Brazilian Poverty Between and Within Groups: Decomposing by Geographical Group-Specific Poverty Lines

Salardi, Paola

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Paola Salardi*
paola.salardi@unibocconi.it

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Abstract

This paper presents empirical findings by applying the reformulation of the FGT class of poverty measures provided by Bottiroli-Civardi and Chiappero-Martinetti (2004) to the Brazilian annual households survey, the Pesquisa Nacional por Amostra do Domicilios (PNAD) for 2002. Starting from a set of geographically-specific poverty lines, we compute poverty between and within these differentiated homogenous groups running two different exercises. First, we consider the whole Brazil and we find the between component is dominant due to the high heterogeneity of this set of poverty lines. Then, by considering separately each region, we find a dominance of the within component in the North and in the Central-West, while the between component is dominant in the remaining regions. These findings renew the importance of having a critical eye in interpreting synthetic indexes of poverty.

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1 Introduction

Brazil is a country with huge regional disparities. In 2002, the real GDP was 1,346,028 million Reais and 56% was generated by the most influential region of Brazil, the South-East, which includes metropolitan areas, such as Rio de Janeiro and São Paulo. On the contrary, the two most depressed regions of the country, the North and the North-East, together produced only 0.6% of the national GDP[1]. Regional differences are sharp not only looking at the GDP values or at the income distribution data but by also looking at social and demographic variables, such as ethnicity and family structures which dramatically change region by region. The diversity of social features might have an impact on, as well as be determined by, economic aggregates[2]. Hence, the study of these geographically-specific discrepancies might be helpful in terms of policy implications to understand causes of poverty and target more focused policies.

The standard approach in measuring poverty is not informative enough where the population is clearly not homogenous and a set of specific group poverty lines might draw a better and more complex picture of the poverty situation.

The adoption of differentiated poverty lines is well-known in the literature on poverty measurement[3] and again Bottiroli-Civardi and Chiappero-Martinetti (2004) legitimize the potential variety among different groups by introducing differentiated poverty lines instead of considering a unique reference for the entire population. However until now empirical studies adopting differentiated poverty lines have provided poverty measurements simply as results of a mere aggregation of poverty outcomes for each homogenous group defined by the adopted set of poverty lines.

The original contribution of Bottiroli-Civardi and Chiappero-Martinetti's (2004) paper is the reformulation of the three most famous poverty indexes, better know as the Foster, Greer and Thorbecke class of measures[4]. This reformulation takes into account not only poverty within homogeneous groups but also it is able to detect poverty existing between different groups. After comparing each individual position within its homogenous group, people belonging to different groups are compared to each other in order to capture the between component.

This alternative conceptual and analytical approach to poverty measurement might have potentially remarkable implications especially where the differenti-

[1] These values are taken from the IBGE publication, Conta Regionais do Brasil, 2002, IBGE(2005).

[2] A more detailed analysis of the Brazilian geographical disparities is provided in section 3.

[3] Regarding Brazil, Ferreira, Leite and Litchfield's (2006) and Ferreira and Litchfield's (2001) papers analyze poverty adopting differentiated poverty lines (Litchfield 2001, 2004). Bottiroli-Civardi and Chiappero-Martinetti's (1999) paper studies the Italian poverty situation by applying a set of differentiated poverty lines.

[4] In their work, Forster, Greer and Thorbecke (1984) aggregated in an unique formula the most common poverty indexes, such as the Headcount Ratio, the Poverty Gap and the Squared Poverty Gap by weighing for α. Later on in this section, this procedure of aggregation is better described.

ation among poverty lines is very consistent.

Since one of the most relevant determinants of such Brazilian heterogeneity is the geographical location, as we said earlier, the construction of differentiated poverty lines might be based on this criterion that, consequentially, divides the population into geographically-specific homogeneous groups. To do that, Rocha's estimation of poverty lines for Brazil has been applied (Rocha, 2003).

To run our empirical exercises, we use a dataset coming out from the annual Brazilian households survey, called the *Pesquisa Nacional por Amostra do Domicilios* (PNAD), for 2002.

Starting from the definition of group-specific poverty lines by geographical location provided by Rocha (2003), the aim of this paper is to analyze empirical findings emerging from the computations of poverty within and between these groups.

The structure of this paper is the following. The second section explains the conceptual and analytical framework of this alternative approach that reformulates the FGT class of measures (Bottiroli-Civardi and Chiappero-Martinetti, 2004). In section 3, we introduce the Brazilian situation by investigating income distribution and poverty. We then draw poverty profiles that are helpful in interpreting findings for the poverty decomposition between and within homogenous groups provided in section 4. In this last section, first we compute the reformulation of poverty indexes for the entirety of Brazil by adopting a unique reference group. Second, recognizing the crucial role played by regional disparities, we run the exercise for each region where each region has its own reference group. The differences and possible implications of these two empirical exercises are explained more deeply in that section, where we also try to advance some interpretations. Conclusions are provided in section 5.

2 A reformulation of the FGT class of poverty measures

The standard approach in measuring poverty consists of computing the well-know Foster-Greer-Thorbecke class of measures by using a unique value that defines the poverty line, i.e. the critical threshold below which one can be considered poor[5].

The definition of a poverty line implies crucial methodological choices that obviously affect the final outcome of poverty analysis. More precisely, this threshold can be set adopting an objective indicator of welfare, such as income or consumption. However, among the economic arena, a growing consensus for the adoption of a wider concept of welfare that might involve more subjective criteria, from education, health and housing to vulnerability and dignity, is broadly noticeable[6].

[5] For more details, see the World Development Report 2000/2001: Attacking Poverty (World Bank, 2000).

[6] A plenty of economists have explored different notions of well-being in contrast with the money-metric approach. Surely, the most important references are Sen's works (1976,

Even though we try to avoid this issue by measuring poverty simply through an objective indicator of welfare, we still have to cope with more than one issue. First of all, we have to consider the renowned choice between income and consumption. From the literature (Deaton, 1997 and Ray, 1998), we know that consumption is generally preferred to income for two fundamental reasons: consumption accounts for self-owned production and non-employed income and is a long-term measure of welfare not affected by fluctuations in income[7]. Anyway, for Latin American countries' studies, income is generally more used due to the greater availability of data, where in the rest of developing countries, consumption data is more often applied. The underreporting of welfare situations given by the adoption of income as an indicator instead of consumption characterizes Latin American household surveys, and Brazil as well, and should be taken into account in interpreting data and outcomes (Wodon et al, 2000).

A second and even more contentious issue related to the definition of the poverty line is the choice between absolute versus relative poverty lines. The absolutist concept of poverty embraced by Sen (1983b) starts from the fundamental assumption that there is a certain level of needs below which it is not possible to survive, while the relative concept is anchored to the distribution of income, or consumption, in a given country.

The choice between a unique poverty line and a set of differentiated poverty lines is the third critical issue. Bottiroli-Civardi and Chiappero-Martinetti (2004) stressed the limitations in adopting a unique poverty line and suggested the implementation of differentiated poverty lines for homogenous population groups.

The most evident restraint in considering the whole population as an homogenous group and using an unique threshold for poverty measurement is the lack of legitimization for one of the most important characteristics of the real world. In fact, the heterogeneity of individuals and households among the entire population cannot be ignored: differences in personal characteristics and in social environmental affect the level and composition of needs and, as a consequence, the level of deprivation.

In other words, the hypothesis of the "representative agent" in the context of poverty analysis does not take into account the existence of many dissimilar personal and household characteristics as well as different socio-economic contexts. Moreover, in studying levels of poverty and welfare we should be aware that individuals usually compare their condition to other analogous situations, thus the idea of relative deprivation cannot be ignored and methodological tools should take into account this approach in order to sketch more reliable poverty profiles.

1983, 1985, 1992). The literature spans from Lipton and Ravallion (1995) and Baulch (1996) to the new multidimensional poverty approach, such as Bibi (2003), Atkinson (2002) and Bourguignon and Chakravarty (2003).

[7] Although consumption is generally preferred because its consistency with the life-cycle theories of consumption, it might not hold a lack of access to insurance and credit market is detected, as likely in developing countries and more broadly speaking in the most vulnerable and deprived part of the population (Lipton and Ravallion, 1995).

In their work, Bottiroli-Civardi and Chiappero-Martinetti (2004) propose a conceptual framework that considers the potential heterogeneity of individual and households and advances a new analytical approach by reformulating the FGT class of measures for absolute, relative and hybrid[8] poverty lines.

Roughly speaking, their approach consists of the ex-ante identification of homogeneous groups following a specific criteria. Then, a specific (absolute or relative) poverty line has to be defined for each homogenous group. Finally, we measure the level of poverty via this reformulation of the FGT class of poverty indexes that is able to capture the within and between component.

This method for computing poverty draws a poverty analysis that conveys not only how much poverty there is within each homogeneous group, but also how much poverty is detached among different groups.

However, there are many criticisms that might arise once this new approach is analyzed. The problem of "subjectivity" in defining the criteria we use to identify homogenous group is an unsolved topic. Finally, the much suffered and strained problem in choosing relative versus absolute poverty lines is still present. Quoting Bottiroli-Civardi and Chiappero-Martinetti (2004), "when we refer to relative poverty lines, the incidence and intensity of poverty are positively related to the degree of inequality existing in the society. However, it is also true that there could be higher level of inequality without poverty if all the people were able to achieve a given absolute threshold of needs".

Underneath, we briefly outline the analytical framework of this reformulation, restricted to the case of the adoption of purely absolute poverty lines. The reason of this restriction is due to the fact that the empirical exercises proposed in section 4 adopt only differentiated absolute poverty lines.

First, we start from the standard class of measures provided by Foster, Greer and Thorbecke (1984) that incorporates the most three common poverty indexes, such as the Headcount Ratio (H), the Poverty Gap (PG) and the Squared Poverty Gap (SPG). This class of measures is usually formulated as follows:

$$P(\alpha) = \frac{1}{n} \sum_{j=1}^{q} \left(\frac{z - y_j}{z} \right)^{\alpha} \tag{1}$$

where y_j is the income of each individual or household j with $j=1 \ldots q$ poor individuals among a population of n individuals. The poverty line is identified by z, while the term α is the weight given to income gaps below the poverty line.

When $\alpha=0$ the above formula becomes the Headcount Ratio, *P(0)*, the *Headcount Ratio* gives the incidence of poverty as follows:

$$P(0) = H = \frac{q}{n} \tag{2}$$

If $\alpha=1$ the formula becomes the *Poverty Gap*, *P(1)*, that describes the intensity of poverty:

[8] To deepen the notion of hybrid poverty lines, see Citro and Michael (1995).

$$P(1) = PG = \frac{1}{n}\sum_{j=1}^{q}\frac{z - y_j}{z} \tag{3}$$

Finally, if α=*2* the measure becomes the *Squared Poverty Gap* or *P(2)*, which gives the severity of the poverty, i.e. the inequality among poor people.

$$P(2) = SPG = \frac{1}{n}\sum_{j=1}^{q}\left(\frac{z - y_j}{z}\right)^2 \tag{4}$$

The greater the α term, the greater the weight given to the lower part of the income distribution, hence in the squared poverty gap, incomes far from the poverty line carries more weight.

Now, we assume that the population size, n, can be divided into k groups, mutually excludible, following a specific criterion that is able to define homogenous group, i.e. gender, age, ethnicity, regional location.

Each k groups has a specific absolute poverty line, z_i, where an absolute poverty line defines a minimum level of basic need that should be reached for being not poor. Differences in this minimum level of basic needs among groups might depend on different preferences in goods or services, differences in their availability and differences in their prices.

As already said, the reformulation of the FGT class of measures aims to identify a within component, poverty measured in each homogenous group, and the between component, which captures poverty among different groups. Hence the overall poverty, $P_{WB}(\alpha)$, is the sum between the within component, P_W, and the between component, P_B, as follows:

$$P_{WB}(\alpha) = P_W + P_B \tag{5}$$

where the within component takes the following formula:

$$P_W = \sum_{i=1}^{k} P_i^{\alpha}\frac{n_i}{n} \tag{6}$$

Looking at the within component, we can deduce that this within component is equal to the overall poverty if there is no difference among groups, P_B=*0*, as well as no difference among poverty lines, i.e. z_1=z_2=...=z_k. In any other case, PB$\neq$0 and $z_1 \neq z_2 \neq ... \neq z_k$.

Having k poverty lines, we arrange this set in a non-decreasing order. It is reasonable that in order to compute the between component we impose to compare each group with the wealthiest group, that means with the group with the *k-th* poverty line.

Now, we can write the reformulation of the three poverty indexes and individuate in each of them the within and between components.

