

# Inequality in Brazil: A Closer Look at the Evolution in States

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Using a novel methodology that allows households' incomes to be adjusted for price-level differences across states, this chapter analyzes the evolution of income inequality in Brazil during the period 2004–14. Inequality declined both within and between states. The decline was sharper in more unequal states. The decline in within-state inequality was driven by, among other factors, strong growth of incomes of poor households, while between-state inequality declined because overall income growth was stronger in poorer states.

## INTRODUCTION

During the period 2004 to 2014, income inequality declined sharply in Brazil. The Gini coefficient for household per capita income fell from 0.54 in 2004 to 0.49 in 2014.<sup>1</sup> The key drivers of this decline in inequality included sustained economic growth, which boosted incomes of the poor, and deliberate income and social inclusion policies, such as increases in the minimum wage and targeted social programs. Particularly noteworthy is the Bolsa Família program, which has played a significant role in reducing income inequality since 1995.<sup>2</sup> In addition, progressive taxation, as well as schooling, demographic changes, and labor market segmentation, contributed to reducing inequality (Lustig, Pessino, and Scott 2014; Menezes-Filho and de Oliveira 2014; Paes de Barros and others 2010). The overall country-level decline in inequality and the focus on national policies, however, mask regional disparities in income inequality (Figure 8.1). This is not a trivial issue, especially because Brazil is a very large country and the

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<sup>1</sup>Brazilian Institute of Statistics, IBGE.

<sup>2</sup>See Neri (2010), Neri and Ferreira de Souza (2013), Azzoni and Silveira-Neto (2012), Soares and others (2006), and Mauricio (2014). Using the Rental Price Index (RPI) adjustments, Góes and Karpowicz (2017) show that, although most of the change in Gini can be explained by income growth, higher schooling levels, labor formalization, and the targeted social program Bolsa Família also contributed to income convergence. Civil servants' wage growth has, in contrast, slowed gains in equality.

heterogeneity in the distribution of income across states is often pronounced. This is the primary focus of this chapter.

The main challenge in studying income inequality within large countries is that price levels differ across states and regions. This variation causes a systematic bias because poorer areas have lower price levels, and the differences in the level of *real* incomes could be smaller than what a comparison of *nominal* incomes would suggest. For these reasons, in both advanced and emerging market economies researchers have resorted to constructing deflators specific to the region, state, or metropolitan area, often based on information contained in consumer price indices.<sup>3</sup>

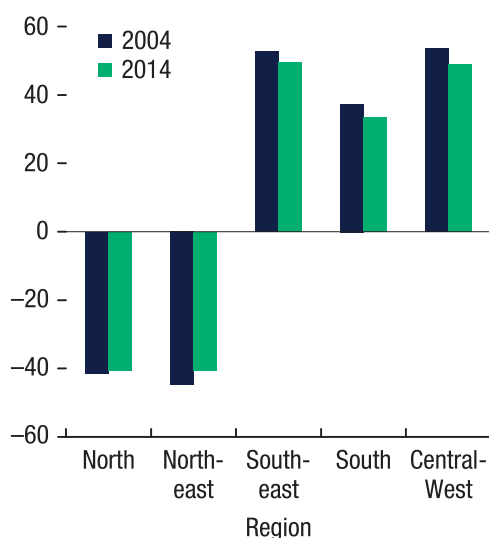
This chapter constructs a novel rental spatial price deflator, RPI, using the rental prices declared by households in the annual Pesquisa Nacional de Amostra de Domicílios (PNAD). The RPI is used to adjust households' incomes that are aggregated from individual and household survey data, which allows comparison of nominal incomes across states with unequal living standards. The techniques developed by Milanović and his co-authors, and recently updated in Lakner and Milanović (2015), who study global income inequality, are then used to gain insights into both within- and between-state inequality in Brazil.

The chapter shows the following:

- The decline in overall inequality in Brazil was led by a decrease in both intrastate and interstate inequality.
- The decline in inequality was more significant in states with higher initial inequality.
- Most of the convergence in incomes over time occurred at about the middle of income distributions in states.

