality. Never have reductions in inequality played such an important role in fighting poverty. Brazil experienced two previous episodes of large reductions in poverty;[55] in both cases, however, poverty reduction was due entirely to balanced economic growth. The decline in inequality during both previous episodes was minimal.

This analysis seeks to identify the factors responsible for the recent decline in inequality, in particular, the role of market forces, public policy, and institutions. It suggests that the decline resulted from three main factors: an increase in contributory and noncontributory government transfers; a decline in wage differentials by educational level and reductions in the inequality in education caused by accelerated expansion of the educational level of the labor force; and an improvement in spatial and sectoral integration of labor markets, in particular among metropolitan and nonmetropolitan 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 labor earnings differentials and the greater spatial and sectoral integration of labor markets are clearly market responses. It remains debatable, nevertheless, whether the reductions in labor 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 toward more balanced regional and sectoral growth must also have contributed to the greater integration of Brazilian labor markets. Indeed, over the last decade, probably in response to the opening up of the Brazilian economy and facilitated by the increase in workers' educational level outside large metropolitan areas, a sizable fraction of Brazil's economic activity moved toward nonmetropolitan areas. According to IPEA, IBGE, and UNI-CAMP (2002), while the metropolitan areas and large cities (having more than 500,000 inhabitants) lost share in GDP between 2002 and 2005, the medium-size cities (between 100,000 and 500,000 inhabitants) had the best performance, 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. The shift in government expenditure toward less

55. The Brazilian Miracle in the 1970s and more recently the Real Plan are important examples.

developed and remote areas fostered local labor markets, hence promoting regional integration.

Brazil's recent success in effectively reducing inequality and poverty is undeniable. However, despite such progress, the magnitude of inequality in the country is still high. According to this analysis, almost two additional decades of similar progress would be necessary for Brazil's level of inequality to align with the world average. As a result, the recent declines in poverty and inequality can be seen only as a very important first step in a long journey.

The sustainability of this unprecedented equalization process should be of serious concern to Brazilian society and policymakers. 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 implemented a bold noncontributory social assistance program (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, as we have shown, increases in the minimum wage are much less effective in reducing inequality than expansions in Bolsa Família benefits. Moreover, poverty is still 10 times greater among children than among the elderly, but the average noncontributory public transfer for an elderly person is at least 20 times greater than the average noncontributory public transfer for a child.[56] This suboptimum nature of Brazilian social policy has two interrelated implications. On one hand, it is one cause of the persistently high levels of inequality and poverty. On the other hand, optimizing social policy design gives Brazilian policymakers 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 Brazil. Hard choices leading to better allocation of resources will have to be made if increases in government expenditures are to be contained. Equally important, policymakers will need to redesign existing policies to take into account the

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56. In Brazil, households with elderly members generally 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.

changing face of poverty and maintain the effectiveness of public policy in fighting inequality.

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