The *Headcount ratio* can be written as follows:

$$H_{WB} = \sum_{i=1}^{k} H_i(z_i)\frac{n_i}{n} + \sum_{i=1}^{k-1} \left[H_i(z_k) - H_i(z_i)\right]\frac{n_i}{n} \tag{7}$$

where the first term identifies the within component, H_W, as a weighted average of the headcount ratios, and the second term represent the between component, H_B, where each headcount ratio is compared with the headcount ratio of the group taken as reference group. This second term can be split into a positive component, H_{B+}, i.e. the poverty level of each *k-1* groups, if the reference poverty line, z_k, were assumed as their poverty line instead of z_i, and a negative component, H_{B-}, that is what we already include in the within component.

Similarly, the *Poverty Gap* is defined by the following formula:

$$PG_{WB} = \sum_{i=1}^{k} PG_i(z_i)\frac{n_i}{n} + \sum_{i=1}^{k-1} \left[PG_i(z_k) - PG_i(z_i)\right]\frac{n_i}{n} \tag{8}$$

and the *Squared Poverty Gap* is defined as:

$$SPG_{WB} = \sum_{i=1}^{k} SPG_i(z_i)\frac{n_i}{n} + \sum_{i=1}^{k-1} \left[SPG_i(z_k) - SPG_i(z_i)\right]\frac{n_i}{n} \tag{9}$$

where, for both indexes, we can again identify the within component, as the first term, and the between component is the second term. Particularly, in the cases of the Poverty Gap and the Squared Poverty Gap, the within component is computed as a weighted average not only in term of population, as for the Headcount ratio, but also in term of relative gaps between z_i and z_k.

3 The profile of Brazilian poverty

This section provides a detailed investigation of Brazilian poverty and the distribution of welfare. In particular, in analyzing Brazilian conditions we strongly focus on regional disparities. Brazil is a country characterized by dramatic differences among geographical regions and these huge gaps are persistent across more than fifty years of Brazilian history (Baer, 2001, page 323).

Here, we simply restrain the analysis only for the year 2002. This is because the aim of this section is specifically to help to deepen the understanding of the Brazilian situation for 2002 in order to support the findings of the empirical exercises provided in the next section where the reformulation of the FGT class of poverty measures is applied to a 2002 dataset.

As already mentioned in the introductory section, this dataset is constructed by using the annual Brazilian household survey, called the *Pesquisa Nacional por Amostra do Domicilios* (PNAD). The PNAD is based on a nationally representative random sample of households and adopts a three multi-stage sampling

procedure, by selecting municipalities, census sectors and, finally, households[9]. In order to guarantee the representativeness of the sample, population weights are estimated. Hence, the PNAD for 2002 counts 409,152 individuals aggregated in 102,500 households, but the weighted individuals are 166,270,000.

From this survey we take the nominal households monthly income as measure of welfare that includes income from employment or self-employment, social insurance receipts for old-age, disability or survivor's pensions, sickness and maternity benefits, work injury and unemployment benefits and family allowances. Finally monthly income also considers other sources of incomes, such as rental incomes, dividends or interest payments on savings and investments.

Since income data refers to households instead of individuals, technical adjustments are needed in order to consider intra-household welfare. The adjustment of household income by adopting equivalence scales improves the reliability of the data because it takes into account the potential heterogeneity of individuals within households and the economies of scale.

When expenditure data are used, equivalence scales are mostly estimated by the adoption of two different techniques: the Rothbarth method, based on expenditure data on goods consumed by children versus adults, and the Engel method, based on the relation of food expenditure versus total expenditure[10].

When income data are exploited, the most common and simplest technique is to compute per capita income, i.e. to divide household income over household size. Hence per capita income, *pcy*, is defined by the following formula:

$$pcy_j = \frac{y_j}{n_j} \tag{10}$$

where y_j is the nominal monthly income for household *j*, with *j=1...n* and n_j is the household size for household *j*. Although largely adopted, the simple per capita adjustment tends to overestimate poverty, as Glewwe and Van der Gaag (1990) stressed in their paper.

So, the most common equivalence scales applied to income data requires weighting the household size, n, to a parameter θ that is defined among [0,1] (Buhnmann et al., 1988). In our case, we adopt an intermediate value, i.e. θ*=0.5*[11]. Hence, the equivalent income is given by the household income divided to the squared root of the household size as follow:

$$ey_{SQR_j} = \frac{y_j}{\sqrt{n_j}} \tag{11}$$

[9] While some municipalities are automatically included, some rural municipalities in the Northern states of Rondônia, Acre, Amazonas, Roraima, Parà, Amapà, are excluded because of their very low population density and their location in remote areas of the Amazonas. Moreover, it is estimated that these excluded municipalities count just for the 2.1% of the entire Brazilian population.

[10] For further discussion, see Deaton (1997, section 4.3).

[11] Buhmann et al.(1988) introduced this specification of using a parametric class of equivalence scale. Coulter et al. (1992) discussed the sensitivity of poverty and inequality measures in applying these scales. The value of 0.5 is the most used, as reported by Atkinson et al. (1995). The OECD countries normally use a value between 0.4 and 0.8.

However, more accurate techniques in constructing equivalence scales have been defined. The most famous equivalence scales adopted by OECD countries are the "OECD equivalence scale", also called "Oxford scale", and the "OECD-modified scale", adopted in the late '90s by EUROSTAT[12]. Since there is no universally accepted methods for defining equivalence scales, we adopt the old OECD equivalence scale weights 1 the first adult, 0.7 each additional adult and 0.5 each child (OECD, 1982). Hence the equivalent income is given by:

$$ey_{OECD_j} = \frac{y_j}{(1 + 0.7^{Aj} + 0.5^{Cj})} \tag{12}$$

where A_j is the number of adults minus the first one in the household j and C_j is the number of children in the household j.

In order to avoid the potential dangerous of adopting only per capita income in poverty and welfare analysis, we decide to pursue the analysis using three different adjustments of household income: per capita income, pcy; the equivalent income following the OECD approach, ey_{OECD}, where each individual has different weight and finally the equivalent income, ey_{SQR}, where the household income is divided by the squared root of the household size.

After computing these three different definitions of income, we are able to calculate some summary statistics of welfare for Brazil and for each geographical region[13].

Table 1 shows mean and median income values as well as the most common inequality indicator, the Gini coefficient for Brazil and its regions.

The discrepancies among values in applying different types of equivalence scales are striking: passing from per capita income to the equivalent income with θ=*0.5*, mean and median income values get consistently higher as well as the distribution of income becomes more equal. In fact, the Gini coefficient is bigger when per capita income is applied instead of the other two equivalent income values. Moreover, the ratio of mean over median income gets smaller corroborating the fact that the distribution of income becomes less skewed to the right.

The huge differences across Brazilian regions are even more striking. Figure 1 shows clearly how Brazilian welfare is not equally distributed among regions

[12] The old "OECD equivalence scale" has been substituted in the late '90s with the "OECD-modified scale" that assigns 0.5 to each additional adult and 0.3 to each children. This scale applied by EUROSTAT was firstly constructed by Haagenars et al. (1994).

[13] In the PNAD survey, the choice of geographic locations is among 27 different municipalities. To analyze Brazilian situation by region, these municipalities have been aggregated in the five geographical regions.

- North: Rondônia, Acre, Amazonas, Roraima, Parà, Amapà and Tocantis;
- North East: Maranhão, Piauì, Cearà, Rio Grande do Norte, Paraìba, Pernambuco, Alagoas, Sergipe, Bahia;
- South East: Minas Gerais, Espìrito Santo, Rio de Janeiro, São Paulo;
- South: Paranà, Santa Catarina, Rio Grande do Sul;
- Central West: Mato Grosso do Sul, Mato Grosso, Golàs, Distrito Federal.

and this pattern is consistent across all of the definitions of income we adopt.

Looking at the level of income, the poorest region is the North-East followed by the North, the South and the Central West[14]. The South-East is the richest geographical region of the country.

As already said, this pattern of regional disparities is well-known in Brazilian history. During the last century, the South-East region always dominated in term of regional distribution of national income as well as of population, while the North and the Central-West were typical the most depressed regions[15]. This allows us to recognize the important jump in term of contribution of Brazilian GDP made by the North and the Central-West regions and, at the same time, to detect a worrying depression for the North-East.

The distribution of income among regions tracks a trend similar to the one obtained from the levels of income. In fact, the most unequal region is the North-East with a Gini coefficient always higher than the value for the whole country. Then we find the Central-West, the North, the South-East and, finally, the South[16].

To deepen the investigation on Brazilian distribution of income, table 2 shows mean incomes per decile by region and the figures 2, 3 and 4 plot regional Lorenz curves using the three different types of income.

Again, the plots of Lorenz curves by different types of income confirm the previous findings in term of income distribution: the South and the South-East seem to be the least unequal Brazilian regions.

One more important issue should be stressed before moving to poverty indexes analysis. As reported in many publications[17], the data coming from national households surveys are often largely different to data elaborated by the National Accounts system.

Table 3 reports total GDP and per capita GDP, in 2002 Reais, provided by National Accounts data. Although we can easily detect sharp differences in regional distribution of GDP that follows and confirms the findings coming from survey's data, in terms of values, the Brazilian per capita income from National Accounts is roughly twenty times greater than per capita income computed using survey's data.

Finally, in the last column of table 3, the evolution of the volume of the added value is provided accumulated by period 1994-2002: the reported values

[14] The ranking between the South and the Central-West varies with the definition of income we look. Using per capita income the South is richer than the Central West, but if we use other two equivalent income values, we find the reversal.

[15] A detail description of changing in regional differences during the past century is well reported in Baer' book (Baer, 2001, chapter 14).

[16] In particular, if we use per capita income, the ranking is really clear: from the most unequal we have the North-East, the Central-West, the North, the South-East and, finally, the South. When we use both equivalent incomes, the ranking is, always starting from the most unequal: the North-East, then the Central-West and the North come together and, finally, together again, the South-East and the South.

[17] For further discussions on discrepancies between National Account data and Household Survey data, see Deaton (1997, section 1.2). Litchfield discussed this issue specifically for Brazil stressing the problem in comparing incomes coming from these two types of dataset (Litchfield, 2001, page 51).

confirm what we already said, i.e. the North and the Central-West are the two regions showing greater economic improvements.

The investigation of Brazilian welfare through levels and distributions of income among regions and across different definitions of income should couple with a detailed poverty profile study to draw a complete analysis.

As already mentioned, the identification of poor people can be conducted only when poverty lines are set. Having highlighted the issue of regional differences characterising the Brazilian situation, we have decided to adopt a set of absolute poverty lines constructed by Rocha (2003) on the basis of geographical differences.

It is important to underline that Brazil has experienced several definitions of poverty lines, most based on the concept of absolute poverty lines. Although the 1$ a day poverty line set by the World Bank has been sometimes used for international poverty comparison, the most common method to define Brazilian poverty lines has been the adoption of the minimum wage or its multipliers[18].

When consumption data became more available, poverty lines started to be assessed by using information on the structure of household consumption. The only two expenditure surveys that are available in Brazil are the *Pesquisa de Orçamentos Familiares* (POF) for 1987/88 and the *Estudo Nacional de Despensa Familiar* (ENDEF) for 1974/1975.

Referring to the literature that have tried to estimate Brazilian poverty lines based on consumption data[19], the choice of measuring poverty taking geographical differentiated poverty lines based is well-established and it provides more reliable results.

Rocha estimates geographically–specific poverty lines on the basis of the cost of basic needs approach[20]. Roughly speaking, this approach estimates the minimum cost of food in order to achieve the recommended calorie intake[21]. Obviously, food baskets vary across geographical locations, such as municipalities, metropolis, urban and rural areas, since preferences and prices change substantially. Rocha (2003) estimates the minimum cost of food baskets for nine metropolitan areas by adopting the POF survey and then she estimates the values for the urban and the rural areas by the implementation of conversion factors provided by Fava (1984) and based on the ENDEF survey. For the non-food expenditure component, she estimates for each metropolitan area adjusted values, avoiding the standard method that exploits the inverse of the Engel coefficient (Rocha, 1997). So, the final values of each geographically-specific poverty lines are the sum between the food and non-food components. In her

[18] Referring to Rocha (2003), among the most famous studies that constructed poverty lines on the basis of the minimum wage, we should remember Pfeffermam and Webb (1983), Hoffmann(1984), Fox and Morley(1991) and Tolosa (1991).

[19] Always referring to Rocha (2003), the first poverty lines estimations based on consumption data are Thomas (1982) and Fava (1984). Rocha (1988) estimates poverty lines using consumption data derived from ENDEF. Then, following studies adopt consumption data coming from the POF, such as Rocha (1993) and Rocha (2003).