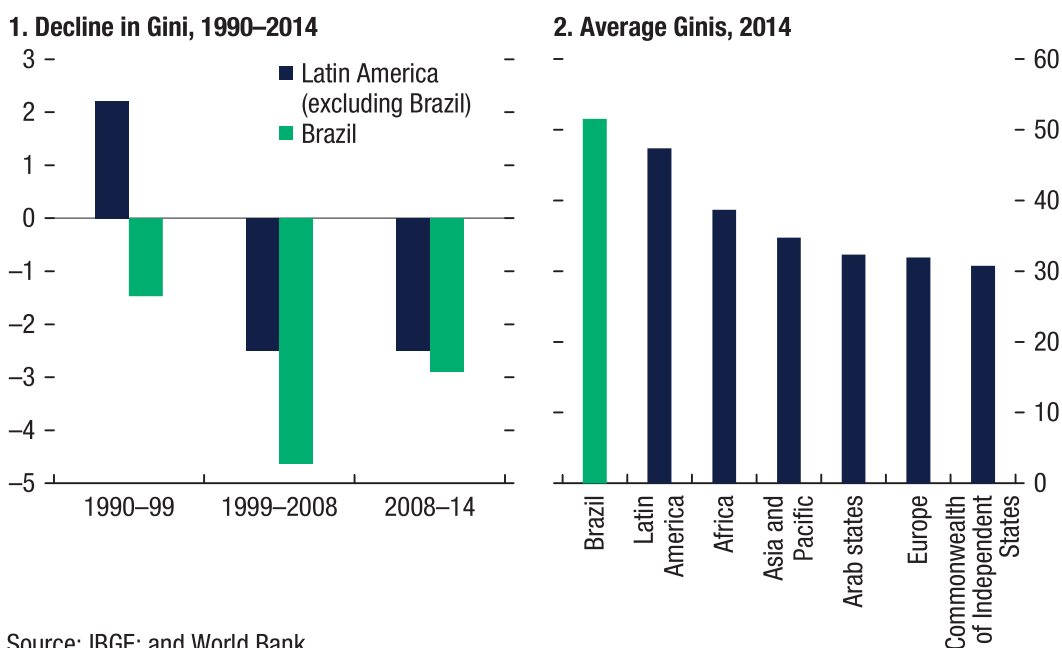
The chapter is organized as follows. First, the evolution of inequality in Brazil during 2004–14, a period preceding the historic decline in economic activity in Brazil and for which consistent data are available, is described. Second, cost-of-living adjustments are presented. Third, regional inequality trends are examined. Last, the chapter concludes.

**Figure 8.1. Real GDP per Capita**  
(Percent distance from the national mean)



Source: IBGE.

<sup>3</sup>The US Bureau of Economic Analysis recently released regional price parities for the 325 Standard Metropolitan Statistical Areas and the 50 state nonmetropolitan areas in the United States.

**Figure 8.2. Gini Coefficients**

Source: IBGE; and World Bank.

