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Measuring Poverty Using Household Consumption

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ACRONYMS AND ABBREVIATIONS

BRAPOV	Brazil Poverty Measurement Study
CBN	Cost of Basic Needs
CPI	Consumer Price Index
DIEESE	Departamento Intersindical de Estatística e Estudos Socio-Economicos
ENDEF	Estudo Nacional de Despesa Familiar
FAO	Food and Agriculture Organization
FEA	Food Energy Availability
FEI	Food Energy Intake
FGV	Fundação Getúlio Vargas (Getulio Vargas Foundation)
FPI	Food Price Index
FPL	Food Poverty Line
GDP	Gross Domestic Product
GE	General Entropy
HH	Households
IBGE	Inistituto Brasileiro de Geografia e Estadística (Brazilian Inistitute for Geography and Statistics
IPEA	Instituto de Pesquisas Econômicas
LAC	Latin America and Caribbean Region
PCE	Consumption Expenditure per Capita
PCINC	Income Per Capita
PCK	Caloric Availability per capita
PME	Monthly Employment Survey
PNAD	Pesquisa Nacional por Amostra the Domicílios (Household Income Survey)
POF	Pesquisa de Orçamentos Familiares
PPA	Plano Pluri-Anual (Multi-Year Plan)
PPP	Purchasing Power Parity
PPV	Living Standards Measurement Survey
PROCON	Secretariat of Defense of the Consumer

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EXECUTIVE SUMMARY

MEASURING POVERTY USING HOUSEHOLD CONSUMPTION: CONTEXT

This report summarizes the work undertaken as part of the Brazil Poverty Measurement Study (BRAPOV) that supported a program of analytical work and technical support via an in-depth assessment of the measurement of poverty and inequality in Brazil.

Past estimates of poverty and inequality have differed significantly depending on which welfare measures and poverty lines were used. The BRAPOV builds on the vast existing literature on the distribution of wealth in Brazil and takes advantage of a new and unique opportunity for constructing new poverty profile for Brazil arising from the recent completion of the Household Budget Survey (*Pesquisa de Orcamentos Familiares* or POF 2002-03). Unlike past surveys, the POF 2002-03 is the first nationally representative survey to include extensive questions on both consumption and income measures of welfare. For a variety of reasons, consumption tends to be a more accurate measure of welfare than income. Brazil's household surveys have traditionally collected data on income, though some smaller sub-national surveys have collected consumption data. The detailed POF 2002-03 thus presents a significant opportunity to analyze poverty and inequality using both consumption and income measures, as well as through qualitative measures via the survey's questions on perceptions of poverty. By virtue of timing, this POF also presents a baseline for poverty and living conditions.[1]

The survey not only presented an opportunity for in-depth analysis, but also for collaboration between the World Bank and partners in Brazil. Indeed, the BRAPOV was carried out through a collaborative process, working closely with the Brazilian Institute of Geography and Statistics (IBGE) and, occasionally, with other partners involved in distributional analysis in Brazil, such as the Institute of Research and Applied Economics (IPEA). One objective of the BRAPOV Program has been to foster collaboration, institutional development, a transfer of technology, and capacity building in our counterpart agencies (primarily IBGE) for greater ownership, dissemination and sustainability of the analysis and results. Emphasis thus was placed also on *process* as a key input for impact, while at the same time balancing this objective with the need to deliver quality and timely analytical work.

Specifically, the analysis in this report builds on earlier studies on the methodologies for constructing consistent poverty profiles and poverty lines (e.g. Bidani and Ravallion, 1994, Ravallion, 1998 and Kakwani, 2003) and on the measurement of poverty in Brazil (such as Ferreira et al., 2003, 2000, Rocha 1997, 2000, and Barros et al., 1995, 2000) in order to construct:

- **poverty lines** for the different regions of Brazil;
- detailed **spatial price indices** to capture spatial variation in the cost of living;
- an **updated poverty profile; and,**
- **"micro-area" maps** of poverty and inequality for Brazil.[2]

Brazil does not yet have an official poverty line. Moreover, the more frequently collected data on income (*Pesquisa Nacional por Amostra the Domicílios*, PNAD, and the Monthly Employment Survey, PME) do not lend themselves to the construction of poverty lines (which is usually based on consumption information and price indices). As a consequence there is a wide range of poverty lines used in Brazil.

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[1] IBGE plans to repeat the POF in 2006-07. This would provide an opportunity to assess changes in poverty and living conditions – as well as the impact of key programs (such as Bolsa Família).

[2] The World Bank is also supporting the poverty map initiative under the HD TAL (which helps finance some of the consultant and equipment costs that would be incurred by IBGE in the exercise), and the BRASA (which expands on the issue of using the poverty map for targeting social assistance programs).

The most commonly used set of poverty lines for policy are the "administrative poverty lines" that are typically set at arbitrary low levels of income such as fractions of the minimum wage (e.g., ½ or ¼ of the minimum wage). Some remain fixed after their initial calculation as a share of the minimum wage (e.g., they were set at ½ or ¼ of the minimum wage in 2002, and remained fixed at those cutoffs even when the minimum wage was increased in subsequent years). These cut-offs have been widely used for determining eligibility for social programs. In fact, most social transfer programs use these cut-offs including: the Bolsa Família Program and its predecessors (Bolsa Escola, Bolsa Alimentação, Cartão Alimentação under Fome Zero, and Auxilio Gas); state and municipal safety net programs; as well as other constitutional social assistance programs such as the BPC-LOAS programs for poor elderly and disabled. These cut-offs are also widely used in the government's Multi-Year Plan (*Plano Pluri-Anual*, PPA).

In 2005 the Government formed a committee to establish an official poverty line. The Poverty Line committee consists of members from the Casa Civil, IBGE, IPEA, and the Ministry of Social Development (MDS). As of June 2006, an official poverty line has not been made public yet. In the absence of an official poverty line it is important to keep in mind that the poverty lines and poverty estimates presented in this study do not represent official measures. Also, the Bank's collaboration with IBGE does not in any way imply that IBGE endorses the poverty lines presented and discussed in this report.

MEASURING POVERTY USING HOUSEHOLD CONSUMPTION: REPORT SUMMARY

Chapter 1 provides the background and context of the measurement of poverty in Brazil. **Chapter 2** provides some useful background information on the POF. For the construction of the regional poverty profile of Brazil the five geographical regions of the country are divided in a total of twenty one different areas (eleven metropolitan and ten urban and rural areas). Chapter 2 also presents two different methodologies for constructing poverty lines and compares and contrasts the advantages and shortcoming of each. The first approach to setting a poverty line is the Cost of Basic Needs (CBN) method. The CBN method aims primarily at generating absolute regional poverty lines that are consistent. Consistency requires that differences in the nominal poverty lines across regions should be entirely (or as much as possible) attributed to regional differences in cost of living. The shortcoming of the CBN method is that it strives for consistency at the expense of specificity. Specificity emphasizes that the nominal poverty lines should be sensitive to regional differences in tastes, perceptions about poverty, and in the standard of living. The second approach is the Food Energy Intake (FEI). The FEI method, however, puts emphasis on specificity at the risk of yielding inconsistent poverty profiles.

The evidence presented in chapter 2 demonstrates that the FEI method yields poverty lines that embody differences in preferences (or tastes) between urban and rural areas, in addition to cost-of-living differences. Based on this and other international evidence, it is determined that the CBN method is preferable since it generates poverty lines that reflect regional differences in cost of living and not differences in tastes, level of activity, relative prices, publicly provided goods and other determinants of affluence. The chapter concludes with the recommendation that the various dimensions of consumption-based poverty in Brazil can be best captured by three different poverty lines:

- A food or **extreme poverty line** (or indigence poverty line) that is determined by the cost of a basic needs food bundle that provides the recommended caloric requirements of 2,300 kcal per capita per day from a sufficiently diverse variety of food. Households with total consumption expenditures per capita less than or equal to the food poverty line may then be considered as households in **extreme poverty**, as they are unable to satisfy the basic food needs. The analysis in

chapter 2 determined that the food or extreme poverty line in Brazil is, on average, equal to R$61 per capita per month. Moreover, the extreme poverty line varies only a little from region to region, with the lowest value of R$55 in the rural South region and the highest value of R$65 in metropolitan Sao Paulo.