[20] On the Basic Need approach, see Streeten et al. (1987).

[21] The minimum caloric requirement is estimated by FAO (1985), as Rocha said in her book (Rocha, 2003, page 54).

recent book (Rocha, 2003, page 73), she reported 24 specific poverty lines at the 1990-99 current prices.

To be able to measure poverty by region, we need to match Rocha's poverty lines areas with the five geographical regions, as reported in table 4. The values of these poverty lines are in 2002 prices: the conversion has been made using the CEPAL deflator equal to 166.1 with 1995 as base year (CEPAL, 2004).

By applying Rocha's poverty lines, we are able to compute the poverty indexes for Brazil and each its region together with their standard errors[22]. Poverty indexes outcomes are shown in table 5.

As we have assumed, poverty measures are sensitive to the choice of the income definition. Moving from per capita income to the two equivalent incomes, poverty noticeably shrinks across all indexes. For example, taking the Headcount ratio for the whole of Brazil, using per capita income, roughly 33% of the population is poor, while using the equivalence scale with the squared root of household size, only 10% of the population is considered poor. This is clearly a noteworthy distortion in assessing poverty.

Looking at regional differences, along all three definitions of income, the pattern that we found in income distribution analysis is reproduced. The North-East region is not only the most unequal region but also the poorest. There then follows the North and the Central-West, always with values largely above the Brazilian average across all notions of income we adopt. Finally, the South-East and the South are the regions that contain fewest poor people.

Moreover the figures 5, 6 and 7 give a clear picture of regional differences by poverty index using different definitions of income.

Having computed Brazilian poverty and income distribution via simple descriptive statistics, the worrying issue of regional gaps pushes us to go further into investigating the main characteristics of poor people by geographical region.

Hence, we sketch an accurate poverty profile by simply taking the Headcount ratio and analyzing characteristics of people below their poverty line for each region besides the entire Brazil. We provide this analysis in the tables 6, 7 and 8 using different definitions of income.

The most important characteristics of the poor people we explore are some individual characteristics of the household head, such as gender, age, race and level of schooling as well as characteristics of the household head related to her employment situation, i.e. if she is active, and works in a formal sector, in which economic sectors and in which position. Then, more general characteristics related to the whole family are considered, such as geographical location in regions and in urban or rural areas as well as family characteristics, i.e. the family size, the number of workers and children per family.

Looking at the three tables that report poverty profiles, it is noticeable that these patterns do not dramatically vary using different concepts of income. Obviously, what changes is the number of poor, as we previously highlighted[23],

[22] The standard errors have been calculated by applying Kakwani standard error.

[23] Previously, we stressed the discrepancies in poverty and income distribution outcomes when different definitions of income are applied. In particular, the adoption of per capita income tends to overestimate poverty.

but the composition is almost invariable.

On noticeable exception comes from the characteristic formal that identifies if the household head work in the formal sector. Roughly speaking, the majority of the poor have a household head working in the formal sector: there is not a net percentage of poor working informally, it depends on the region where they work and the type of income that we adopt. Particularly, it is noticeable that using per capita income the majority of poor household heads work in the formal sector, except for the North, while the more we adopt equivalence scales, the more we find out that the majority of poor household heads are attracted by the informal sector. In other words, the informal sector dominants when we consider only the people that are poor even when we adopt equivalence scales. Hence, very poor people work in the informal sector.

Another exception is given by the family size variable that shows dramatic changes when moving between income measures. In fact, using per capita income, the size of poor families varies across regions: in the North and in the North-East the majority of poor families have over 6 persons, while, in the rest of Brazil, poor families are on average four or five individuals. Adopting equivalence scale, the size of the poor family becomes constant around 4-5 individuals across all regions.

Focusing on profiles among regions, we find interesting similarities as well as disparities. The personal characteristics of the household head does not vary so much by region and on average it reveals a man aged between 35 and 45 years with an intermediate level of schooling as the typical household head among poor people.

What only changes among regions looking at personal characteristics of the household head is the race. Generally, the majority of Brazilian poor people are black while the non poor people are white: hence ethnicity can be considered as a crucial determinant of being poor in Brazil. More specifically, focusing on regional patterns, in the North, the North-East and the Central-West[24], the majority of the population is black, so both poor and non poor people are will tend to be predominantly black. The reverse is true in the South, where the population is prevalently constituted by white people. The most interesting pattern is given by the South-East that follows a pattern similar to the one when we consider the entire Brazil: the black people are mostly poor while the majority of non poor population is white.

Interestingly, the majority of the poor household heads are economically active. Having a job is not a critical determinant for not being poor; it probably depends mostly on the position of occupation and on the economic sector.

What seems to be really crucial for being poor is the level of education: almost all the household heads among the poor have an intermediate education. But very few people have attended high school and in all of the profiles we produce, nobody among poor household head has attended college. Although

[24]The Central-West follows the same pattern than the North and the North-East when equivalence scales are adopted. When per capita income is adopted, the Central-West reveals a situation similar to the South-East: the majority of poor people are black people, while the majority of non poor people are white people.

illiteracy is not a crucial problem for Brazil, the low level of returns on secondary school education and the lack of access to graduate and postgraduate education for the majority of the population is one of the most important determinants of Brazilian inequality and poverty[25].

As a likely consequence, the majority of the poor household heads work in blue collar professions without any significant variations across regions.

If the position on occupation is almost constant, the economic sectors where the poor household head is employed varies across regions. We can individuate two main groups: in the North and in the North-East, poor predominantly work in the sector of agriculture and trade; while in the South, the South-East and the Central-West, poor people are employed, not only in the agricultural and commercial sectors, but also in the sectors of construction and industry, particularly in the South.

Once again, the variable urban stresses that Brazilian poor are concentrated in urban areas.

Finally, observing the characteristics related to the family structure among poor people, we see that the majority of poor households have on average two or three workers per family as well as two or three children across all regions. On the contrary we have already highlighted that family size varies by regions, when we adopt per capita income, otherwise it remains almost constant. In particular, in the North and in the North-East the majority of the poor families have sizes over 6 persons, while, in the rest of Brazil, poor families are on average four or five individuals.

4 Empirical exercises on decomposability of the FGT class of measures

The empirical exercises we present in this section are based on the conceptual and analytical reformulation of the FGT class of poverty indexes carried on by Bottiroli-Civardi and Chiappero-Martinetti (2004) using the Brazilian households survey for 2002.

Starting from Rocha's (2003) definition of group-specific poverty lines by geographical location, the computation of poverty between and within these groups should provide additional information on the Brazilian poverty situation.

As already stated, this poverty decomposition allows us not only to compute the poverty levels within each homogeneous group, but also to capture the between-component that is otherwise ignored.

The within component is simply the sum of the poverty levels calculated for each homogeneous group by adopting its group specific poverty line. The between component is the aggregated value of some additional poverty levels that each group would have when it is compared with the reference group.

[25] A lot of publications on Brazilian welfare focus on education as the major determinant of income inequality and poverty, for example Ferreira and Paes de Barros (1999) and Ferreira and Litchfield (2001).

Table 9 shows the results of this poverty decomposition adopting homogenous geographically specific poverty lines with the better-off Brazilian group used as reference group. In particular, the wealthiest group of Brazil following Rocha's estimations is the metropolitan area of São Paulo.

The table reports the total values of the reformulated FGT class of measures together with their within and between components. Each absolute value of both components shown in the table is followed by its contribution in percentage points. These contributions to the whole measure of poverty allow us to detect which is dominant.

Below each poverty decomposition the table records the values for both components by region. It is important to highlight that each region is not a homogenous group, since we adopt 25 geographically specific groups. Hence, each region has more than one homogenous group. Checking for the contribution of each Brazilian region to either the within component or the between one might help in better understanding the whole picture.

Moreover, all computations have been made adopting the three different notions of income as we have already done in the previous section.

The table shows that the between component is clearly dominant. The only case where the within component is higher than the between one is for the Headcount Ratio by using per capita income.

Looking at how these values change when adopting different notions of income we can advance some explanations. As already stressed, when we use per capita income, poverty is overestimated and, consequentially, the estimated poverty within each homogenous group tends to be more relevant, especially if the index simply counts the proportion of poor as the Headcount Ratio.

When we adopt equivalent incomes, the more we take into account economies of scale, the more between and within components shrink: we are inflating income values exactly like when we lower the values of poverty lines.

Although the levels of both between and within components decrease, we can notice that it does not happened the same to the fractions. The proportion of the within components tends to increase while the proportion of the between components gets smaller. It might mean that the thresholds of differentiated poverty lines are really sensitive to shifts and that even negligible changes make the difference.

Hence we can conclude that the adoption of equivalent income, that takes into consideration economies of scale, increases the importance of the between component because it probably reduces the weight of the poverty within each homogenous group with respect to the poverty broken out from the comparison among different groups.

Another reflection arises when we observe poverty decomposition results across the three poverty measures. The trend passing from the poverty incidence to the poverty intensity and inequality is very similar to the one we have just explained: the more we look at the Poverty Gap and the Squared Poverty Gap, the bigger between components get. The measurements of poverty depth and severity are more sensitive to the between component than the poverty incidence.

As said earlier, the contribution of each Brazilian region in determining both

components can help to get a more complete picture of the situation. In line with what we said in the previous section, since the North-East is the region with biggest poverty and inequality levels, it is also the one that mainly contributes to either within and between components.

The second region that participates most is the South-East: this is a quite surprising result. Our previous investigations convey that the South-East is the richest region in terms of mean income, GDP values and traditional poverty measures. Clearly the outcomes of poverty measures reformulation add some important information.

One of the reasons for such differing results can be due to the fact that both components are weighted to the population share of each region and that the between component is very sensitive to the heterogeneity of the poverty lines values. In other words, the South-East is the most populated region and its poverty levels count more when the poverty measure takes into account population shares Moreover, the between component of this region is noticeably inflated by the great variability of its set of poverty lines.

A final remarkable comment is that the contribution of each region varies across poverty measures. In particular, the contribution of the North-East dominates moving from the Headcount Ratio to the Poverty Gap and the Squared Poverty Gap and diverges from the contribution of the South-East and other regions as well. It seems that when we consider poverty depth and severity the North-East is the region that performs worst.

It is important to highlight that between components have a central reason to be so dominant in this exercise of poverty decomposition. We are using an estimated population from a sample that covers the entire Brazil. Hence we are comparing a high number of homogenous groups with respect to a unique reference group for the entire country.

Having analyzed the huge differences in term of poverty and income distribution across the country, the between component is obviously dominant when we use a high number of very different poverty lines.

In order to run a more realistic and refined exercise, we think that it is necessary to apply this poverty decomposition by region, that means giving to each of the five geographical regions its own reference group that is always the wealthiest group for each region.

We believe that the thinking on poverty analysis that considers the notion of relative deprivation is really important. So it seems to be realistic to presume that a person not only compares her own situation within a group of people with similar personal and socio-economical characteristics, but she also compares herself with people with different characteristics that she has seen or with whom she experiences some kind of relationship.

Having supposed in our exercise that the heterogeneity among individuals depends on the geographical location, we find more reasonable to impose, for example, that an household living in the rural area somewhere in Amazons compares itself with people living there or if it wants to compare with different people it may think to compare with the wealthiest people living in Belem, the capital of that region, but for sure not with the wealth of São Paulo.

Table 10 provides findings from poverty decomposition by region following the same structure than table 9. Then we present a summary table with the relevant results in table 11.

At the top of this table, we give the outline of table 9, where poverty decomposition is computed with a unique reference group. The between component is dominant across different poverty indicators and using different definitions of income. Then, the table provides an overview of poverty decomposition by region.

Roughly speaking, the within component dominates for all of the indexes and for all different types of income in the North and in the Central-West. The pattern totally changes for the rest of the Brazilian regions, where the between component is dominant and the within component prevails for the Headcount Ratio only using per capita income or the equivalent income with the "mildest" economies of scale, the OECD equivalent income.

It is difficult to understand these findings that arose from poverty decomposition by region. So we suggest some observations that might be useful in interpreting this pattern.

First, the dominance of the between component is not dependent on the size of the sample of each region as well as to the number of groupings within each region, because the reformulation of the poverty indexes still holds the population principle.

Although the number of groupings for each region do not affect any outcomes, the population size of each group belong to each region is important in determining the weight of both components.

Hence, the mapping of the differentiated poverty lines, i.e. of each homogenous group, plays a crucial role in determining the dominance of the between or of the within component. In particular, the definition of the reference group, and its size in term of population, is fundamental in establishing the value of the between component.