## OVERALL INEQUALITY TRENDS IN BRAZIL

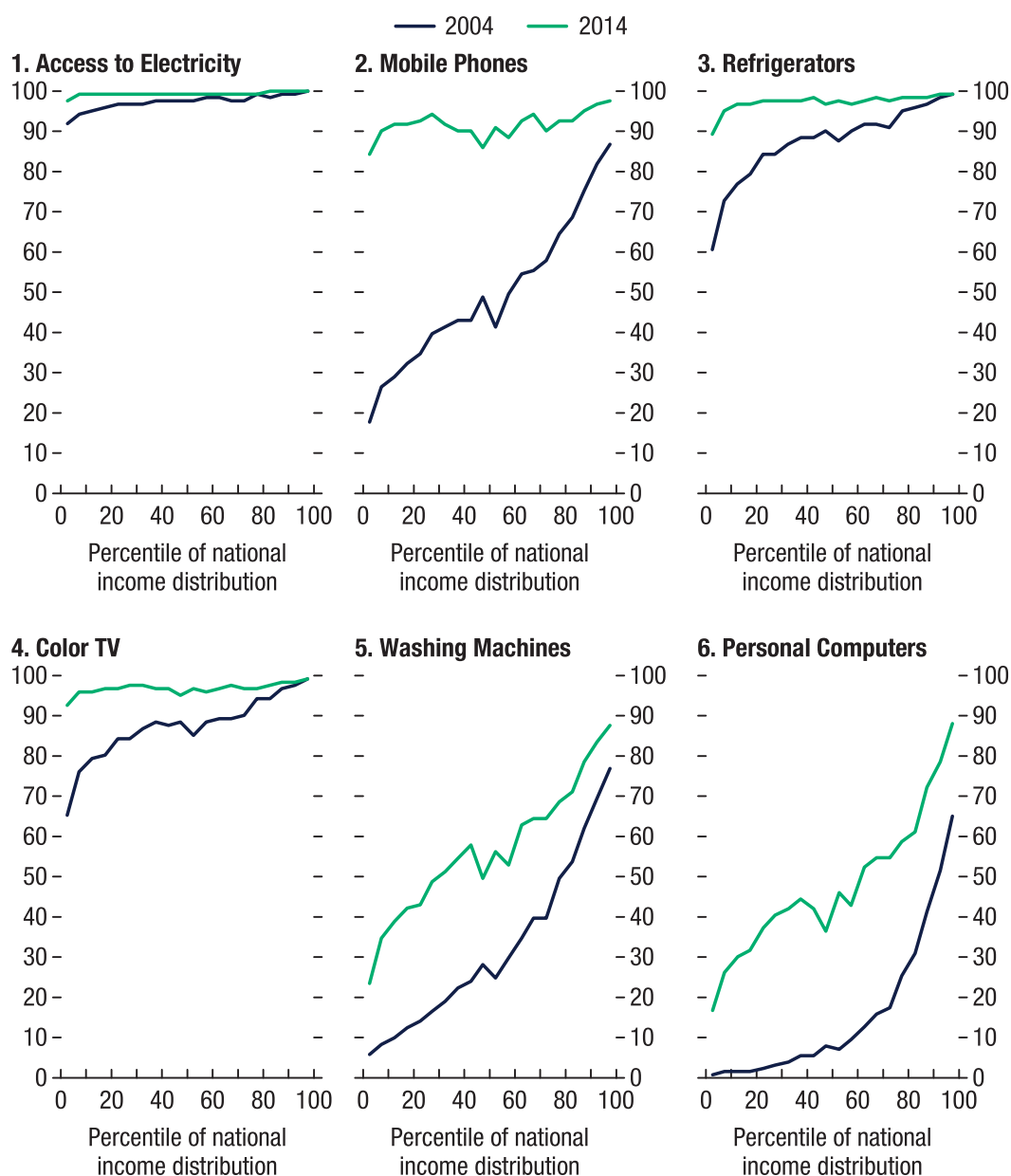
Although many other countries in Latin America have witnessed a decline in inequality, Brazil's record is remarkable. Yet inequality remains high: the share of labor income of the top decile of the income distribution is 40 percent of the labor income of all Brazilians, and that of the top 1 percent is 12 percent.<sup>4</sup> Indeed, Brazil's income distribution still is one of the most unequal in Latin America and in the world (Figure 8.2).

Changes in household consumption patterns also reflect the decline in inequality. Income growth over the past decade has allowed the poorer segments of the population to increase their consumption of durable goods. With access to electricity being nearly universal across all income levels in 2004, access to durable goods, such as refrigerators, color TVs, washing machines, personal computers, and mobile phones, increased substantially for all households in the subsequent 10 years, with poorer households benefiting relatively more. Figure 8.3 shows the percentage of households with access to selected durable goods by decile in 2004 and 2014.

But how have incomes changed at the regional level, and how do intrastate and interstate income inequality today compare with those in the previous decade?

<sup>4</sup>Data from the 2014 PNAD.

**Figure 8.3. Brazil: Convergence in Goods Consumption by Household, 2004–14**  
*(Percent of total households in that quantile of the distribution)*



Sources: PNAD (Pesquisa Nacional por Amostra de Domicílios, National Household Sample Survey); and IMF staff calculations.