- An intermediate poverty line that is determined by the cost of satisfying the **minimum livelihood needs**. This poverty line is the CBN-Lower poverty line discussed in chapter 2 that adjusts upwards the food poverty line for the cost of essential nonfood needs. The upward adjustment for the cost of essential nonfood needs is determined by the nonfood expenditures of households that have total consumption expenditures equal to the value of the food poverty line but forego some spending on food in order to purchase these essential nonfood items. The analysis in chapter 2 determined that the minimum livelihood or intermediate poverty line in Brazil is on average equal to R$103 per capita per month. As is the case with the extreme poverty line, the minimum livelihood poverty line does not vary much from region to region, with the lowest value of R$90 in the rural South region and the highest value of R$115 in metropolitan Sao Paulo.
- An **upper poverty line** that sets a limit to the range of useful poverty lines. This more generous poverty line corresponds to the CBN-Upper poverty line that adjusts upwards the food poverty line for the cost of basic nonfood needs. In contrast to the minimum livelihood needs poverty line (CBN-Lower), the adjustment for the cost of basic food needs is determined by the nonfood expenditures of households who just satisfy the basic food needs (i.e., their food spending is already equal to the cost of the food poverty basket). The analysis in chapter 2 determined that the upper poverty line in Brazil is on average equal to R$220 per capita per month, more than two times the minimum livelihood needs poverty line.

This report takes the view that the extreme poverty line and the minimum livelihood poverty line are the poverty lines most relevant for policy. This choice is based on two key reasons. First, these two poverty lines are the poverty thresholds most useful for identifying the households with the most pressing needs. The extreme poverty line is useful for identifying individuals who cannot even afford to satisfy the basic food needs, while the minimum livelihood poverty line is useful for identifying individuals who cannot afford to satisfy the basic food and nonfood needs. The second reason is based on more practical considerations. Both poverty lines are close to the "Administrative Poverty Lines" of R$50 and R$100 per capita per month that were used to determine eligibility for one of the major poverty alleviation programs of Brazil, the *Bolsa Família*.[3] The fact that on average the upper poverty line is more than three times the average food poverty line suggests that the "basic nonfood needs of poor households" are overestimated to identify extreme poverty.

To the extent that cost-of-living differences are substantial between regions, uses of nominal income or consumption expenditures to measure the inequality in the standard of living in Brazil may be quite misleading. A spatial price index is especially useful for deriving more reliable measures of inequality in Brazil, which has one of the highest inequality rates in the world. **Chapter 3** compares and contrasts a Laspeyres and Paasche index for food. The spatial variability in the cost of food is found to be small. Expanding these price indices to include the cost of housing reveals substantially larger differences in the cost of living across regions. A direct comparison of the implicit price index obtained from the regional variability in the nominal poverty line confirms that the cost of basic needs upper poverty line provides an adequate approximation to the regional variability in the cost of living differences across regions of Brazil, and thus a consistent poverty profile. Another important finding is that consumption inequality is considerably lower than income inequality based on either POF or the PNAD data. Adjusting nominal expenditures per capita by the proper spatial price index leads to a decrease in the Gini inequality measure from 0.507 to 0.481.

[3] The Bolsa Família per capita income eligibility thresholds were just raised (in April 2006) from R$100 (upper threshold) and R$50 (extreme poverty threshold) to R$120 and R$60.

Based on the estimated poverty lines, **chapter 4** of the report constructs an updated poverty profile from an entirely new source (consumption expenditures from the POF). The profile builds on the rich existing literature on poverty inequality, including the work conducted under the last Poverty Assessment (Report No. 20475-BR, 2001) and the work by Ferreira, Lanjouw and Neri (2003 and 2000). This poverty profile examines patterns in the distribution of poverty using a variety of poverty measures (absolute incidence of poverty, headcount index, P1 index of poverty depth, and P2 measure of poverty severity). The profile examines these patterns across a variety of characteristics of the population, including, *inter alia*: (a) region and area of residence (metropolitan areas, non-metropolitan urban, and rural areas); (b) housing characteristics (e.g., housing status, water, sanitation, electricity, waste disposal, and access to paved road); (c) characteristics of the household head, such as gender, age, race, education, migration status, and occupational category.

Overall the poverty profile based on consumption expenditures from the POF turns out to be in remarkable agreement with the existing poverty profiles generated by income measures in the PNAD surveys (e.g. Ferreira et al., 2003). According to the estimates, approximately 8.5% of the Brazilian population did not have total consumption expenditure sufficient to buy the basic needs food bundle. Given the total population of Brazil, the estimate of extreme poverty in Brazil implies that 14,903,203 individuals are in extreme poverty. The poverty estimates increase substantially when higher poverty lines are used to take into account basic nonfood expenditures. The minimum livelihood poverty line implies poverty rate of 21.5% for Brazil which amounts to 37,696,336 individuals being unable to meet basic food and nonfood needs.

The aggregate statistics for Brazil also conceal very large regional disparities. The six regions with the highest extreme poverty and minimum livelihood poverty are the rural areas in the Northeast, with an extreme poverty index of just under 31%, followed by the rural areas in the North, urban areas in the Northeast, rural areas in the Center-West region and Southeast region, and urban areas in the North, which has an extreme poverty of 9.5%.

The aggregate food poverty gap in Brazil, measuring the average distance below the food poverty line (as a proportion of the food poverty line), is estimated to be 2.5%. This food poverty gap represents 0.45% of the country's aggregate consumption of all goods and services. Using the minimum livelihood poverty line of R$103 per person per month, the value of the poverty gap index increases to 7.3% which amounts to 0.767% of the country's aggregate consumption. These estimates suggest that the potential gains from targeting are quite large in Brazil. For example, the costs of assuring that everyone in the country can afford the poverty food bundle without targeting is about 40 times the cost of a perfect targeting scheme that transfers an amount equal to household-specific poverty gap to each poor household. It is important to clarify that this estimate represents only the potential gains from perfect targeting, where "perfect" is defined as providing tailor-made household-specific transfers that vary depending on the distance of household consumption from the poverty line. The extent to which such potential gains can be realized in practice depends on the constraints and the costs faced by policy makers in identifying the household-specific poverty gaps.

Chapter 5 of the report explores some of the policy implications that can be derived from the regional distribution of poverty in Brazil based on the poverty analysis using household consumption. The poverty estimates from the consumption-based poverty lines are compared to the poverty estimates of the "administrative poverty line" (the R$100 and R$50 formerly used for *Bolsa Família* and other programs). It is found that the enforcement of the same poverty line that was used as a threshold for eligibility to the *Bolsa Familia* program tends to result in some *leakages* (inclusion errors) in the rural and non-metropolitan urban areas and some *undercoverage* (exclusion error) of the poor in the metropolitan

areas.[4] Even though these estimates are not intended to provide an assessment of the targeting performance of the *Bolsa Familia* program, they do suggest that improvements of the targeting of the program could be achieved easily by employing poverty lines that vary from region to region.

A comparison of the poverty and inequality rates using income from the POF survey, instead of consumption as a measure of household welfare is also presented. With the POF per capita consumption expenditures as the standard of comparison, the income per capita measure from POF tends to *overestimate* poverty in the non-metropolitan urban areas and *underestimate* it in the rural areas.

Also, an analysis of the coverage of the poor by the social program contained in the POF confirms that social assistance programs, such as the *Bolsa Escola* and *Auxilio Gas* that are currently merged into *Bolsa Familia*, are much better targeted towards the poor in comparison to the social insurance programs. Although the objective of social insurance programs is primarily protection from poverty rather than redistribution of income to the poor, these findings suggest that it is also important to reconsider the level of fiscal resources allocated to financing the deficits of social insurance programs especially in light of the fact that less room is left in the government budget for spending on better targeted social assistance programs.