Second, it seems that there is no evidence of a relation between the level of inequality of a region and the dominance of the between component in that region. We have presumed it in the earlier exercise at the beginning of this section, because it might be logical to infer that a high inequality affects poverty between groups component more than poverty within group component. Put in other words, inequality deepens potential discrepancies in welfare among heterogeneous groups.

From this second empirical exercise in decomposing poverty by region, this relation does not seem to hold. The North-East, the most unequal region of Brazil, shows in table 11 a pattern very similar to the two least unequal regions of the country from our computations in section 3, such as the South and the South-East. In particular, the most equal region of Brazil, the South, shows the highest dominance of the between component.

Going further, the inequality among different homogenous groups within regions matters because what is really crucial in determining the dominance of one of the two components is how income is distributed within each homogenous group and how sensitive is the thresholds of the poverty lines for each homo-

geneous group to shifts towards the wealthiest threshold within each region. So, to understand these findings, the understanding of the complex relationship existing among poverty and income inequality is very fundamental.

Looking at the table 10, the within component is strongly determined by the incidence, the intensity and the severity of the homogenous groups with a consistent weight in term of population size.

When the within component is huge, the between component needs to be large in order to dominate. On the contrary, when the within component is small, the between component does not need to be very large to dominate.

Between components tend to be large due to sharp changes in the poverty measures shifting from a poverty line to the wealthiest one and these variations depend not only to the simple changes in poverty measures, but also to the weights of each group in term of population.

Moreover, since we know that the negative term of the between component is nothing else than the within component without the value for the wealthiest group, between components might be inflated by big values in the poverty measures for the reference group.

So, what we find is that in the North the within component dominates due to the high level of poverty in all homogenous groups. Moreover, the negative term of the between component reduces the overall between component. The North-East has a large within component, but the sharp differences among groups generate huge values for between components that finally dominate.

The South-East shows a small within component because of the low level of poverty in this region with respect to the two previous ones. Hence the variation given by the between component does not have to be very large to dominate the within component. The South shows an even more remarkable situation. Since this region has the lowest level of poverty, its within component is very low. Finally, the Central-West presents a situation similar to the North because of the high level of poverty within each homogenous group.

To sum up, the within component is dominant in the North and the Central-West due to the high level of poverty within each group. Although the North-East is the region with the highest level of poverty, this region follows a pattern similar to the South-East and the South where poverty levels are lower and between components dominate, only because its very high poverty level is offset by the sharp variations in poverty measures, when we change the poverty line, making the between component dominant. And this happens due to the high level of inequality of the North-East.

5 Conclusions

The aim of this paper was to interpret the empirical findings coming out from the application of Bottiroli-Civardi and Chiappero-Martinetti's (2004) poverty measures reformulation on Brazilian household survey data for 2002.

The reformulation aims to decompose poverty into between and within components by applying group-specific poverty lines. Since the empirical exercises have been made using Brazilian data, we applied a geographically specific poverty lines provided by Rocha (2003) to identify homogenous groups. This choice was mainly due to the fact that Brazil is a country characterized by sharp regional discrepancies. Thus geographical location might be considered a significant criterion to divide the country into homogeneous groups.

After presenting in section 2 the conceptual and analytical framework of this alternative approach that reformulates poverty indexes, section 3 gave a detailed description of Brazilian situation in order to better understand our empirical exercises provided in section 4. Indeed in this last section we run two empirical exercises of poverty decomposition. First we referred to the whole country and we applied a unique reference group, the wealthiest metropolitan area of Brazil, São Paulo. We found that the between component dominates due to the huge differences among all of the Brazilian homogenous groups with respect to the metropolitan area of São Paolo.

Then, being aware of the deep differences among Brazilian regions, we run the poverty decomposition by region that means giving to each region its own regional reference group. This second and more refined exercise gave interesting results we can sum up as follows. The North and the Central-West analysis revealed a dominance of the within component, likely due to the high level of poverty shown by these two regions. The other three regions showed a similar pattern where the between component is dominant, although these regions present very dissimilar situations. More precisely, the South and the South-East had the lowest level of poverty, so between components easily dominate over within ones. The North-East showed the highest level of poverty, even higher than the North and the Central-West, but the big within component is counterbalanced by a bigger between component, attributable to the high level of inequality of the North-East.

Looking at these findings, we believe that this poverty decomposition between and within groups is more informative than the standard approach when differentiated poverty lines are adopted.

This alternative way of measuring poverty remarks the importance of keeping separate poverty and inequality analysis. Indeed both analyses are important and they do not substitute to each other. As Sen already claims, poverty and inequality are two separate concepts[26].

This is important especially under the point of view of policy implications. When an inequality rise is detected, policy makers should be more focused on fiscal policies and particularly on policies about social mobility that could

[26] For more details, see Sen (1983a).

improve income distribution at least in the long run. On the contrary when poverty increases it is much more a matter of fight against starvation.

To sum up, we should be aware that behind the interpretation of the dominance of the between or the within component lies a deep understanding of the complex relationship among poverty levels, income distributions and the robustness of poverty lines. This last remark renews the importance of having a critical eye in interpreting synthetic indexes of poverty.

Bibliography

Atkinson, A.B., (2002), Multidimensional Deprivation: Contrasting Social Welfare and Counting Approaches, mimeo, Nuffield College, Oxford;

Atkinson, A.B., L. Rainwater and T.M. Smeeding, (1995), Income Distribution in OECD Countries, OECD Social Policy Studies, No. 18, Paris: OECD;

Baer, W., (2001), The Brazilian Economy, Growth and Development, 5th Edition, Wesport: Praeger Publishers;

Baulch, R., (1996), Neglected Trade-Offs in Poverty Measurement, IDS Bulletin, 27(1):36-42;

Bibi, S., (2003), Measuring Poverty in a Multidimensional Perspective: A Review of Literature, mimeo, CIRPEE, Université Laval, Quebec, Canada;

Bottiroli-Civardi, M., and E. Chiappero-Martinetti, (1999), Strutture Familiari e Povertà: un Rapporto tra diversi Metodi di Analisi, Ricerche Qualitative per la Politica Economica 1997, Banca d'Italia;

Bottiroli-Civardi, M., and E. Chiappero-Martinetti, (2004), Poverty between and within groups: a reformulation of the FGT class of index, Quaderni di Dipartimento di Economia Pubblica e Territoriale, No.3, mimeo, University of Pavia;

Bourguignon, F., and S.R. Chakravarty, (2003), The Measurement of Multidimensional Poverty, Journal of Economic Inequality, 1:25-49;

Buhmann, B., L. Rainwater, G. Schmaus and T. Smeeding, (1988), Equivalence Scales, Well-being, Inequality and Poverty: Sensitivity Estimates across Ten Countries using the Luxembourg Income Study database, Review of Income and Wealth, 34:115-142;

CEPAL, (2004), Statistical Yearbook for Latin America and the Caribbean, Santiago de Chile: ECLAC;

Citro, C.F., and R.T. Michael, (1995), Measuring Poverty: a new approach, National Academy Press, Washington D.C.;

Coulter, F.A.E., F.A. Cowell and S.P. Jenkins, 1992, Equivalence Scale Relativities and the Extent of Inequality and Poverty, Economic Journal, 102:1067-82.

Deaton, A., (1997), The Analysis of Household Survey: A Microeconometric Approach to Development Policy, Baltimore and London: John Hopkins Press and World Bank;

FAO, (1985), Necessidades de energia e proteinas, Série Informes Técnicos, No.724, Geneva: FAO/WHO;

Fava, V. L., (1984), Urbanização, Custo de Vida e Pobreza no Brasil, Série Ensaios económicos, Vol.37, São Paulo: IPE/USP;

Ferreira, F.H.G., P.G. Leite and J.A. Litchfield, (2006), The Rise and Fall of Brazilian Inequality: 1981-2004, World Bank Policy Research Working Paper 3867;

Ferreira, F.H.G., and J.A. Litchfield, (2001), Education or Inflation? The Micro and Macroeconomics of the Brazilian Income Distribution during 1981-1995, in N. Hicks and A. Valdés (eds) Especial Edición de Cuadernos de Economía [Latin American Journal of Economics], 114:209-238;

Ferreira, F.H.G. and R. Paes de Barros, (1999), The Slippery Slope: Explaining the Increase in Extreme poverty in Urban Brazil, 1976-1996, Brazilian Review of Econometrics, 19(2);

Foster, J., J. Greer, and Eric Thorbecke, (1984), A Class of Decomposable Poverty Measures, Econometrica, 52:761-65;

Fox, M.L. and S.A. Morley, (1991), Who Paid the Bill? Adjustment and Poverty in Brazil, 1980-95, World Bank Policy, Research and External Affairs Working Paper No.648, Washington, D.C.: World Bank;

Glewwe, P., and J. Van der Gaag, (1990), Identifying the Poor in Developing Countries: Do Different Definitions Matter?, World Development, 18(6):803-14;

Haagenars, A. K., K. de Vos and M. A. Zaidi, (1994), Poverty Statistics in the Late 1980s: Research Based on the Micro-Data, Office for Official Publications of the European Communities, Luxembourg;

Hoffmann, R., (1984), Pobreza no Brasil, Série Estudos e Pesquisas, No.43, Piracicaba: Esalq;

IBGE, (2002), Pesquisa Nacional por Amostra de Domicilio: Notas Técnicas-2002, Rio de Janeiro: IBGE;

IBGE, (2005), Conta Regionais do Brasil, 2002, Rio de Janeiro: IBGE ed.;

Lipton, M., and M. Ravallion, (1995), Poverty and Policy, in Behrman J., and Srinivasen T. N., (eds), Handbook of Development Economics, vol. 3B, Amsterdam: Elsevier;

Litchfield, J. A., (2001), Welfare and Income Distribution in Brazil, 1981-1995, Ph.D. Dissertation, London: London School of Economics;

OECD, (1982), The OECD List of Social Indicators, Paris: OECD;

Pfefferman, G. and R. Webb, (1983), Pobreza e Distribuição de Renda no Brasil, Revista Brasileira de Economia, 37(2);

Ray, D., (1998), Development Economics, Princeton University Press;

Rocha, S., (1988), A incidência da pobreza na primeira metade da década de 80, Texto para Discussão, Rio de Janeiro: IPEA/Dipes;

Rocha, S., (1993), Poverty Lines for Brazil. New Estimates from recent empirical evidence, Relatório para o Banco Mundial;

Rocha, S., (1997), Do Consumo observado à Linha de Pobreza, Pesquisa e Planejamento Economico, IPEA, 27(2): 313-52;

Rocha, S., (2003), Pobreza no Brasil, Afinal, de que se trata?, Rio de Janeiro: Editora FGV;

Sen, A., (1976), An Ordinal Approach to Measurement, Econometrica, 44:219-232;

Sen, A., (1983a), Poor, Relatively Speaking, Oxford Economic Papers, New Series, 35(2):153-169;

Sen, A., (1983b), Poverty and Famines: An Essay on Entitlement and Deprivation, Oxford: Oxford University Press;

Sen, A., (1985), Commodities and Capabilities, Amsterdam: North Holland;

Sen, A., (1992), Inequality Reexamined, Oxford: Oxford University Press;

Tolosa, H.C., (1991), Pobreza no Brasil: Uma Avaliação dos Anos 80, in J.P. dos Reis Veloso, (ed.), A Questão Social no Brasil, São Paulo: Nobel;

Wodon, Q., (2000), Poverty and Policy in Latin America and the Caribbean, World Bank Technical Paper No.467, mimeo, Washington D.C.: World Bank;

World Bank, (2001), World Development Report 2000/2001: Attacking Poverty, Washington D.C.: World Bank.