## THE COST OF LIVING ADJUSTMENT

Inequality measures must consider differences in the cost of living across countries to distinguish between nominal and real differences in incomes. Cross-country inequality studies, such as Lakner and Milanović (2015) or Dollar, Kleinberg, and Kraay (2013), for instance, typically correct between-country income statistics using purchasing-power-parity conversions, often based on national price indices. Adjusting for living standards is also important when studying inequality within



large countries because the Balassa-Samuelson effect may cause richer regions to show permanently higher price levels (see Deaton and Dupriez 2011). Indeed, price levels are not homogeneous across Brazilian states. Góes and Matheson (2017) document large divergences of product-specific price dynamics, particularly for nontradables, across different metropolitan areas. Almeida and Azzoni (2016) show that overall price levels can deviate from the national average in Brazil's metro areas between -19 percent and +14 percent.

However, microdata for consumer price-level differences are not available in Brazil. Moreover, consumer price indices are available for only 12 metropolitan areas, which is insufficient for capturing the potentially significant differences in living cost dynamics across Brazilian states. To overcome this obstacle, Deaton and Dupriez (2011), for instance, construct indices for India and Brazil based on food prices. Proxies based on traded goods prices are, however, flawed because they ignore the fact that spatial price dispersion is more pronounced for nontraded goods prices, especially housing, including in Brazil. Li and Gibson (2014), for example, use data on dwelling sales in urban China to develop spatially disaggregated indices of house prices, which they use as spatial deflators for both provinces and core urban districts.

This chapter uses information on rental prices as a proxy for the cost of living. The RPI is constructed using data on declared household rent prices from the PNAD and other characteristics of the dwelling (such as the number of rooms or area in square meters), and household incomes are adjusted for spatial price differences. A potential drawback of using the RPI is that it does not consider differences in price levels of goods that represent a significant share of the consumption basket (notably primary goods that are typically consumed in greater shares by poor households), although the RPI is a superior measure compared with a deflator that uses only information from traded-goods prices.

First, for each subregion  $k = [1, 2, \dots, 7]'$  of each state  $s = [1, 2, \dots, 27]'$  and each year  $t = [2004, \dots, 2015]'$ , an *RPI* is constructed that measures the percentage deviation of the per room average rental price from the national average:

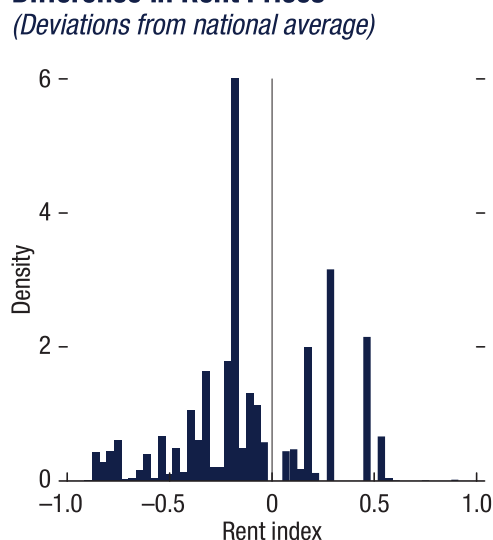
$$r_{s,k,t} = \frac{m_{s,k,t}/n_{s,k,t}}{m_i^*/n_i^*} - 1.$$

The term  $m$  is the average monthly rent price for the cluster  $s, k$ ;  $n$  is the average number of rooms per household for the cluster; and the asterisks denote national averages.

The distribution of spatial price differences across the 189 clusters for which indices were created shows substantial variability of rent price levels in Brazil (Figure 8.4).