One more comparison worthy of serious consideration in the future concerns the regional distribution of poverty based on the minimum livelihood poverty line and the regional distribution of federal funds for poverty alleviation. To the extent that the distribution of federal funds does not match the regional distribution of poverty, a re-alignment in the regional allocation of federal funds may be called for.

The BRAPOV also provided the foundations for building a consumption-based **poverty map**. Poverty maps are especially useful for identifying the geographic variations in poverty within the twenty one different regions that are represented in POF, and they can be used for the design and better targeting of programs, budget allocation, and for monitoring and evaluation. Micro-area poverty maps are constructed using econometric techniques[5] that combine data from the 2000 census with data from the 2002-03 POF. By combining census and household survey data, the poverty maps benefit from the strengths of each data source: the complete coverage of households in the country with the census, and the more precise measures of household consumption and income from the POF. Statistical models are developed using "explanatory variables" in the household survey that are also included in the census. Once robust models have been identified to predict consumption (and/or income) in the household survey (using this common set of explanatory variables), these models are applied to census data at the household level to predict per capita consumption (or income) in the census (including an error estimate). These household-level estimates are then aggregated to small statistical "micro areas" to obtain robust estimates of the percentage of households living below the poverty line in these areas.

As of June 2006, the official poverty lines have not been made public yet and thus the work on poverty maps remains incomplete. It is hoped that the completion and publication of official IBGE poverty maps will be completed in the near future. For poverty maps, the Bank adopted a "transfer of technology" and "capacity-building" approach. Specifically, IBGE actually is in the process of implementing the work

[4] It is important to note that some degree of leakage occurs in all programs, regardless of income thresholds. In fact, Brazil's recent PNAD 2004 shows that, on average, the Bolsa Família program is quite well targeted (in terms of minimizing leakages), with 73% of all benefits going to the poorest quintile and 94% going to the poorest two quintiles. These results put Bolsa Familia as the most accurately targeted public transfer program in LAC. See Lindert, Skoufias, and Shapiro (forthcoming).

[5] These methods were pioneered by researchers at the World Bank in 1996 (Hentschel and Lanjouw, 1996). The techniques have been further refined, mostly under the leadership of researchers at the World Bank in collaboration with universities and in-country partner institutions (e.g., Hentschel et. al. 1998, Hetschel et. al. 2000 and Elbers, Lanjouw and Lanjouw, 2002). These maps have been applied to numerous countries around the world. Henninger and Snel (2002) summarizes experiences with the development and use of poverty maps in several countries.

("learning-by-doing"), with the World Bank providing training and technical assistance (via formal seminars and workshops, on-going training and supervision, regular missions, continuous feedback via email, etc.). This collaboration has already resulted in a significant transfer of technology to build IBGE's capacity for carrying out such work, conducting further analysis, and implementing future updates. In fact, IBGE sees the "poverty map project" as an innovative chance to integrate its own data instruments (census, surveys, GIS, etc.) and staff across the institution. The IBGE "poverty map team" comprised of some 10-15 people with different professional backgrounds (e.g., statisticians, economists, etc.) and coming from different departments in IBGE (e.g., those responsible for household surveys, the census, the GIS unit, etc.).

CHAPTER 1: BACKGROUND AND CONTEXT

Poverty and inequality have been the subjects of numerous studies in Brazil, reflecting their relatively high levels and hence important place in debates about the country's development experience. Estimates of poverty and inequality vary widely, depending on data sources, welfare measures; and poverty lines used.

SURVEY DATA AND WELFARE MEASURES

Poverty is traditionally measured through monetary measures of income and consumption through nationally representative household surveys. Brazil has a long-standing tradition of collecting household survey data, carried out by the National Statistics Office (IBGE).[6] The more frequent surveys (PNAD, and the employment survey, PME) have generally focused on the collection of income and employment data, while intermittent surveys (POFs) have collected more complete information on income, consumption and expenditures (Table 1). Consumption is generally viewed as a more accurate measure of welfare for poverty analysis since (a) consumption tends to fluctuate less than income in the short run; (b) income commonly suffers from numerous measurement errors due to informal, seasonal and in-kind earnings; (c) there is a strong life-cycle pattern in income since it typically rises and falls in the course of one's lifetime; and (d) measures of income can suffer perceived incentives for under-reporting by respondents.

For the purpose of analyzing poverty and inequality in Brazil, each survey has its advantages and disadvantages reflecting the cost trade-offs between frequency, depth of questionnaires and sample size (Table 1). The most frequent survey, **the PME** (employment survey), is conducted on a monthly basis but is deficient for poverty analysis due to its sub-national sample and limited questionnaire (providing data mainly on labor earnings). Instead, most estimates of poverty and inequality have been based on **the PNAD** (household survey) due to its regular frequency (annual) and large coverage (almost national sample). Despite these advantages, the PNAD questionnaire has a number of shortcomings for the purposes of poverty analysis, including incomplete measurement of income (particularly for income from transfers, housing, in-kind benefits, self-employment, agricultural production for own-consumption), and a lack of data on consumption and expenditures. The use of the incomplete measure of income as an indicator of welfare may result in inaccurate measures of poverty for two important groups: self-employed informal sector workers and cultivating households.[7]

The 1996/97 PPV (Living Standards Measurement Survey) was designed to fill some of the data gaps left by the PNAD. It provides a much more detailed picture of household expenditures and consumption (in addition to income), as well as the utilization of publicly subsidized services in education, health and transportation. However, the survey sample is relatively small and not representative for the entire country. Moreover, the survey was only conducted once (as a pilot in 1996), and the results are now quite out of date.

Most recently, IBGE fielded a household budget survey (the **POF 2002-03**), primarily to generate information needed to update the consumption basket for price indices. This new POF is both nationally representative and extensive in its questionnaire coverage of income, consumption and expenditures. It thus provides a new and unique opportunity for a thorough analysis of the measurement of poverty and inequality in Brazil, as discussed below.

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[6] See Bianchini and Albieri (1998 and 2002 (revision)) for a comparison of many of IBGE's surveys, including the PNAD, PME, POF and PPV; see Paes de Barros, Mendonça and Neri (1995) for a comparison of the (former) POF surveys and the PNAD.

[7] See recent work by Ferreira, Lanjouw and Neri (2000 and 2003) for an analysis of these shortcomings.

Comparative studies of the various surveys suggest that differences in surveys and welfare concepts yield significant differences in welfare distributions (income, consumption, expenditures) and measures of poverty and inequality. Specifically, Barros and Mendonça (1992) compare the information on income from the PNAD and PME and encounter considerable differences. Similarly, Rocha (1993) finds that poverty estimates based on the earlier ENDEF and POF surveys are quite different. More recently, two studies have compared the results emerging from (a) the PNAD and the (old) POF; and (b) the PNAD and the PPV and find important differences in these cross-survey and cross-concept comparisons:

- **PNAD vs. (old) POF: Differences in income measures.** Barros et al. (1995) compared the income measures captured in the PNAD and POF for the overlapping metropolitan areas in 1996. First, they found considerable discrepancies in the cumulative distributions and means of labor income from the PNAD and the POF.[8] Second, they found even larger differences in distributions and means for total family income, which is not surprising given the POF's relatively more in-depth treatment of non-labor sources of income. These differences yield significant differences in inequality and poverty estimates. The cross-survey estimates would likely diverge even more with coverage of rural populations for whom non-formal labor earnings carry more weight.

- **Income vs. consumption and expenditure: previous POF surveys.** Barros et al. (1995) also compared income, consumption, and expenditure measures from the 1995/96 POF itself (again for the metropolitan regions that it covered that year). They found considerable differences between income and consumption, but more consistency between income and expenditures. These differences applied to the cumulative distributions, means, and consequently, the estimates of poverty and inequality.