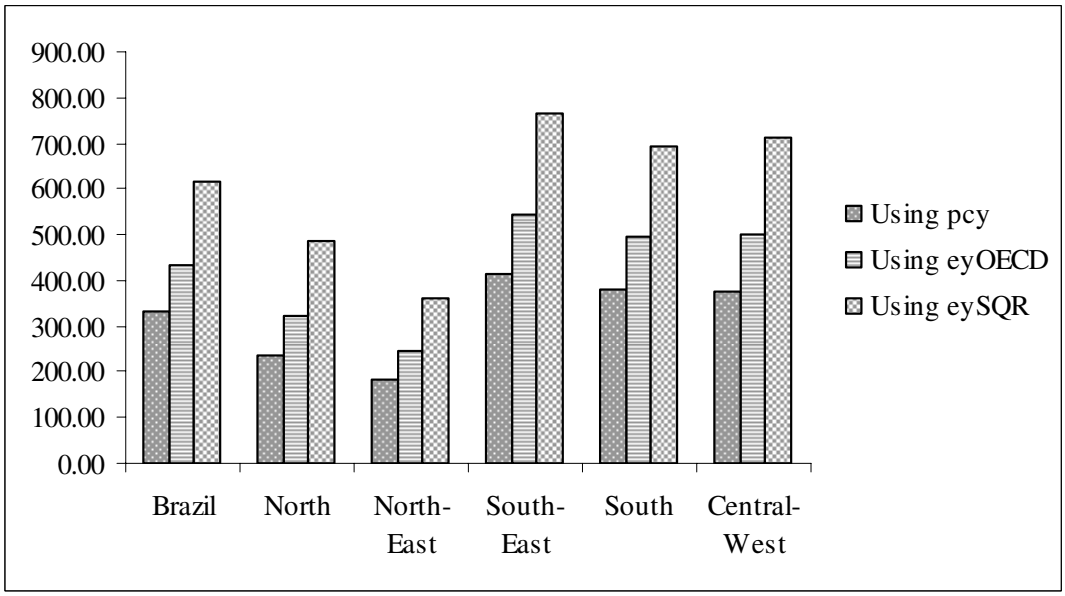
Appendix

Table 1: Summary statistics for Brazilian regions using three different type of income, 2002

	Mean	Median	Gini
Using pcy			
Brazil	329.85	171.43	0.58
North	237.51	126.67	0.56
North-East	181.89	92.50	0.59
South-East	415.89	226.67	0.55
South	378.59	225.00	0.52
Central-West	377.57	187.50	0.58
Using ey_{OECD}			
Brazil	433.26	232.56	0.56
North	323.48	181.25	0.54
North-East	243.30	127.78	0.57
South-East	541.87	305.26	0.54
South	495.38	300.00	0.51
Central-West	499.47	249.46	0.57
Using ey_{SQR}			
Brazil	617.89	339.41	0.55
North	484.31	281.17	0.53
North-East	359.77	200.00	0.56
South-East	765.97	447.21	0.53
South	692.36	425.00	0.50
Central-West	713.18	357.77	0.56

Source: Author's calculations from the PNAD 2002.

Figure 1: Regional differences in mean values using different definition of income, 2002



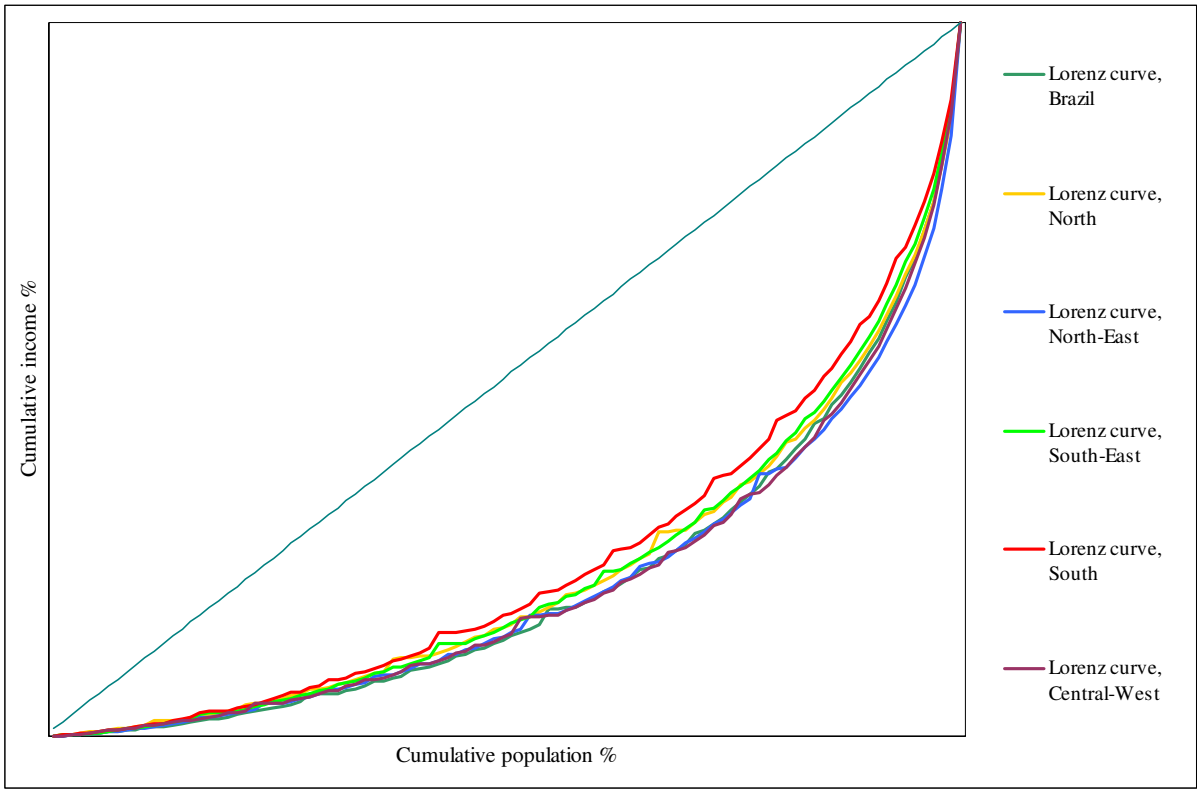
Source: Author's calculations from the PNAD 2002.

Table 2: Mean income per Decile by Region, 2002

	North	North-East	South-East	South	Central-West	Brazil
Using pcy						
1	30.54	18.81	48.50	48.04	42.82	30.83
2	53.08	36.81	89.36	89.38	76.67	59.80
3	71.59	50.76	124.13	125.13	103.68	88.42
4	92.63	65.06	161.69	163.55	135.63	119.20
5	115.21	81.88	204.23	204.03	169.40	152.59
6	142.80	102.63	255.11	253.74	207.57	194.59
7	184.12	133.08	328.15	319.08	268.48	251.85
8	243.07	180.06	443.98	428.39	381.09	346.19
9	368.71	264.45	672.95	625.54	607.84	534.15
10	1078.60	894.35	1834.12	1556.51	1798.50	1533.37
Using ey_{OECD}						
1	46.48	28.44	70.80	70.50	63.91	45.99
2	79.17	55.00	127.16	127.34	110.97	87.06
3	105.40	74.45	174.28	177.29	146.11	122.31
4	131.32	93.20	220.79	223.42	184.35	161.58
5	162.89	115.65	274.48	272.39	225.99	206.45
6	200.29	142.48	342.55	337.79	278.87	260.73
7	250.65	180.20	433.76	420.83	359.07	338.24
8	332.84	234.85	582.25	549.80	504.32	458.68
9	499.82	351.25	878.88	799.12	805.77	700.09
10	1429.88	1159.77	2314.93	1985.03	2321.38	1953.58
Using ey_{SQR}						
1	73.65	44.09	105.89	103.81	92.11	70.80
2	122.55	87.10	186.80	182.61	158.63	131.26
3	161.70	114.70	251.28	250.28	211.31	183.23
4	202.97	143.21	319.45	316.19	265.24	237.86
5	251.63	181.54	400.28	389.00	325.53	300.80
6	308.07	221.00	496.14	477.06	405.61	380.59
7	384.01	271.20	625.52	595.50	518.46	489.57
8	505.33	349.64	838.44	777.19	723.02	659.68
9	755.47	519.82	1251.30	1126.04	1166.88	1005.29

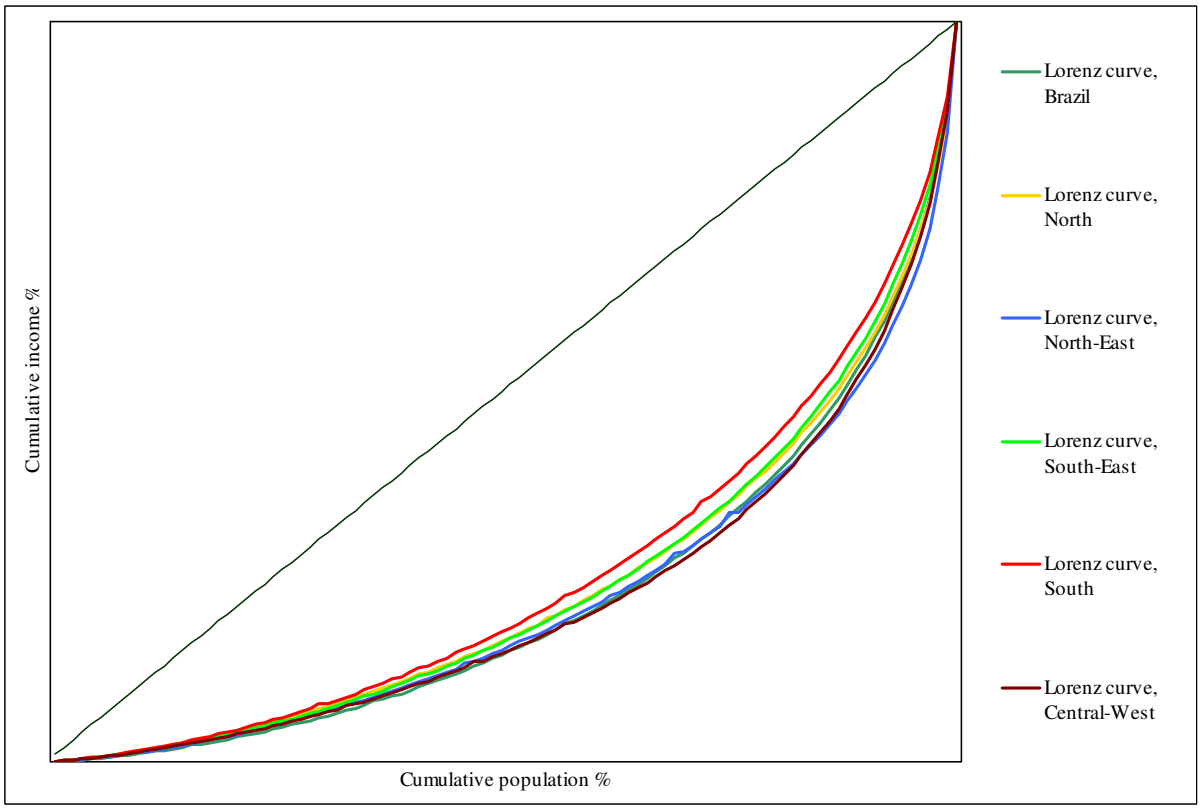
Source: Author's calculations from the PNAD 2002.

Figure 2: Lorenz curve using pcy



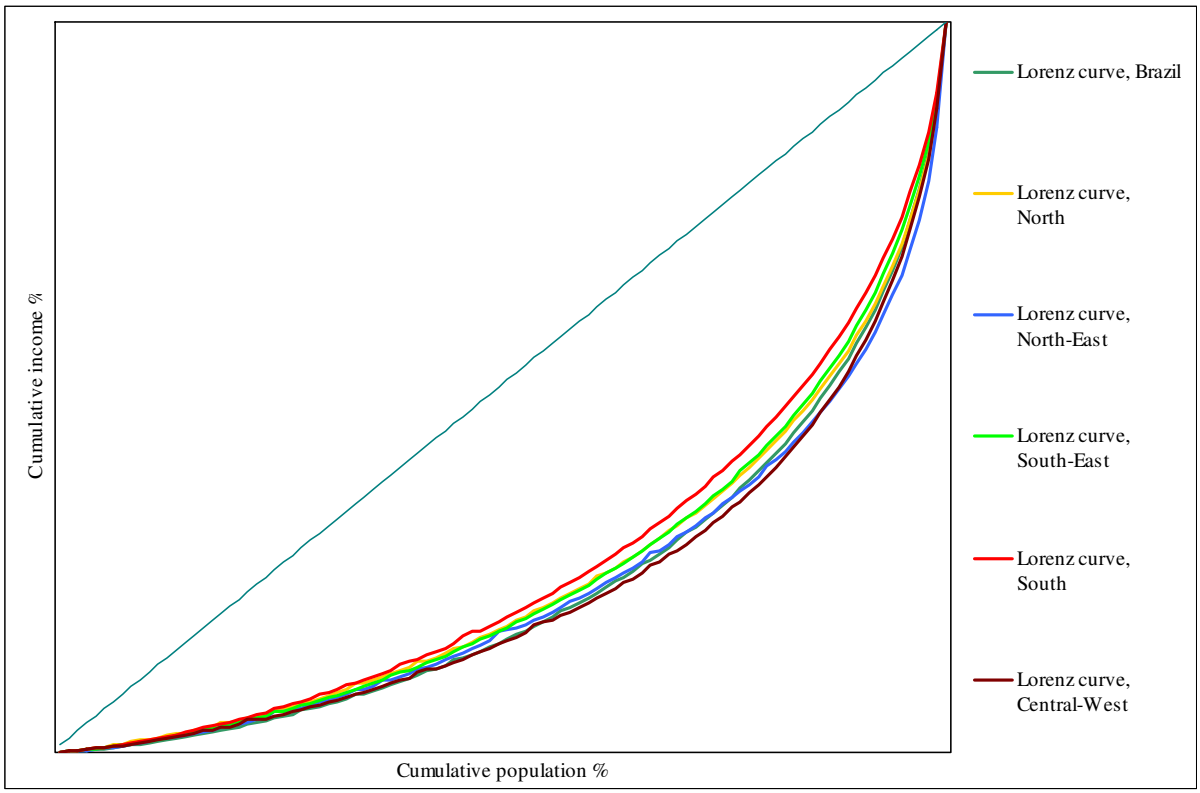
Source: Author's calculations from the PNAD 2002.