Using data on price-level differences in 12 metro areas estimated by Almeida and Azzoni (2016) from the households budget survey (Pesquisa de Orçamento Familiar), overall spatial price differences can be expressed as a linear function of housing spatial price differences (Figure 8.5). The regression coefficient  $\phi$ , assumed to be homogenous across regions, and the heterogeneous RPI can be used to fit an overall spatial price difference index  $\hat{p}_{s,k,t} = \phi r_{s,k,t}$ . Finally,  $\hat{p}_{s,k,t}$  is used to obtain adjusted household incomes, which are then used in the analysis

**Figure 8.4. Distribution of Spatial Difference in Rent Prices**  
(Deviations from national average)

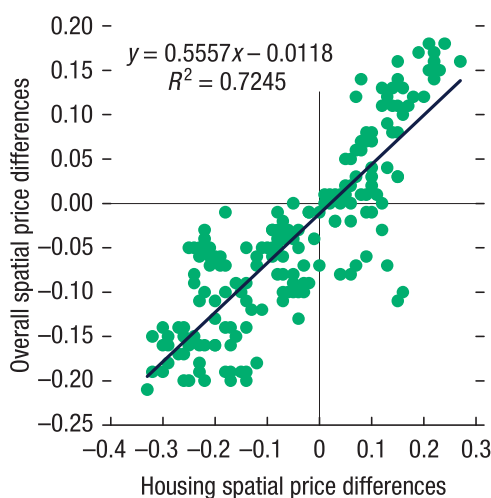


Source: Authors' calculations based on PNAD.

of income distributions and their trends (Figure 8.6).

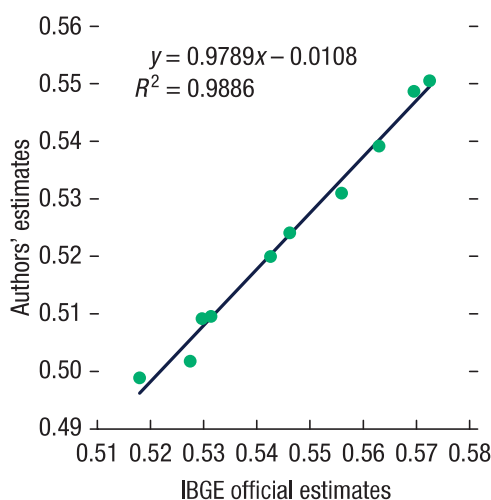
Richer regions have higher price levels; conversely, poorer regions have lower price levels. Thus, adjusting for spatial price differences compresses nominal differences in incomes and decreases the overall inequality indicator. On average, for the period 2004–14, correcting for spatial price differences reduces the Gini by 4 percent. The “RPI-adjusted” Gini index shows a decline in inequality at the country level from 0.55 to 0.50 over 2004–14, which is broadly the same reduction implied by the unadjusted Gini. Therefore, the inequality measure displays a level effect while maintaining the same trend.

**Figure 8.5. Brazilian Metro Areas: Correlation between Overall and Housing Spatial Price Differences**  
(Deviations from national averages)



Sources: Almeida and Azzoni 2016; PNAD microdata; and IMF staff calculations.