- **Comparing and Combining the PPV and the PNAD.** Elbers et. al. (2003) compare estimates of poverty and inequality for the Northeast and Southeast regions using data from the PNAD and PPV surveys, both for 1996.[9] First, they find that poverty and inequality are statistically significantly higher when measured using income from the PNAD versus consumption from the PPV. The patterns of poverty and relative rankings across regions, however, are quite similar between the two surveys. Second, they find very comparable estimates and patterns of poverty and inequality between the (observed) consumption measures from the PPV and an imputed measure of consumption in the PNAD.[10] Poverty and inequality estimated on the basis of consumption in the PNAD (and PPV) tend to be much lower than estimates based on the income measure of well-being. The study demonstrates that the differences in estimates of poverty in the PNAD and the PPV are not due to non-comparability of these surveys, but rather due to differences in the measurement and concept of income and consumption.

[8] Moreover, they found considerable discontinuities, with discrete shares of the population located at specific income levels, in the PNAD labor income estimates, as compared with those of the POF, which presented far more continuity in the cumulative distribution function. The questionnaires differ even in their treatment of labor income, with POF estimates based on an average of six retrospective responses given by each person for his/her income over the past six months, and the PNAD referring to a single personal response about monthly labor income normally received.

[9] Using the same poverty line across the surveys.

[10] This consumption variable is imputed using econometric consumption models derived from the PPV that are then plugged into the PNAD using comparable "explanatory" variables. See Elbers et. al. (2003) and Elbers et. al. (2001) for methodological details.

Table 1 Poverty-Relevant Surveys in Brazil: A Comparison of Basic Features

Survey	Periodicity	Geographic Coverage	Sample Size # HH	Welfare Measures	Advantages for Poverty Analysis	Disadvantages for Poverty Analysis
PNAD (house-hold income survey)	Annual since 1967 (except in years of the Census)	National (except the rural areas of the North)	105,000 (2000)	Income	Sample: National coverage (almost) Frequency (annual)	Incomplete measurement of income Lack comprehensive consumption and expenditure data
PME (employment survey)	Monthly since 1980	Six Metropolitan Regions	37,212 (latest)	Labor Earnings	Frequency (monthly) Partial panel sample	Sample: not-national Lack comprehensive data on income (only labor earnings) Lack consumption and expenditure data
PPV (LSMS)	1996/97	North-East and South-East Regions	4,944	Income, Consumption and Expenditures	Fairly complete questionnaire for income, consumption and expenditure	Sample: not-national Frequency: single survey, out-of-date
POF-old (house-hold budget survey)	ENDEF 1974-75 POF 1987/88 POF 1995/96	ENDEF: National POF-old: 11 urban areas POF-old: 11 urban areas	55,000 13,707 19,816	Income, Consumption and Expenditures	Fairly complete questionnaire for income, consumption and expenditure	Sample: not-national Frequency: infrequent surveys, out-of-date
POF-new (house-hold budget survey)	2002/03	National	48,470	Income, Consumption and Expenditures	Sample: nationally representative Extensive questionnaire for income, consumption and expenditure Recent	Frequency: single survey (with this sample; though hope to repeat in 1995).

Sources: World Bank staff analysis of survey questionnaires and existing literature; IBGE; Bianchini and Albieri (1998 and 2002).

POVERTY LINES

In addition to the variation in surveys and welfare measurement, there is a wide range of poverty lines used in Brazil. In fact, Brazil does not have an official poverty line. Moreover, the more frequently collected data on incomes (PNAD, PME) do not lend themselves to the construction of poverty lines (which is usually based on consumption information and price indices). As a result, three categories of poverty lines can be found in the literature (see Table 2):

- **"Administrative Poverty Lines."** The first set is commonly used for policy (and will hence be called "Administrative Poverty Lines" in this paper) as well as by various researchers. These Administrative Poverty Lines are typically set at arbitrary low levels of income such as fractions of the minimum wage (e.g., ½ or ¼ of the minimum wage). Some remain fixed after their initial calculation as a share of the minimum wage (e.g., they were set at ½ or ¼ of the minimum wage in 2002, and remained fixed at those cutoffs even when the minimum wage was increased in subsequent years). These cut-offs have been widely used for determining eligibility for social programs. In fact, most social transfer programs use these cut-offs including: the Bolsa Família Program and its predecessors (Bolsa Escola, Bolsa Alimentação, Cartão Alimentação under Fome Zero, and Auxilio Gas); state and municipal safety net programs; as well as other constitutional social assistance programs for poor elderly and disabled. These cut-offs are also widely used in the Government's Multi-Year Plan (*Plano Pluri-Anual*, PPA).

- **"International Poverty Lines."** The second set of poverty lines is generally found in the literature involving international comparisons and/or the Millennium Development Goals, (MDGs). This set is similarly "arbitrary" and involves converting the international extreme and full poverty lines of US$1 and US$2 per day into Brazilian currency with purchasing power parity (PPP) adjustments.
- **"Consumption-Based Poverty Lines."** Finally, the third set of poverty lines used in the literature has attempted to construct "meaningful" poverty lines using information on the structure and costs of consumption (food and nonfood). The 1974-75 ENDEF survey provided the first opportunity to create a consumption-based poverty line (with statistically-significant information for 23 regions in Brazil). Researchers then used price indices to update those ENDEF-based poverty lines, applying them to PNAD income data for subsequent years. The passage of time made the ENDEF consumption patterns obsolete. Consumption information for the 1986-87 and 1995-96 POF was used to generate poverty lines for those years, although such information was only available for 11 metropolitan areas. The 1996 PPV also included consumption information needed for the construction of consumption-based poverty lines. Researchers then update the poverty lines from the 1995-96 POF or 1996 PPV using price indices, and then apply them to the PNAD. Some example results are included in Table 2. On variant of the consumption-based poverty lines is the "misery line" presented by Marcelo Neri of the Social Policy Center at FGV. The misery line is based on a food basket that guarantees 2,288 calories per day and the consumption patterns of the poorest 20-50% of the population. This results in a line of R$108 per person per month for the greater São Paulo area (October 2003), which is quite close to the "Administrative Poverty Line" of R$100 per person per month.

Table 2 Comparison of Poverty Lines and Rates in Brazil

	Poverty Line R$ per month	Poverty Rate % of pop below line	Year	Survey
"Administrative Poverty Lines" - Thresholds for Transfer Programs*				
Extreme Poverty (=¼ the 2002 Minimum Wage)	R$50 per capita income	12.93% (Individuals)	2002	PNAD
		9.61% (Households)	2002	PNAD
Full Poverty (=½ the 2002 Minimum Wage)	R$100 per capita income	32.33% (Individuals)	2002	PNAD
		25.65% (Households)	2002	PNAD
International Poverty Lines [1]				
US$1 per day converted PPP (indigence)	R$ 62.58 (1999)	4.0%	1999	PNAD
US$2 per day converted PPP (full poverty)	R$125.16 (1999)	n.a.		
Consumption-Based Poverty Lines				
IPEA [2] (poverty lines from PPV)				
Extreme Poverty – 1999	R$76.36 (Sep. 1997 São Paulo)	14.5% (Income)	1999	PNAD
Full Poverty – 1999	R$152.73 (Sep. 1997 São Paulo)	34.1% (Income)	1999	PNAD
Extreme Poverty – 1996	Same source, adjusted	15.0% (Income)	1996	PNAD
Full Poverty – 1996	Same source, adjusted	33.5% (Income)	1996	PNAD
FLN / World Bank [3] (poverty lines from PPV)				
Extreme Poverty	R$65.07 (1996 São Paulo; PPV)	22.59% (Income)	1996	PNAD
Full Poverty	R$131.97 (1996 São Paulo; PPV)	45.29% (Income)	1996	PNAD
CEPAL [4] (poverty lines from PPV)				
Extreme Poverty	R$139.30 (1999)	13.8% (Income)	1996	PNAD
Full Poverty	n.a.	n.a.	1999	PNAD

These poverty lines are the existing thresholds for the Bolsa Família Program (launched in 2003). They are consistent with the thresholds used for the pre-reform programs (Bolsa Escola, Bolsa Alimentação, etc.) and had been established as equal to ¼ and ½ of the minimum wage in 2002. The minimum wage has since been increased to 240 in 2003 and 260 in 2004, but the thresholds remain fixed at R$50 and R$100 for the Bolsa Família Program. Sources: [1] CEPAL (2002a) [2] Barros et. Al. (2000) [3] Ferreira et al. (2000) and World Bank (2001b) [4] CEPAL (2002)

WIDE RANGE OF POVERTY AND INEQUALITY ESTIMATES

Poverty Rates. Given the different surveys, welfare measures, and poverty lines, it should come as little surprise that estimates of poverty in Brazil vary widely (Table 2). Estimates for extreme poverty in 1996 range from 15% (IPEA) to close to 23% (FGV/World Bank). For that same year, estimates for full poverty range from a third of the population (IPEA) to just under a half (FGV/World Bank). Similar ranges are found for 1999, with a lower estimate of just 4% for extreme poverty ("$1 a day" measure) to close to three times that estimate (14.5%, IPEA).