Figure 3: Lorenz curve using ey_{OECD}



Source: Author's calculations from the PNAD 2002.

Figure 4: Lorenz curve using ey_{SQR}



Source: Author's calculations from the PNAD 2002.

Table 3: General indicators of Brazilian economy from National Account, 2002

	GDP, total (in millions of $R)	GDP, per capita (in $R)	Value Added[(a)], %
Brazil	1,346,028	7,631	0.24
North	67,790	4,939	0.51
North-East	181,933	3,694	0.22
South-East	758,374	10,086	0.2
South	237,729	9,157	0.23
Central-West	100,202	8,166	0.36

(a) The evolution of the volume of the value added is accumulated by period 1994-2002;
Source: IBGE, (2005), *Conta Regionais do Brasil*, 2002, Rio de Janeiro: IBGE ed.

Table 4: Brazilian per capita poverty lines, in 2002 prices

Geographical Regions matched with Rocha's Regions		Value (in $R)
Region 1: North		
Region VII	Metropolis of Belem	119.99
	Urban	104.59
	Rural[(a)]	77.64
Region 2: North-East		
Region V	Metropolis of Fortaleza	119.82
	Metropolis of Recife	163.97
	Metropolis of Salvador	153.43
	Urban	102.83
	Rural	62.02
Region 3: South-East		
Region I	Metropolis of Rio de Janeiro	164.79
	Urban	102.53
	Rural	74.84
Region II	Metropolis of São Paulo	198.57
	Urban	126.88
	Rural	79.83
Region IV	Metropolis of Belo Horizonte	136.38
	Urban	91.69
	Rural	54.28
Region 4: South		
Region III	Metropolis of Curitiba	134.03
	Metropolis of Porto Alegre	103.45
	Urban	89.16
	Rural	60.11
Region 5: Central-West		
Region VI	Brasilia	189.06
Region VIII	Goiania	177.53
	Urban	135.17
	Rural[(a)]	77.64

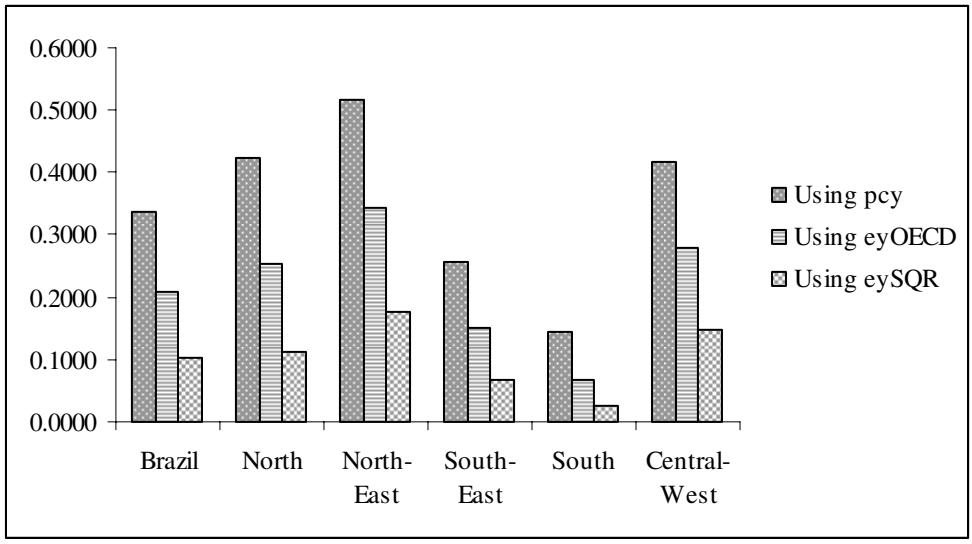
Source: Rocha, 2003, re-adapted by the Author.
(a) We impute to the rural poverty line for Region VII, the same value of the rural poverty line for Region VIII, following Ferreira and Litchfield (2001).

Table 5: Summary statistics of FGT class of measures by region, 2002

	Headcount	Poverty Gap	Squared Poverty Gap
Using pcy			
Brazil	0.3359	0.1357	0.0742
	(0.0019)	(0.0010)	(0.0007)
North	0.4225	0.1681	0.0897
	(0.0060)	(0.0032)	(0.0022)
North-East	0.5156	0.2247	0.1292
	(0.0035)	(0.0021)	(0.0015)
South-East	0.2582	0.0968	0.0500
	(0.0030)	(0.0014)	(0.0010)
South	0.1455	0.0480	0.0236
	(0.0035)	(0.0015)	(0.0009)
Central-West	0.4173	0.1729	0.0950
	(0.0053)	(0.0029)	(0.0021)
Using ey_{OECD}			
Brazil	0.20845	0.0733	0.0369
	(0.0016)	(0.0007)	(0.0005)
North	0.25228	0.0840	0.0402
	(0.0055)	(0.0023)	(0.0015)
North-East	0.34189	0.1297	0.0684
	(0.0034)	(0.0017)	(0.0011)
South-East	0.15213	0.0487	0.0231
	(0.0025)	(0.0010)	(0.0007)
South	0.06715	0.0212	0.0100
	(0.0025)	(0.0010)	(0.0006)
Central-West	0.27778	0.0974	0.0482
	(0.0049)	(0.0023)	(0.0015)
Using ey_{SQR}			
Brazil	0.1014	0.0321	0.0156
	(0.0012)	(0.0005)	(0.0003)
North	0.1113	0.0314	0.0143
	(0.0038)	(0.0014)	(0.0008)
North-East	0.1779	0.0594	0.0300
	(0.0027)	(0.0012)	(0.0007)
South-East	0.0676	0.0202	0.0094
	(0.0017)	(0.0007)	(0.0004)
South	0.0271	0.0088	0.0042
	(0.0015)	(0.0006)	(0.0004)
Central-West	0.1479	0.0447	0.0207
	(0.0039)	(0.0015)	(0.0010)

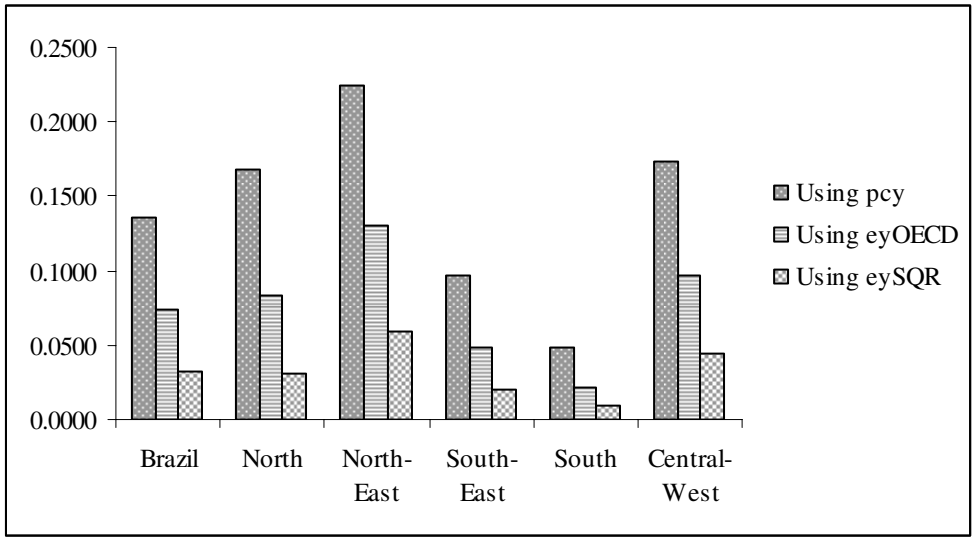
Source: Author's calculations from the PNAD 2002.

Figure 5: Regional differences in the Headcount ratio using different definitions of income, 2002



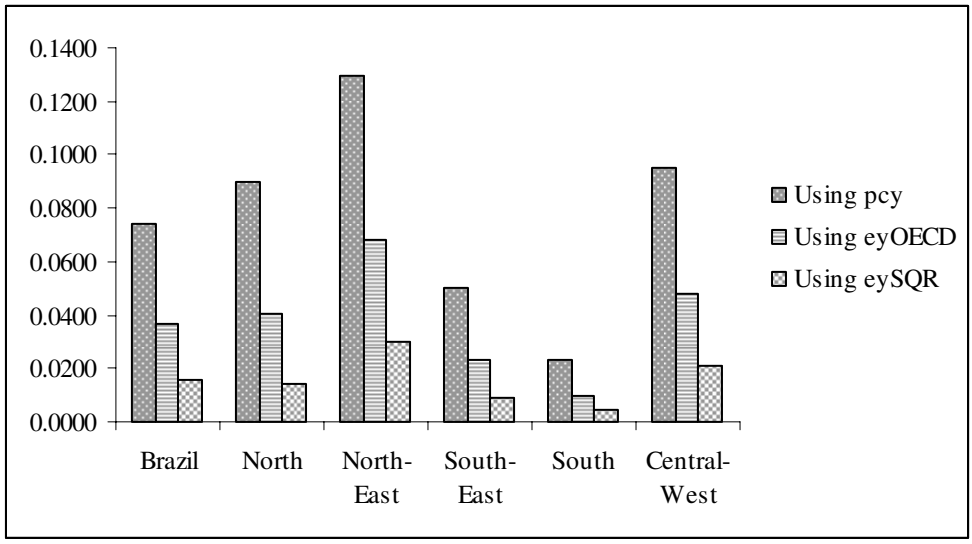
Source: Author's calculations from the PNAD 2002.

Figure 6: Regional differences in the Poverty Gap using different definitions of income, 2002



Source: Author's calculations from the PNAD 2002.

Figure 7: Regional differences in the Squared Poverty Gap using different definitions of income, 2002



Source: Author's calculations from the PNAD 2002.

Table 6: The profile of Poverty in Brazil by region using per capita income, 2002

	North		North-East		South-East		South		Central-West		Brazil	
	poor	non poor	poor	non poor	poor	non poor	poor	non poor	poor	non poor	poor	non poor
Gender of Head of HH												
Male	2952331	4239647	19365278	17896389	13882446	42009091	2858008	17509514	3848113	5430571	42906176	87085216
Female	1203797	1441430	5217389	5197775	4624575	11162677	820765	4097683	1071707	1440124	12938233	23339688
Age of Head of HH												
x<25	248242	257438	1324504	728837	868864	1547019	224251	786671	319270	279726	2985131	3599691
25=<x=<34	1122005	1161434	5778293	3553170	4826609	8465348	948758	3892563	1328916	1365219	14004581	18437734
35=<x=<44	1179686	1539685	7159282	5088201	6086489	14163806	1278860	6210164	1543938	1914199	17248256	28916056
45=<x=<54	868200	1285335	5290208	5045182	3538075	13390075	695288	5136248	908487	1636028	11300258	26492868
55=<x=<64	458869	799274	3069470	4231698	1890575	8245966	366699	3004532	502955	985305	6288568	17266776
x=>65	279126	637911	1960910	4447076	1296409	7359554	164917	2577019	316254	690218	4017616	15711778
Race of Head of HH												
White	887558	1777840	5867733	7924158	8623287	35623066	2527471	18076685	1618747	3468296	19524796	66870045
Black	3264611	3882642	18659509	15123776	9863469	17095126	1146220	3430528	3287364	3350181	36221173	42882253
Asian	3959	20595	55425	46230	20265	453576	5082	99984	13709	52218	98440	672603
Education of Head of HH												
illiterate	909918	930766	7324893	5257045	2700487	4952087	522239	1977648	875376	833583	12332913	13951129
elementary	915619	1104314	6906651	6470349	5018686	15243171	1058602	6621857	1178366	1437540	15077924	30877232
intermediate	2317454	3238623	10306084	9556535	10628715	26285495	2089256	10851096	2838339	3694786	28179848	53626536
high school	13137	383860	45039	1711072	159133	6342167	8676	2038532	27739	849612	253724	11325243
college plus	0	23514	0	99163	0	348848	0	118064	0	55174	0	644763
Head of HH Economically Active												
active	3387353	4721167	20413558	18083942	15163630	41758308	3139454	18245738	4167255	5836235	46271248	88645392
no active	768775	959910	4169109	5010222	3343391	11413460	539319	3361459	752565	1034460	9573159	21779512
Head of HH in Formal Sector												
formal	2040203	3735322	12805047	14249555	9483432	34427146	1937883	14877954	2613635	4766353	28880200	72056328
informal	2115925	1945755	11777620	8844609	9023589	18744622	1740890	6729243	2306185	2104342	26964208	38368572
Sectoral Distribution												
agriculture	635965	498786	8775486	5651579	2084038	4319444	1022360	3837267	935176	977857	13453025	15284933
industry	478172	673785	1500360	1734912	2046482	8025041	365984	3432576	459737	638520	4850735	14504834
construction	459114	465259	2132714	1322236	2420555	4424691	496627	1808887	690576	486908	6199586	8507981
trade	523385	936842	2574370	2931022	2157338	7015039	310968	2921470	556033	1172936	6122094	14977309
tourism	137976	145779	575652	531348	598047	1514565	69815	497951	155119	187128	1536609	2876771
transports	170104	339545	691943	1177912	820920	3595215	97118	1248680	212878	433439	1992963	6794791