**Figure 8.6. Brazil: National Gini Coefficient (2004–14)**  
(Index, 0 = absolute equality)

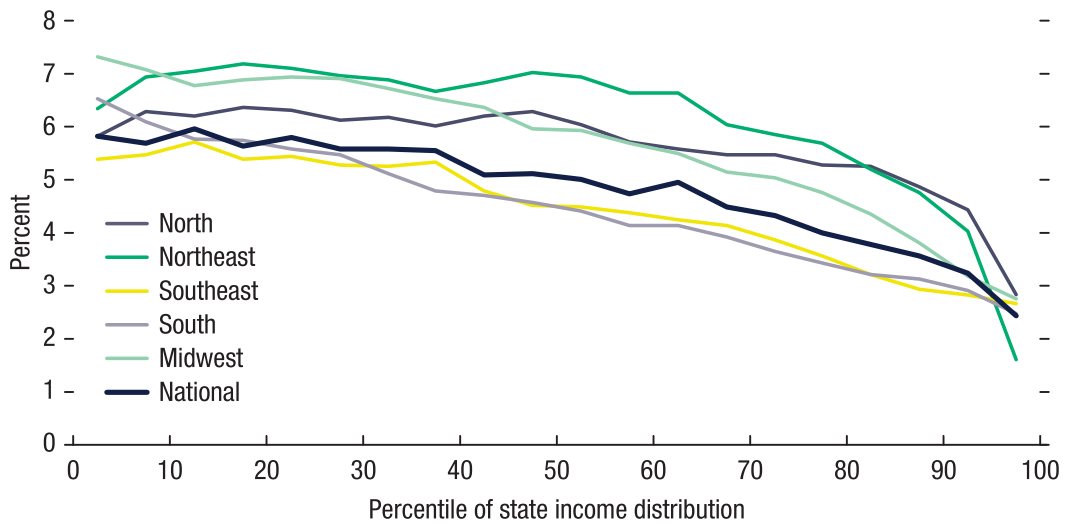


Source: IBGE; and authors' calculations based on PNAD.  
Note: IBGE = Brazilian Institute of Geography and Statistics.

## TRENDS IN INEQUALITY IN STATES (2004–14)

This section analyzes the historical trends in regional income inequality in Brazil based on PNAD data adjusted for spatial price differences. Because data on household incomes are being used, the analysis focuses on inequality of outcomes; inequality of opportunities, such as access to health-care, clean water and

**Figure 8.7. Brazil: Income Inequality in Brazilian States: A Dynamic Decade**  
*(Average real income growth per year; average across states per quantile; adjusted for spatial-price differences)*



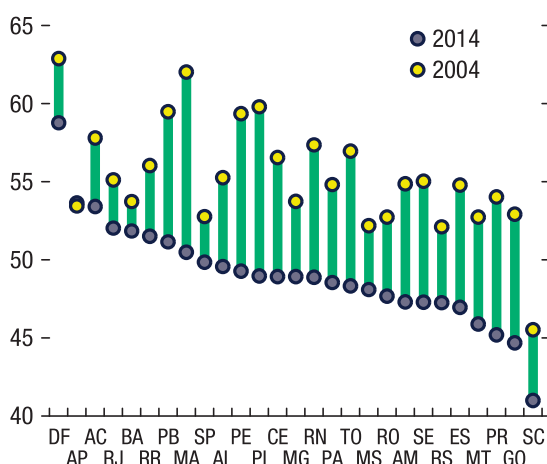
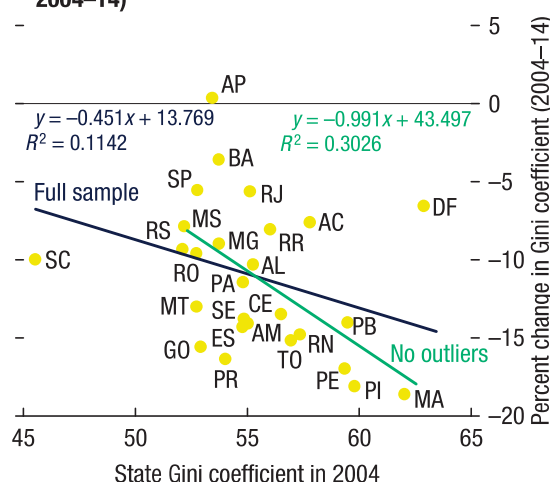
Sources: PNAD microdata; and IMF staff calculations.

sanitation, and quality infrastructure, is not examined. The estimates of inequality are based on *pretax* per capita income as reported in the PNAD, which includes data on labor income, retirement benefits, social security benefits, and income from financial and real assets.

*Between*-state inequality has decreased, given that real income per capita in the poorer regions of the north, northeast, and midwest grew faster than real income per capita in the richer regions of the south and southwest, possibly reflecting strong redistribution policies (Góes and Karpowicz 2017). The blue, green, and yellow lines in Figure 8.7 are above the national mean for each quantile of the regional income distribution adjusted for spatial-price differences at the state level. Real income growth was stronger for households belonging to the lower quantiles of the income distributions across all regions, although it was generally high at about the middle of the distribution in the poorer regions.