Inequality. Likewise, the estimates of inequality (Gini Coefficients) vary substantially, from 0.594 to 0.65 for 1999 (using the PNAD, Table 3). Across surveys and welfare measures, the differences in the levels of inequality are even more stark.

Table 3 Comparison of Inequality Indices, Various Studies

Study	Year	Survey	Sample	Measure	Gini Coefficient
CEPAL[1]	1999	PNAD	National	Income	0.64
Barros[2]	1998	PNAD	National	Income	0.60
World Bank[3]	1999	PNAD	National	Income	0.594

Sources: [1] CEPAL (2002a) [2] Barros et. Al. (2000) [3] World Bank (2003), WB 24887-BR [4] World Bank (2001), WB 20475-BR

Moreover, it may be that Brazil appears to be more unequal compared to other countries and regions because of systematic differences between income and expenditure inequality (as discussed below).[11] Indeed, estimates of inequality based on (imputed) consumption are far lower than those based on income in the PNAD (see Table 5 below).

Patterns of Poverty and Inequality over Time. As discussed above, the PNAD provides the only (almost) nationwide estimates of welfare (income) over time. The top part of Figure 1 shows extreme poverty (indigence) and poverty rates for Brazil from 1995 to 2004 using income measures from the PNAD and IPEA poverty lines. Between 1995 and 2004 extreme poverty and poverty rates in Brazil declined 2 percentage points (from 14.5 to 12.2 and from 33.8 to 31.7, respectively). During the period there were three peaks in 1997, 2001 and 2003, and declines in 1998, in 2002 and particularly in 2004. The increases were mostly related to slowdowns and falls in GDP growth rates. For instance, in 2003 the economy shrank slightly by about 0.2 percent (which represented a 1.7 fall in average per capita income), and extreme poverty and poverty rates rose by around one percentage point, accounting for a 2 percent increase. The fall in poverty between 2001 and 2002 was not accompanied by appreciable growth rate, which may suggest that the decrease was influenced by redistribution policies.[12] The considerable 8 percent decrease in poverty rates between 2003 and 2004 can be attributed both to a GDP growth rate of 5 percent in 2004 in Brazilian economy and also to improvements in income distribution.

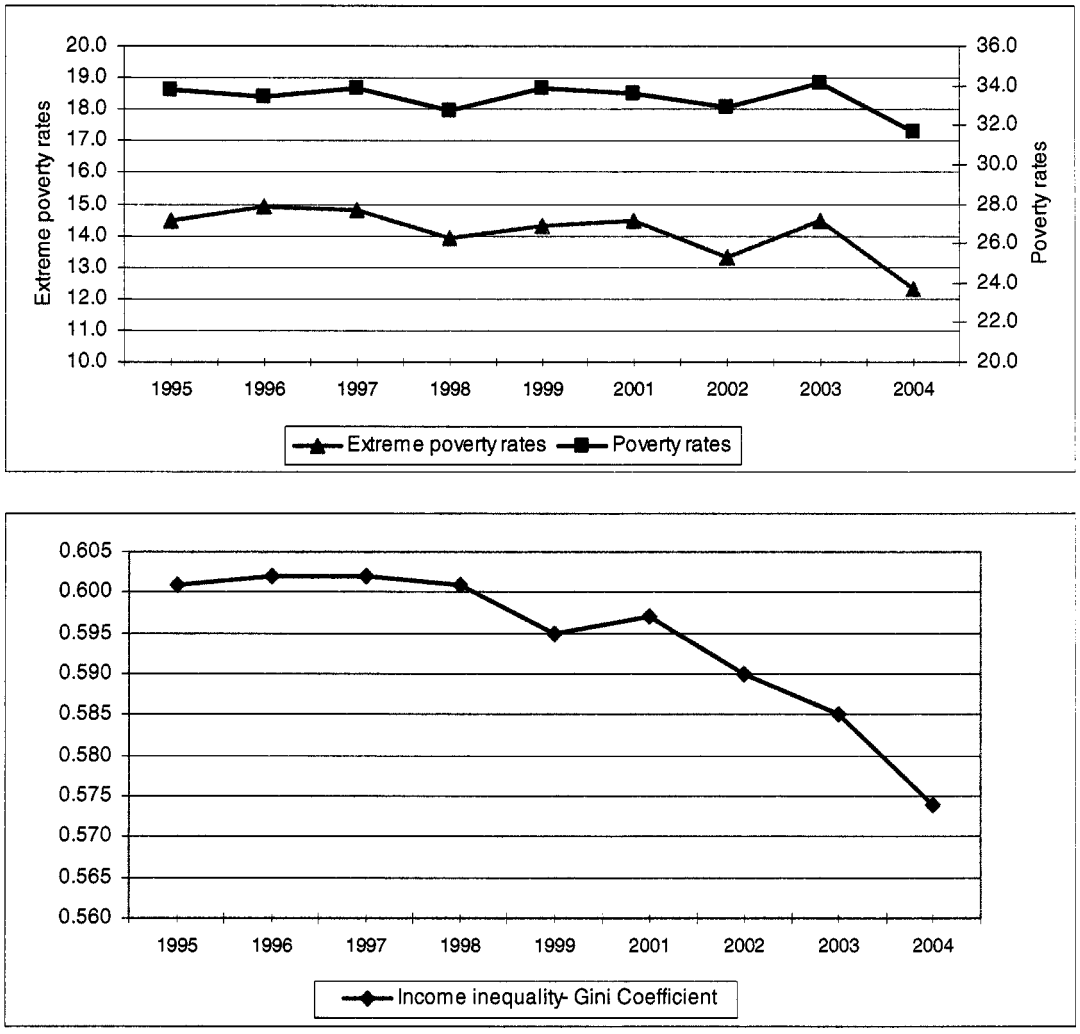
Income inequality, as measured by the Gini coefficient, fell considerably between 2003 and 2004 from 0.585 to 0.574. In fact, the overall reduction in poverty between 2001 and 2004 has been almost exclusively attributed to the reduction in income inequality, since per capita income fell during that period. The bottom part of Figure 1 shows the persistent decline in the value of the Gini coefficient used to measure income inequality in Brazil especially between 2001 and 2004. Thus the decrease in poverty has been accompanied by the decline in inequality along the period. Although it would be tempting to attribute much of the decline in inequality to recent social policies, a more definite answer to this issue can only be provided with further research.[13]

[11] See Elbers et. al. (2004) and de Ferranti et. al. (2004).

[12] In 2000 the economy grew by 4.5 percent; in 2001 this fell to 1.8 percent.

[13] In fact, in May 2006, IPEA, on behalf of the Brazilian government, decided to sponsor a High Level Committee and a network of specialists and research institutions in Brazil to study the causes of the decline in inequality. The report of the Committee is to be released to the public in early August 2006.