public adm	154667	599100	562911	1462531	433261	2534795	54553	1038932	128223	649875	1333615	6285233
health, educ, etc.	499673	708018	1914900	2098037	2034346	5464090	352312	1895457	562252	723226	5363483	10888828
others	1097072	1313963	5854331	6184587	5912034	16278888	909036	4925977	1219826	1600806	14992299	30304220
Occupation of Head of HH												
professional/technicians	76616	681979	383390	2296981	241328	7272508	28836	2572794	104152	1195680	834322	14019942
intermediate	1339380	1937897	5563723	5648673	5720370	14845684	778686	5181090	1420981	2010479	14823140	29623824
blue collars	2740132	3061201	18635554	15148510	12545323	31053576	2871251	13853313	3394687	3664536	40186948	66781136
Region of Family												
North	-	-	-	-	-	-	-	-	-	-	4156128	5681077
North-East	-	-	-	-	-	-	-	-	-	-	24582668	23094164
South-East	-	-	-	-	-	-	-	-	-	-	18507020	53171768
South	-	-	-	-	-	-	-	-	-	-	3678773	21607196
Central-West	-	-	-	-	-	-	-	-	-	-	4919820	6870695
Location of Family												
urban	3989239	5522631	17267562	16397496	16746869	49023791	2789153	17795689	4200588	6092020	44993412	94831624
rural	166889	158446	7315105	6696668	1760152	4147977	889620	3811508	719232	778675	10850998	15593274
Family Size												
1	8969	150216	88858	868623	69365	2124128	12759	750443	22064	328229	202015	4221639
2-3	490502	1565864	3444370	7491863	3404354	19989454	572038	8427501	1003801	2429689	8915065	39904372
4-5	1545152	2461671	9928475	9695492	8615806	24395330	1729001	10018116	2493217	3204347	24311652	49774956
over 6	2111505	1503326	11120964	5038186	6417496	6662856	1364975	2411137	1400738	908430	22415678	16523935
Numbers of Workers per Family												
0	191899	180056	1197739	1439359	985768	3336644	171945	1096057	199680	294478	2747031	6346594
1	1631025	1347648	7816155	5288732	6982983	13406083	1292091	5055696	1821470	1652831	19543724	26750990
2-3	1773683	3182627	11721982	12682983	8836262	29994470	1892013	12989010	2453927	4049914	26677868	62899004
4-5	465693	809657	2987071	3018317	1472689	5744868	289280	2282202	371479	805709	5586212	12660753
over 6	93828	161089	859720	664773	229319	689703	33444	184232	73264	67763	1289575	1767560
Number of Children per Family, 0-14												
0	363000	1854293	3056725	9999362	2767151	25580651	347289	9135806	846356	3155381	7380521	49725492
1	721559	1764603	5492904	7025455	4266199	15593736	776976	6846870	1233092	1972411	12490730	33203076
2-3	1977883	1833729	11075341	5525120	8930245	11376569	1797566	5303491	2285031	1651265	26066066	25690174
over 4	1093686	228452	4957697	544227	2543426	620812	756942	321030	555341	91638	9907092	1806159

Source: Author's calculations from the PNAD 2002.

Table 7: The profile of Poverty in Brazil by region using ey_{OECD}, 2002

	North		North-East		South-East		South		Central-West		Brazil	
	poor	non poor	poor	non poor	poor	non poor	poor	non poor	poor	non poor	poor	non poor
Gender of Head of HH												
Male	1711707	5480271	12776537	24485130	7935774	47955763	1285645	19081877	2556030	6722654	26265692	103725695
Female	770057	1875170	3523745	6891419	2968615	12818637	412397	4506051	719082	1792749	8393896	27884026
Age of Head of HH												
x<25	148294	357386	948960	1104381	516288	1899595	106294	904628	223330	375666	1943166	4641656
25=<x=<34	686808	1596631	3963600	5367863	2700091	10591866	420586	4420735	863308	1830827	8634393	23807922
35=<x=<44	740254	1979117	4927709	7319774	3663402	16586893	585695	6903329	1032281	2425856	10949341	35214968
45=<x=<54	503600	1649935	3622417	6712973	2152535	14775615	328248	5503288	607836	1936679	7214636	30578490
55=<x=<64	259727	998416	1844599	5456569	1144838	8991703	191537	3179694	337366	1150894	3778067	19777276
x=>65	143081	773956	992997	5414989	727235	7928728	65682	2676254	210991	795481	2139986	17589408
Race of Head of HH												
White	509215	2156183	3756554	10035337	4904289	39342064	1122054	19482102	1042935	4044108	11335047	75059794
Black	1969314	5177939	12508642	21274643	5989273	20969322	573825	4002923	2226857	4410688	23267911	55835515
Asian	3235	21319	35086	66569	10827	463014	2163	102903	5320	60607	56631	714412
Education of Head of HH												
illiterate	560708	1279976	4888341	7693597	1657290	5995284	257615	2242272	621471	1087488	7985425	18298616
elementary	521960	1497973	4481303	8895697	3091185	17170672	537017	7143442	788267	1827639	9419732	36535424
intermediate	1394314	4161763	6903984	12958635	6086316	30827894	903050	12037302	1855365	4677760	17143028	64663352
high school	4782	392215	26654	1729457	69598	6431702	360	2046848	10009	867342	111403	11467564
college plus	0	23514	0	99163	0	348848	0	118064	0	55174	0	644763
Head of HH Economically Active												
active	1973846	6134674	13618942	24878558	8773303	48148635	1413349	19971843	2730557	7272933	28509996	106406643
no active	507918	1220767	2681340	6497991	2131086	12625765	284693	3616085	544555	1242470	6149592	25203078
Head of HH in Formal Sector												
formal	1086971	4688554	8288650	18765952	4901847	39008731	753559	16062278	1578181	5801807	18050380	47282400
informal	1394793	2666887	8011632	12610597	6002542	21765669	944483	7525650	1696931	2713596	16609208	84327320
Sectoral Distribution												
agriculture	390608	744143	5931168	8495897	1216590	5186892	488526	4371101	672231	1240802	8699123	20038836
industry	269965	881992	898842	2336430	968546	9102977	115188	3683372	265571	832686	2518112	16837456
construction	240038	684335	1363649	2091301	1394616	5450630	222845	2082669	450804	726680	3671952	11035615
trade	283944	1176283	1697309	3808083	1195947	7976430	120298	3112140	345564	1383405	3643062	17456340
tourism	82045	201710	401725	705275	344974	1767638	15054	552712	96953	245294	940751	3472629
transports	93904	415745	430669	1439186	433474	3982661	42527	1303271	109001	537316	1109575	7678179

public adm	80450	673317	319255	1706187	183124	2784932	10772	1082713	81772	696326	675373	6943475
health, educ, etc.	307223	900468	1272479	2740458	1245394	6253042	171553	2076216	362227	923251	3358876	12893435
others	733587	1677448	3985186	8053732	3921724	18269198	511279	5323734	890989	1929643	10042765	35253756
Occupation of Head of HH												
professional/technicians	28248	730347	175159	2505212	85685	7428151	14508	2587122	56933	1242899	360533	14493731
intermediate	783467	2493810	3700952	7511444	3235968	17330086	327891	5631885	897920	2533540	8946198	35500764
blue collars	1670049	4131284	12424171	21359893	7582736	36016163	1355643	15368921	2320259	4738964	25352858	81615224
Region of Family												
North	-	-	-	-	-	-	-	-	-	-	2481764	7355441
North-East	-	-	-	-	-	-	-	-	-	-	16300282	31376548
South-East	-	-	-	-	-	-	-	-	-	-	10904389	60774400
South	-	-	-	-	-	-	-	-	-	-	1698042	23587928
Central-West	-	-	-	-	-	-	-	-	-	-	3275112	8515403
Location of Family												
urban	2384172	7127698	11892987	21772071	9925443	55845217	1288947	19295895	2743783	7548825	28235332	111589706
rural	97592	227743	4407295	9604478	978946	4929183	409095	4292033	531329	966578	6424257	20020016
Family Size												
1	8969	150216	88858	868623	69365	2124128	12759	750443	22064	328229	202015	4221639
2-3	268721	1787645	2243402	8692831	2080455	21313353	252800	8746739	661663	2771827	5507041	43312396
4-5	886528	3120295	6312913	13311054	4740817	28270319	756084	10991033	1580831	4116733	14277173	59809432
over 6	1317546	2297285	7655109	8504041	4013752	9066600	676399	3099713	1010554	1298614	14673360	24266252
Numbers of Workers per Family												
0	134782	237173	801368	1835730	724868	3597544	108766	1159236	158622	335536	1928406	7165219
1	1055878	1922795	5526789	7578098	4451198	15937868	599707	5748080	1329729	2144572	12963301	33331412
2-3	1035141	3921169	7595116	16809849	4860161	33970571	844275	14036748	1528232	4975609	15862925	73713944
4-5	220609	1054741	1818893	4186495	738261	6479296	127637	2443845	231920	945268	3137320	15109645
over 6	35354	219563	558116	966377	129901	789121	17657	200019	26609	114418	767637	2289498
Number of Children per Family, 0-14												
0	188828	2028465	1871125	11184962	1761246	26586556	185555	9297540	577979	3423758	4584733	52521280
1	400671	2085491	3478579	9039780	2378630	17481305	338863	7284983	741087	2464416	7337830	38355976
2-3	1138001	2673611	7108433	9492028	4925809	15381005	735986	6365071	1508813	2427483	15417042	36339200
over 4	754264	567874	3842145	1659779	1838704	1325534	437638	640334	447233	199746	7319984	4393267

Source: Author's calculations from the PNAD 2002.