*Within*-state income distribution varies considerably from state to state. In 2014, the Gini coefficient of the most unequal state was 18 percent higher than the national Gini, whereas the Gini of the least unequal state was almost 20 percent lower than the national coefficient. These differences are, however, narrower than in the past because inequality within states also dropped. The standard deviation of state Gini coefficients declined from 0.035 to 0.033 between 2004 and 2014 (Figure 8.7).

Supported by schooling and labor formalization, household income in lower income deciles grew more than household income in the other deciles in nearly all states during the period, as indicated by the downward movement of the dots in Figure 8.8. However, inequality declined relatively more in the states with higher *initial* levels of inequality in 2004. This relationship is even stronger when

**Figure 8.8. Brazil: Income Inequality in Brazilian States: Evidence of Convergence****1. Brazil: Gini Coefficient by State, 2004–14**  
(Statewide Gini coefficient)**2. Brazilian States: Evidence of Convergence in within-State Income Inequality**  
(State Gini coefficient in 2004 and percent change 2004–14)

Sources: PNAD microdata; and IMF staff calculations.  
 Note: See Table 12.1 (Chapter 12) for state abbreviations.

excluding Santa Catarina (SC) and the Federal District (DF)—the most equal and the most unequal states, respectively.<sup>5</sup> This development illustrates convergence in within-state inequality indices across the country.

Figure 8.9 explores how within-region income distributions are related to the national income distribution.<sup>6</sup> Households that belong to the lowest and highest deciles of the regional income distribution also belong to the lowest and highest deciles of the national distribution. In other words, the very rich and the very poor have similar income levels across states. However, depending on the region, the regional median household income can fall anywhere between the 30th and 60th percentiles of the national distribution.

These differences have shrunk over time. For each percentile of the statewide income distribution depicted on the  $x$ -axis in Figure 8.10, the standard deviation in incomes from the national mean decreased between 2001 and 2014, as shown by the downward shift of the curve (black to green). The decrease in the deviation from the mean was more pronounced around the 30th to 70th percentiles, suggesting that most of the gains in equality were achieved through compression of income at about the middle of the distribution.

How has the recession affected inequality? The recession that hit Brazil between 2015 and 2017 may have reversed some equality gains. With the drop

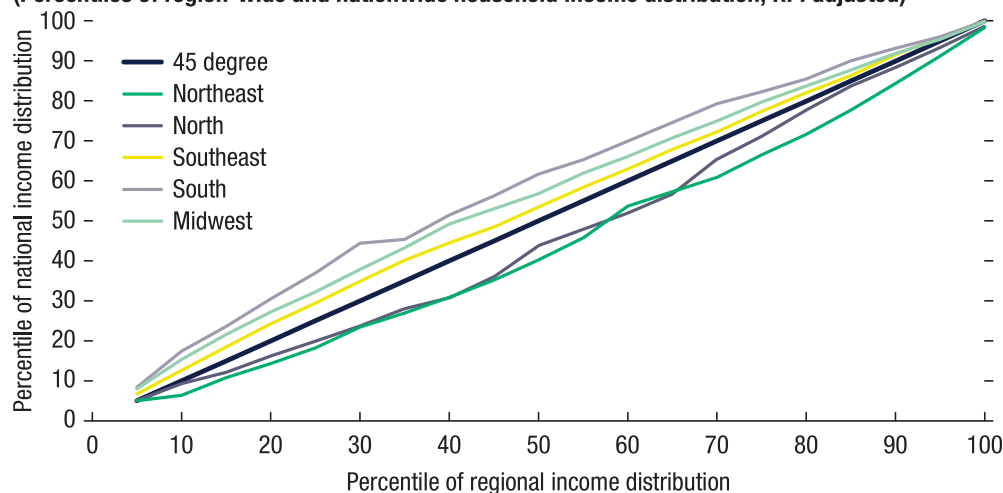
<sup>5</sup>The percentage decline in the Gini in the figure was higher for states with the higher Gini in 2004, and the correlation is more negative when excluding the outliers.

<sup>6</sup>The lines in Figure 8.4 represent median household income per capita distributions of states that are located in the region.