Figure 1 The Evolution of Poverty (Headcount) and Inequality (Gini) in Brazil: 1995-2004



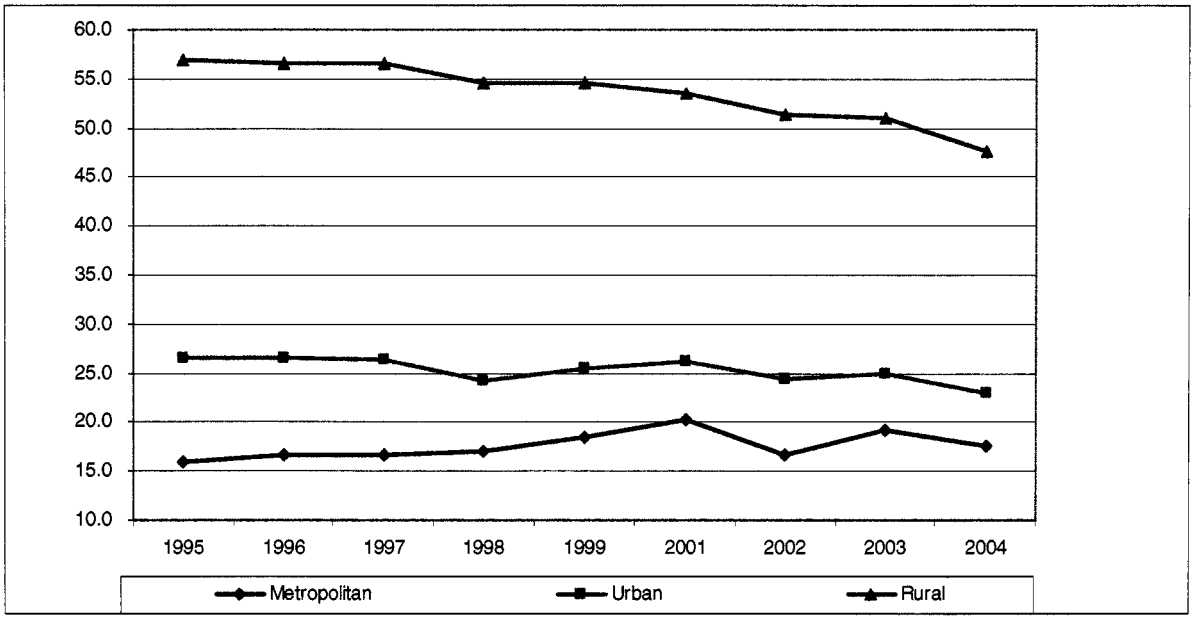
Source: Barros et al (2005). Estimates based on PNAD. Note: The PNAD survey was not collected in 2000.

Regional Patterns and Trends. The regional profile of poverty suggests several important patterns and trends. **First**, poverty *rates* are higher in rural areas than urban, and in the North and North east (absolute poverty numbers, however, show higher density in urban areas). Brazil can be divided into two "super" regions: the first, covering the North and North East, with very high poverty rates (over 50% using income measures in the PNAD), and the rest of the country with lower poverty rates (but higher absolute poverty density). **Second,** these regional patterns in poverty rates are fairly robust regardless of welfare-measure/data source combination.[14] Table 4 shows that, although considerable differences in the *level* of poverty across surveys and welfare measures, the *patterns* of poverty by region are fairly consistent despite these measurement differences. Regardless of the welfare measure or survey, both approaches find clear evidence that poverty rates are highest in the rural and urban Northeast and lowest in the metropolitan areas of the Southeast. **Third,** there are considerable regional differences with respect to

[14] Regional patterns compare estimates from the PNAD (income and imputed consumption) and the PPV (consumption). Elbers (2004) et. al.

relative ranking of inequality across regions between all three data-source/welfare-measure combinations (Table 5). **Fourth,** in terms of trends over time, although overall poverty rates have fallen in recent years, this reduction is not uniform nationally (Figure 2). While rural poverty declined over the period from 1995-2004, poverty rates in metropolitan areas rose during that period. According to Thomas (2004), the fastest proportional poverty reduction in this period took place in the South, the Center-West, and the Northeast. For example, the share of the Northeast (of total poor) reduced from 55% in 1998 to 52% in 2001, while the share in the Southeast rose from 24% in 1998 to 26% in 2001. Thomas (2004) notes that developments in the Northern Region and in São Paulo state should be of particular concern on the grounds of rising poverty in those areas in recent years.

Figure 2 Regional Patterns and Trends of Poverty in Brazil: 1995-2004.



Source: Centro Políticas Sociais (CPS)-FGV using micro data from PNAD.
Note: The PNAD survey was not collected in 2000.

Table 4 Poverty Rates by Region for Different Data Sets and Welfare Measures

	PNAD Income	PPV Consumption	PNAD Imputed Consumption
Rural North East	71%	50%	52%
Urban North East	48%	38%	39%
Rural South East	38%	26%	27%
Metro Salvador	36%	20%	21%
Metro Fortaleza	35%	19%	18%
Metro Recife	34%	22%	14%
Metro Belo Horizonte	15%	8%	9%
Urban South East	12%	5%	5%
Metro Rio de Janeiro	11%	3%	4%
Metro São Paulo	7%	4%	3%

Source: Elbers, et. al. (2004). Data from the PNAD 1996 and PPV 1996. Poverty line of R$65.07 (in 1996 Sao Paulo reais).

Table 5 Inequality by Region for Different Data Sets and Welfare Measures (General Entropy Measure; 0.5)

	PNAD Income	PPV Consumption	PNAD Imputed Consumption
Rural North East	0.72	0.36	0.40
Urban North East	0.65	0.40	0.32
Rural South East	0.62	0.42	0.35
Metro Salvador	0.62	0.37	0.50
Metro Fortaleza	0.59	0.34	0.33
Metro Recife	0.58	0.38	0.33
Metro Belo Horizonte	0.50	0.38	0.32
Urban South East	0.49	0.24	0.44
Metro Rio de Janeiro	0.48	0.28	0.30
Metro São Paulo	0.48	0.30	0.24

Source: Elbers, et al. (2004). Data from the PNAD 1996 and 1996. Poverty line of R$65.07 (in 1996 Sao Paulo reais).

CHAPTER 2: SETTING POVERTY LINES FOR BRAZIL

Regional poverty profiles attempt to describe how a measure of poverty varies across different regions of the country. Their main purpose is to inform policy makers about the distribution of poverty across regions, so it can facilitate the formulation, design and targeting of social programs aimed at alleviating poverty in the short run and/or in the long run.

The commonly used approach is to classify households within any given region as poor if their welfare measure is less than or equal to a poverty line specific to each region. The typical dilemmas faced in the construction of any regional poverty profile are (i) choosing an appropriate measure of household welfare (e.g. household consumption or income), and (ii) setting appropriate poverty lines for each region.

This report adopts consumption as the preferred measure of household welfare. Defining loosely a poor household as having a "low level of resources over its lifetime," there is strong theoretical support for household consumption as the preferred measure of the long-run level of resources available to a household (Deaton and Zaidi, 2002).[15] Various theoretical results suggest that consumption is less susceptible to seasonal (or inter-temporal) variation and provide a strong basis for the use of cross sectional measures of household consumption at any point in time to target program resources towards households with lower lifetime wealth. Aside from the theoretical considerations for the use of consumption as the best available indicator of household welfare, there is a variety of practical considerations (e.g., Deaton, 1997). From the household's perspective, information about consumption may be a less sensitive topic than information about income.