Table 8: The profile of Poverty in Brazil by region using ey_{SQR}, 2002

	North		North-East		South-East		South		Central-West		Brazil	
	poor	non poor	poor	non poor	poor	non poor	poor	non poor	poor	non poor	poor	non poor
Gender of Head of HH												
Male	707763	6484215	6552947	30708720	3180174	52711363	484891	19882631	1330929	7947755	12256704	117734684
Female	386703	2258524	1929427	8485737	1667625	14119627	199506	4718942	413429	2098402	4596690	31681232
Age of Head of HH												
x<25	87164	418516	601300	1452041	258904	2156979	54795	956127	149041	449955	1151204	5433618
25=<x=<34	358235	1925204	2421384	6910079	1252185	12039772	212534	4628787	515368	2178767	4759706	27682608
35=<x=<44	337961	2381410	2698644	9548839	1767569	18482726	224995	7264029	535708	2922429	5564877	40599432
45=<x=<54	166189	1987346	1672140	8663250	834209	16093941	117725	5713811	291699	2252816	3081962	34711164
55=<x=<64	94841	1163302	797278	6503890	476482	9660059	59110	3312121	172616	1315644	1600327	21955016
x=>65	50076	866961	291628	6116358	258450	8397513	15238	2726698	79926	926546	695318	19034076
Race of Head of HH												
White	220099	2445299	1935304	11856587	2103017	42143336	436987	20167169	524689	4562354	5220096	81174745
Black	871132	6276121	6529691	27253594	2736139	24222456	245247	4331501	1215665	5421880	11597874	67505552
Asian	3235	21319	17379	84276	8643	465198	2163	102903	4004	61923	35424	735619
Education of Head of HH												
illiterate	247892	1592792	2422521	10159417	719722	6932852	90802	2409085	332625	1376334	3813562	22470480
elementary	170081	1849852	2098629	11278371	1312546	18949311	183923	7496536	381623	2234283	4146802	41808352
intermediate	674780	4881297	3945786	15916833	2767102	34147108	409312	12531040	1023850	5509275	8820830	72985552
high school	1713	395284	15438	1740673	48429	6452871	360	2046848	6260	871091	72200	11506767
college plus	0	23514	0	99163	0	348848	0	118064	0	55174	0	644763
Head of HH Economically Active												
active	850925	7257595	7164360	31333140	3840316	53081622	563927	20821265	1447931	8555559	13867459	121049181
no active	243541	1485144	1318014	7861317	1007483	13749368	120470	3780308	296427	1490598	2985935	28366736
Head of HH in Formal Sector												
formal	411972	5363553	4114353	22940249	1723598	42186980	267805	16548032	763068	6616920	7280796	93655736
informal	682494	3379186	4368021	16254208	3124201	24644010	416592	8053541	981290	3429237	9572598	55760184
Sectoral Distribution												
agriculture	177187	957564	3177034	11250031	495915	5907567	211697	4647930	397226	1515807	4459059	24278900
industry	78619	1073338	409172	2826100	333362	9738161	13033	3785527	105941	992316	940127	18415442
construction	96370	828003	587623	2867327	568395	6276851	67617	2237897	206327	971157	1526332	13181235
trade	107875	1352352	861046	4644346	427908	8744469	43808	3188630	167344	1561625	1607981	19491422
tourism	50378	233377	217098	889902	126452	1986160	3132	564634	44006	298241	441066	3972314
transports	40433	469216	226351	1643504	142840	4273295	16591	1329207	42856	603461	469071	8318683

public adm	26712	727055	133204	1892238	46699	2921357	1224	1092261	35392	742706	243231	7375617
health, educ, etc.	132845	1074846	664405	3348532	619943	6878493	80165	2167604	215226	1070252	1712584	14539727
others	384047	2026988	2206441	9832477	2086285	20104637	247130	5587883	530040	2290592	5453943	39842576
Occupation of Head of HH												
professional/technicians	12461	746134	67053	2613318	31915	7481921	4548	2597082	21076	1278756	137053	14717211
intermediate	332973	2944304	1883243	9329153	1375116	19190938	141089	5818687	453070	2978390	4185491	40261472
blue collars	749032	5052301	6532078	27251986	3440768	40158131	538760	16185804	1270212	5789011	12530850	94437232
Region of Family												
North	-	-	-	-	-	-	-	-	-	-	1094466	8742739
North-East	-	-	-	-	-	-	-	-	-	-	8482374	39194456
South-East	-	-	-	-	-	-	-	-	-	-	4847799	66830992
South	-	-	-	-	-	-	-	-	-	-	684397	24601572
Central-West	-	-	-	-	-	-	-	-	-	-	1744358	10046157
Location of Family												
urban	1054574	8457296	6193752	27471306	4422760	61347900	483861	20100981	1438823	8853785	13593770	126231268
rural	39892	285443	2288622	11723151	425039	5483090	200536	4500592	305535	1192372	3259624	23184648
Family Size												
1	8969	150216	88858	868623	69365	2124128	12759	750443	22064	328229	202015	4221639
2-3	122964	1933402	1298273	9637960	1078928	22314880	149070	8850469	438676	2994814	3087911	45731524
4-5	482168	3524655	3741730	15882237	2147974	30863162	293762	11453355	818398	4879166	7484032	66602576
over 6	480365	3134466	3353513	12805637	1551532	11528820	228806	3547306	465220	1843948	6079436	32860176
Numbers of Workers per Family												
0	84472	287483	537290	2099808	462591	3859821	58059	1209943	114401	379757	1256813	7836812
1	576827	2401846	3395713	9709174	2230530	18158536	260616	6087171	849035	2625266	7312721	38981992
2-3	380519	4575791	3824987	20579978	1973519	36857213	314459	14566564	698943	5804898	7192427	82384448
4-5	45930	1229420	611478	5393910	163572	7053985	44543	2526939	70778	1106410	936301	17310664
over 6	6718	248199	112906	1411587	17587	901435	6720	210956	11201	129826	155132	2902003
Number of Children per Family, 0-14												
0	90406	2126887	922518	12133569	746434	27601368	76374	9406721	289880	3711857	2125612	54980400
1	161990	2324172	1706688	10811671	1011918	18848017	151361	7472485	401923	2803580	3433880	42259924
2-3	535829	3275783	3834125	12766336	2202672	18104142	280979	6820078	785480	3150816	7639085	44117156
over 4	306241	1015897	2019043	3482881	886775	2277463	175683	902289	267075	379904	3654817	8058434

Source: Author's calculations from the PNAD 2002.

Table 9: Poverty decomposition between and within group with a unique reference for Brazil, 2002

Using pcy

	Hwb=	0.5447			PGwb=	0.2807			SPGwb=	0.1774		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
Brazil	**0.3358**	**61.66**	**0.2088**	**38.34**	**0.1357**	**48.33**	**0.1450**	**51.67**	**0.0742**	**41.85**	**0.1031**	**58.15**
North	0.0250	7.44	0.0145	6.95	0.0099	7.33	0.0111	7.62	0.0053	7.15	0.0080	7.71
North-East	0.1478	44.02	0.0738	35.33	0.0644	47.49	0.0689	47.48	0.0370	49.92	0.0550	53.31
South-East	0.1113	33.14	0.0710	34.02	0.0417	30.77	0.0393	27.09	0.0215	29.04	0.0245	23.76
South	0.0221	6.59	0.0425	20.33	0.0073	5.38	0.0211	14.57	0.0036	4.83	0.0126	12.21
Central-West	0.0296	8.81	0.0070	3.36	0.0123	9.04	0.0047	3.23	0.0067	9.07	0.0031	3.00

Using ey_{OECD}

	Hwb=	0.4314			PGwb=	0.1914			SPGwb=	0.1105		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
Brazil	**0.2084**	**48.32**	**0.2229**	**51.68**	**0.0733**	**38.28**	**0.1181**	**61.72**	**0.0369**	**33.39**	**0.0736**	**66.61**
North	0.0149	7.16	0.0174	7.79	0.0050	6.78	0.0091	7.73	0.0024	6.45	0.0055	7.49
North-East	0.0980	47.03	0.0989	44.38	0.0372	50.76	0.0641	54.25	0.0196	53.13	0.0437	59.35
South-East	0.0656	31.46	0.0641	28.75	0.0210	28.64	0.0275	23.31	0.0100	27.02	0.0151	20.50
South	0.0102	4.90	0.0352	15.77	0.0032	4.40	0.0138	11.72	0.0015	4.13	0.0073	9.93
Central-West	0.0197	9.45	0.0074	3.32	0.0069	9.43	0.0035	3.00	0.0034	9.27	0.0020	2.73

Using ey_{SQR}

	Hwb=	0.2711			PGwb=	0.1064			SPGwb=	0.0563		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
Brazil	**0.1013**	**37.39**	**0.1697**	**62.61**	**0.0321**	**30.16**	**0.0743**	**69.84**	**0.0156**	**27.70**	**0.0407**	**72.30**
North	0.0066	6.49	0.0131	7.70	0.0019	5.79	0.0054	7.22	0.0008	5.42	0.0027	6.73
North-East	0.0510	50.33	0.0910	53.64	0.0170	53.08	0.0446	60.05	0.0086	55.19	0.0261	64.20
South-East	0.0292	28.76	0.0398	23.43	0.0087	27.08	0.0149	20.09	0.0040	25.85	0.0073	17.91
South	0.0041	4.06	0.0210	12.37	0.0013	4.17	0.0073	9.81	0.0006	4.12	0.0035	8.56
Central-West	0.0105	10.35	0.0049	2.87	0.0032	9.88	0.0021	2.82	0.0015	9.43	0.0011	2.60

Source: Author's calculations from the PNAD 2002.

Table 10: Poverty decomposition between and within group with a reference for each Brazilian region, 2002

Using pcy

North	Hwb=	0.4670			PGwb=	0.2013			SPGwb=	0.1113		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.4225	90.46	0.0445	9.54	0.1681	83.49	0.0332	16.51	0.0897	80.55	0.0216	19.45
North-East	Hwb=	0.7078			PGwb=	0.3825			SPGwb=	0.2490		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.5156	72.84	0.1922	27.16	0.2247	58.74	0.1578	41.26	0.1292	51.88	0.1198	48.12
South-East	Hwb=	0.4230			PGwb=	0.1880			SPGwb=	0.1068		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.2582	61.04	0.1648	38.96	0.0968	51.51	0.0912	48.49	0.0500	46.79	0.0569	53.21
South	Hwb=	0.2797			PGwb=	0.1052			SPGwb=	0.0555		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.1455	52.01	0.1342	47.99	0.0480	45.60	0.0572	54.40	0.0236	42.46	0.0319	57.54
Central-West	Hwb=	0.5034			PGwb=	0.2256			SPGwb=	0.1291		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.4173	82.89	0.0861	17.11	0.1729	76.66	0.0526	23.34	0.0950	73.57	0.0341	26.43

Using eyOECD

North	Hwb=	0.3113			PGwb=	0.1080			SPGwb=	0.0530		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.2523	81.03	0.0591	18.97	0.0840	77.74	0.0241	22.26	0.0402	75.88	0.0128	24.12
North-East	Hwb=	0.5840			PGwb=	0.2688			SPGwb=	0.1576		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.3419	58.55	0.2421	41.45	0.1297	48.27	0.1390	51.73	0.0684	43.37	0.0893	56.63
South-East	Hwb=	0.3008			PGwb=	0.1126			SPGwb=	0.0581		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.1521	50.58	0.1487	49.42	0.0487	43.25	0.0639	56.75	0.0231	39.78	0.0350	60.22
South	Hwb=	0.1640			PGwb=	0.0546			SPGwb=	0.0264		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.0672	40.94	0.0969	59.06	0.0212	38.80	0.0334	61.20	0.0100	37.96	0.0164	62.04
Central-West	Hwb=	0.3643			PGwb=	0.1362			SPGwb=	0.0699		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.2778	76.25	0.0865	23.75	0.0974	71.54	0.0387	28.46	0.0482	68.98	0.0217	31.02

Using eySQR

North	Hwb=	0.1459			PGwb=	0.0429			SPGwb=	0.0194		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.1113	76.27	0.0346	23.73	0.0314	73.25	0.0115	26.75	0.0143	73.59	0.0051	26.41
North-East	Hwb=	0.3869			PGwb=	0.1478			SPGwb=	0.0791		
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.1779	45.98	0.2090	54.02	0.0594	40.19	0.0884	59.81	0.0300	37.93	0.0491	62.07

South-East		Hwb=	0.1599			PGwb=	0.0548			SPGwb=	0.0263	
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.0676	42.30	0.0922	57.70	0.0202	36.79	0.0346	63.21	0.0094	35.61	0.0169	64.39
South		Hwb=	0.0765			PGwb=	0.0237			SPGwb=	0.0111	
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.0271	35.37	0.0495	64.63	0.0088	37.05	0.0150	62.95	0.0042	38.16	0.0068	61.84
Central-West		Hwb=	0.2050			PGwb=	0.0676			SPGwb=	0.0321	
	Hw	%	Hb	%	PGw	%	PGb	%	SPGw	%	SPGb	%
	0.1479	72.15	0.0571	27.85	0.0447	66.17	0.0229	33.83	0.0207	64.67	0.0113	35.33

Source: Author's calculations from the PNAD 2002.

Table 11: Summary table of the dominance among between and within components

	H	PG	SPG
Unique reference group			
Using pcy	W=61.66	B=51.67	B=58.15
Using eyOECD	B=51.68	B=61.72	B=66.61
Using eySQR	B=62.61	B=69.84	B=72.30
A reference group for each region			
Using pcy			
North	W=90.46	W=83.49	W=80.55
North-East	W=72.84	W=58.74	W=51.88
South-East	W=61.04	W=51.51	B=53.21
South	W=52.01	B=54.40	B=57.54
Central-West	W=82.89	W=76.66	W=73.57
Using ey_{OECD}			
North	W=81.03	W=77.74	W=75.88
North-East	W=58.55	B=51.73	B=56.63
South-East	W=50.58	B=56.75	B=60.22
South	B=59.06	B=61.20	B=62.04
Central-West	W=76.25	W=71.54	W=68.98
Using ey_{SQR}			
North	W=76.27	W=73.25	W=73.59
North-East	B=54.02	B=59.81	B=62.07
South-East	B=57.70	B=63.21	B=64.39
South	B=64.63	B=62.95	B=61.84

Source: Author's calculations from the PNAD 2002.