**Figure 8.9. Brazil: Income Inequality in Brazilian States: Dispersion of Median State Households' Incomes across Regions**

Household Income per Capita Distribution, by State, 2014

(Percentiles of region-wide and nationwide household income distribution, RPI adjusted)



Sources: PNAD microdata; and IMF staff calculations.

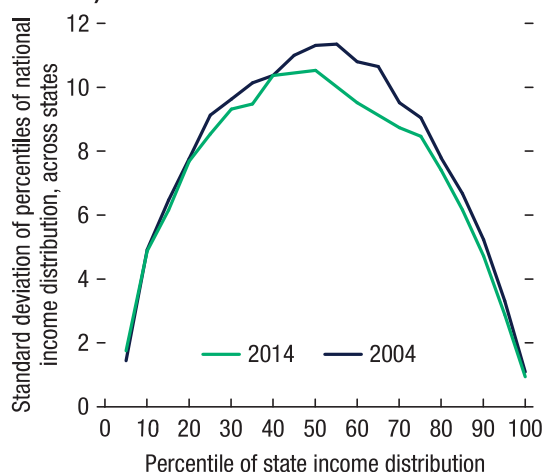
Note: RPI = Rental Price Index.

in the employed population, real gross household earnings contracted in 2015 across all professions and for the first time in 11 years. However, earnings from work represent a higher share of total income in the survey and a higher share of the income of households in the lowest quartile. Job destruction and high inflation through 2016 may have affected relatively poor households more.

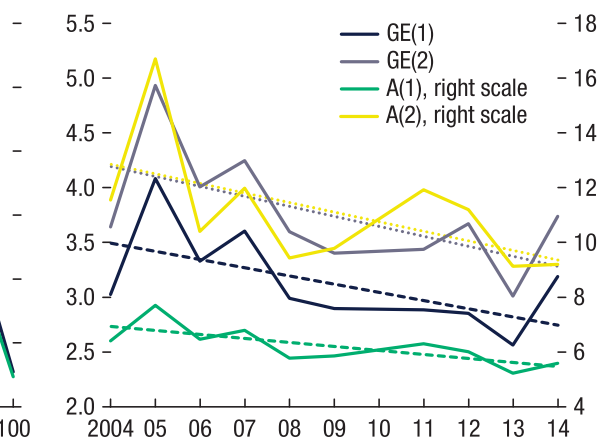
**Figure 8.10. Brazil: Income Inequality in Brazilian States—Convergence in the Middle**

1. Regional Inequality in Brazil, 2004–14

(Standard deviation of corresponding percentiles of national income distribution per percentile of statewide household income distribution, across states)



2. Brazil: Trends in between-State Inequality, 2004–14  
(Share of total inequality represented by differences between state averages)



Sources: PNAD microdata; and IMF staff calculations.



The latest data indicate a slow-moving deterioration in income distribution. The 2015 PNAD showed no evidence of reversal of progress toward equality—although all real incomes declined, the higher incomes declined proportionally more, reducing inequality. The official (unadjusted) Gini index calculated for all income sources fell from 0.497 in 2014 to 0.491 in 2015. The Gini calculated for labor income fell from 0.490 to 0.485 and, for household income, from 0.494 to 0.493. But preliminary inequality estimates suggest that inequality widened slightly in 2016 for the first time in 22 years. The number of the poor in Brazil likely increased in the range of 2.5 million to 3.6 million by 2017, while the Gini index increased from 0.51 to 0.52–0.54 (World Bank 2017). Young, skilled workers in the services sector will probably represent the higher share of those falling below the poverty line because of the crisis.

## CONCLUSIONS

This chapter documents a decline in inequality in Brazil during 2004–14, controlling for differences in state price levels. Inequality shrank both between and within the 27 Brazilian states. The decline in inequality can be attributed to the pronounced growth of incomes of poorer households and the convergence in household incomes in the middle of the distribution. Income convergence was stronger in states that were initially more unequal. The decline in inequality is also reflected in the consumption pattern dynamics of households that report increased consumption of durable goods by the poorer segments of the population compared with 10 years earlier.

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