Having chosen a measure of welfare at the household level, one now needs to make a conversion from a household to an individual basis. This report follows the common practice of making the conversion to the individual level by dividing total expenditures by the number of people in the household (e.g. Deaton and Zaidi, 2002). Implicitly the use of consumption per capita as a measure of welfare makes the following set of assumptions: (a) everyone in the household receives an equal allocation irrespective of age or gender; (b) everyone in the household has the same needs irrespective of age or gender; and (c) the cost for two (or three or more) people living together is the same as the cost of each person living separately. Although the first assumption could be easily defended based on the constraints imposed by lack of information on consumption or income at the individual level, the other two assumptions may be questionable. It is possible that not everyone in the household has the same needs and in particular that needs vary based on gender and age. It is also possible that there are "economies of scale" to living together, perhaps because family members benefit from each other's consumption, or because there are public goods that can be used by all family members at no additional costs. Under both of these circumstances, starting with a one-person household, the increase in the minimum cost of living associated with an extra person in the household may not be the same for a two-person or a three-person family.

These implicit assumptions separately, and in combination, have important consequences on the poverty status of large families. For example, it is often the case that the use of a per capita measure of welfare, typically results in larger households commonly classified as poor. Whether this is correct or not depends on whether the marginal increase in the cost of living associated with an extra person in the household is equal to or lower than the cost of living increase assumed by the per capita measure. In the absence of no

[15] This arguably captures only one of a number of important dimensions of welfare, namely the ability of households to purchase goods through markets. But it is an important dimension that is commonly focused on in both policy analysis and the relevant literature. For a more complete welfare analysis, one may wish to supplement such information with data on access to public goods that cannot be purchased through markets (especially where access is not highly correlated with income or consumption), or even with indices of "capability" (Sen, 1992).

generally accepted methods for calculating either adult equivalent scales or for accounting for economies of scale within households, per capita consumption is used in spite of its limitations and its consequences for welfare and poverty measurement.

The setting of an appropriate poverty line for each region involves a number of considerations. Differences in the cost of living, as well as differences in preferences, food tastes, and average living standards (or affluence) across regions are among the factors that need to be taken into account. The **"relative"** approach to measuring poverty tends to define poverty lines relative to the average standard or living of a region (or a country). The **"absolute"** approach to measuring poverty, is based on the principle that there is a socially acceptable minimum standard or set of basic needs. Households with a standard of living below the socially acceptable minimum standard are those considered to be poor. Absolute poverty lines are useful for evaluating the effect of poverty alleviating policies over time.

Directly related to the concepts of absolute and relative poverty are the frequently encountered concepts of **consistency** and **specificity** (Ravallion and Bidani, 1994). Consistency, which is analogous to the concept of absolute poverty, requires that the real poverty line, defined as the nominal poverty line after adjusting for the cost of living differences between regions, be the same for all regions. In other words, consistency requires that differences in the nominal poverty lines across regions should be entirely (or as much as possible) attributed to differences in regional cost of living.[16] Specificity, on the other hand, emphasizes that the socially accepted minimum standard or set of basic needs should be sensitive to regional differences in tastes, preferences and perceptions. Thus, specificity is more akin to the concept of relative poverty, which emphasizes that the poverty line should be anchored in relation to the average standard of living of the region rather than a socially acceptable standard that may appear to be alien for one or more regions of the country.

Acknowledging the preceding considerations involved in the setting of poverty lines, this chapter investigates and compares the poverty lines resulting from using two fundamentally different approaches to setting poverty lines.[17] The first approach to setting a poverty line is the Cost of Basic Needs (CBN) method. The second approach is the Food Energy Intake (FEI) method. Unfortunately, in Brazil, as in many other developing countries, there is no satisfactory spatial cost-of-living index. Given this basic constraint, each method has its relative advantages and disadvantages. The CBN method, for example, is aimed primarily at generating absolute regional poverty lines that are consistent, at the risk of sacrificing specificity. The FEI method, on the other hand, emphasizes specificity at the risk of yielding inconsistent poverty profiles.[18]

A BRIEF DESCRIPTION OF THE POF SURVEY

The POF survey aims to measure the structure of consumption, expenditures and income of the Brazilian population. The earlier versions of the survey, the 1987/1988 and the 1995/1996 POF were conceived to review the structure of the price indexes build by IBGE, and covered only nine metropolitan regions plus Goiânia and Brasilia (Distrito Federal). The 2002-03 POF survey is the first consumption survey since 1975 that allows representative statistics for the urban as well as the rural areas of all the five regions of

[16] Kakwani (2003) also argues that a desirable poverty line should also be "horizontally equitable", meaning that poverty lines should differ not only across regions but also differ depending on individual circumstances, such as age and gender.

[17] See appendix 5 for a summary discussion of the effort to derive subjective poverty lines based on the POF data. Unfortunately, the estimates obtained for the subjective poverty lines appear to be problematic and thus not very useful for investigating the complementarities between subjective measures of poverty and the objective poverty estimates discussed in this chapter.

[18] The regional distribution of poverty using the relative approach to measuring poverty is explored in Appendix 7. It is shown that the relative approach to poverty measurement yields regional poverty line estimates and poverty rankings that are very similar to those obtained with the FEI method.

Brazil. The survey is also representative at the state level, as well as for urban areas (though not rural areas) within each state.

For the construction of the regional poverty profile of Brazil the five geographical regions were divided in twenty one different regions, eleven metropolitan and ten urban and rural regions, as follows:

Table 6 The regional distribution of the total population and its share in the 2002-03 POF

	Regions		Total population	Population share
1	North	Metro Belem	1,845,708.10	1.05%
2		Urban	8,229,439.10	4.69%
3		Rural	3,533,712.70	2.02%
4	Northeast	Metro Fortaleza	2,985,822.90	1.70%
5		Metro Recife	3,331,278.30	1.90%
6		Metro Salvador	3,088,893.00	1.76%
7		Urban	25,579,176.00	14.59%
8		Rural	13,940,461.00	7.95%
9	Southeast	Metro Rio De Janeiro	11,052,249.00	6.30%
10		Metro Sao Paulo	17,696,179.00	10.09%
11		Metro Belo Horizonte	4,437,345.50	2.53%
12		Urban	35,016,773.00	19.97%
13		Rural	6,586,851.30	3.76%
14	South	Metro Curitiba	2,641,166.40	1.51%
15		Metro Porto Alegre	16,722,914.00	9.54%
16		Urban	5,937,284.00	3.39%
17		Rural	2,430,221.80	1.39%
18	Center West	Brasilia	1,333,651.00	0.76%
19		Goiania municipality	6,392,352.60	3.65%
20		Urban	2,194,866.30	1.25%
21		Rural	355,452.52	0.20%
	Total		175,331,797	100%

Source: World Bank estimates using the 2002-03 POF.

The POF sample is defined to capture expenses from each family (consumption unit) living in the same household. For comparison, the PNAD 2002 represented 51,560,959 families while the 2002-03 POF represented 48,534,638 families (based on the sample of 48, 568 households in the survey).

The interviews took place from July 2002 to June 2003 covering the full diversity of items of the country (e.g. there 5,442 different codes for food products purchased). The consumption expenditure module collects information on household and individual food and nonfood expenditures using four recall or reference periods: last 7 days (for food expenditures), last 30 days, last 90 days and last 12 months. The reference period for all earnings and other income received is the last 12 months. In the version of the POF data sets released to the public all nominal values are expressed in January 15th 2003 prices.

The POF survey also collects information of both monetary and non-monetary expenses as well monetary income and imputed household rent for owners. [19]. The survey classifies as monetary expenditures the expenditures made in cash, credit card or check. Non-monetary expenditures correspond to all types of

19 Defined according the "Informe de la Décimo Séptima Conferência International de Estadisticos del Trabajo (2003)"

auto-consumption or trade with no money involved. Individual respondents were asked to use current market prices to value all non-monetary transactions.

Table 7 provides the regional household consumption expenditure per capita (PCE) and the mean household income per capita (PCINC) obtained from the POF survey. The per capita income variable used here from the POF is the household income total made publicly available by IBGE excluding net withdrawals from savings. It is important to note the sizeable difference between the PCE and PCINC variables in the POF. The difference between PCE and PCINC imply a saving rate of 33% which is considerably higher than the saving rate of 20% estimated from National Accounts. One possible explanation for this difference is the fact that many publicly provided goods are excluded from the consumption aggregate.[20] This implies that the difference between PCE and PCINC includes not only savings but savings plus components of public spending such as spending on public schools free of charge etc.

Table 7 also reports the mean PCINC obtained from the 2004 PNAD survey (with nominal household income deflated to January 2003).It is critical to keep in mind, however, that the household income variables in the POF and the PNAD surveys are not really comparable because they are collected based on very different reference periods (the PNAD for the last month and the POF for the last year).

Table 7 Mean Expenditures per capita (PCE) and Income per capita (PCINC) by region (in R$ per person per month).

Regions			POF PCE	POF PCINC	PNAD PCINC
1	North	Metro Belem	299.0	387.3	322.4
2		Urban	238.2	315.1	287.7
3		Rural	135.0	193.5	185.3
4	Northeast	Metro Fortaleza	309.4	443.9	316.9
5		Metro Recife	331.3	434.3	348.1
6		Metro Salvador	386.8	555.5	350.0
7		Urban	207.6	281.9	239.6
8		Rural	111.9	125.3	111.3
9	Southeast	Metro Rio De Janeiro	547.7	794.6	577.7
10		Metro Sao Paulo	525.3	819.4	545.9
11		Metro Belo Horizonte	429.1	728.3	470.0
12		Urban	381.3	584.0	452.3
13		Rural	207.0	314.5	232.1
14	South	Metro Curitiba	522.8	802.3	609.6
15		Metro Porto Alegre	485.0	807.6	587.3
16		Urban	368.3	574.7	487.1
17		Rural	236.9	346.6	300.2
18	Center West	Brasilia	596.2	940.5	733.6
19		Goiania Municipality	425.9	654.8	n.a*.
20		Urban	268.5	411.7	413.2
21		Rural	217.7	303.6	242.2
National			**335.9**	**502.1**	**389.1**
Metropolitan			**457.7**	**698.5**	**514.2**
Urban excluding Metropolitan			**310.7**	**461.8**	**381.4**
All Urban including Metropolitan			**372.2**	**560.8**	**431.7**
Rural			**159.7**	**217.3**	**182.6**

Source: World Bank estimates using the 2002-03 POF. and the 2004 PNAD
*In the PNAD survey it was not possible to identify the Goiania municipality separately so it is classified with urban areas.

[20] The general guidelines for deriving a household consumption aggregate to measure household welfare based on Deaton and Zaidi (2002) are discussed in detail in Appendix 1 of this report. Appendix 1 also presents the kernel estimates of the density function of the POF income and expenditures (in per capita terms) as well as the density function of the per capita income from the 2004 PNAD.

THE COST OF BASIC NEEDS (CBN) METHOD OF SETTING POVERTY LINES [21]

The CBN method in essence determines the consumption bundle considered adequate for basic consumption needs and then estimates the cost of this basic needs bundle in each of the regions of the country. A household is then considered poor if its consumption expenditures are less than or equal to the cost of this basic needs bundle.

The CBN method can be best described as a two-step method, whereby in the first step, the food poverty line for each region is determined, and in the second step, the food poverty line is adjusted upward by an allowance for basic nonfood needs.

The Food Poverty Line

The food poverty line is derived as follows: First a reference population group is chosen to determine the composition of the basic needs food basket. Second, the basic needs food basket is constructed with three properties in mind: (i) the composition of the basket reflects the variety of food items consumed by a reference population close to the expected poverty threshold; (ii) it provides the recommended food energy requirement of 2300 kcal per capita per day; and (iii) the recommended caloric requirements are derived from a sufficiently diverse variety of foods (e.g. some meat and fruits and vegetables and not just rice and other cereals).

The reference population chosen to determine the basic needs food basket is the set of households in the 20 to 40 percentiles of the distribution of the total per capita expenditure (PCE). The levels of per capita consumption for households in the 20% to 40% are between R$94 and R$165.[22] Table 8 below summarizes the regional distribution of the total population in Brazil, the regional distribution of the reference group of 20-40 percentiles of the distribution of PCE and the regional distribution of the bottom 20 % of the of the distribution of PCE. As it can bee seen, the distribution of the population among Brazilian regions in the 20 to 40 percentiles is similar to the pattern of the distribution of total population in those regions. In contrast, the bottom 20 percentiles were overrepresented by the Northeast.

According to the Food and Agriculture Organization (FAO) the average daily caloric requirement for Brazil is estimated at 2,300 kcal per capita per day. It is important to keep in mind that setting the food energy requirement at 2,300 kcal per capita per day is rather arbitrary, since food energy requirements vary by age, gender, and level of physical activity.[23] Moreover, as it is clearly noted by FAO, there is no implication that exactly 2,300 kcal must be consumed by every person during each and every day.

[21] This section draws heavily from Bidani and Ravallion (1993), Ravallion and Bidani (1994), and Ravallion (1998).
[22] The sensitivity of the food poverty line by the CBN method to the choice of the reference population is examined in greater detail in Appendix 2. The food poverty line was not sensitive at all to the choice of the reference population.
[23] In fact, as Rocha (1997) notes in her study on poverty lines for Brazil, the FAO recommended caloric requirements have been declining over time (see annex 1 of her paper).

Table 8 Regional composition of the 20 to 40 percentiles relative to the regional composition of total Brazilian population

Regions			Total Population (in %)	Reference population (20-40% of PCE) (in %)	Dif Total	Bottom 20 Percentiles	Dif with Total
1	North	Metro Belem	1.05	1.21	0.16	0.74	-0.31
2		Urban	4.69	5.98	1.29	5.83	1.14
3		Rural	2.02	2.94	0.92	4.8	2.78
4	Northeast	Metro Fortaleza	1.70	2.12	0.42	1.71	0.01
5		Metro Recife	1.90	2.04	0.14	1.48	-0.42
6		Metro Salvador	1.76	1.58	-0.18	1.06	-0.7
7		Urban	14.56	18.52	3.93	25.84	11.25
8		Rural	7.95	9.97	2.02	22.81	14.86
9	Southeast	Metro Rio De Janeiro	6.30	3.65	-2.65	2.21	-4.09
10		Metro Sao Paulo	10.09	6.6	-3.49	2.12	-7.97
11		Metro Belo Horizonte	2.53	2.06	-0.47	0.67	-1.86
12		Urban	19.97	17.1	-2.87	11.54	-8.43
13		Rural	3.76	5.51	1.75	5.27	1.51
14	South	Metro Curitiba	1.51	1	-0.51	0.31	-1.2
15		Metro Porto Alegre	9.54	1.39	-0.7	0.57	-1.52
16		Urban	3.38	8.06	-0.54	5	-3.6
17		Rural	1.39	2.88	0.35	2.31	-0.22
18	Center West	Brasilia	0.76	0.75	-0.48	0.34	-0.89
19		Goiania Municipality	3.65	0.49	-0.15	0.12	-0.52
20		Urban	1.25	5.19	0.9	4.14	-0.15
21		Rural	0.20	0.96	0.17	1.14	0.35

Source: World Bank estimates using the 2002-03 POF.

Given the large number of food items (5,442) in the POF survey, the selection of the specific food items composing the basic needs food basket was based on the following steps. First, the 5,442 different food items were first grouped in 41 food groups (i.e., cereals, beans, vegetables, etc.). Second, the specific food items was performed by selecting food items with the highest frequency (most frequently purchased) from food groups with an average weighted share of greater than 1 percent. Among the 41 different food groups only 24 had a frequency greater than one percent. The resulting basket of basic food consumption contained 26 specific food items: 1 from each of the 24 different groups with two extra items in the vegetables food group.[24]

Next, the quantities were expressed in per capita and per day terms by dividing by the number of household members residing in the household (see column b). The average quantity of each of the 26 items in food basket was rescaled to ensure that the food basket yields 2,300 kcal per capita per day. This was done by multiplying the average quantity of each of food item with a conversion factor of 0.59 obtained from the ratio of the recommended daily caloric requirement per capita and the total calories yielded by the average quantities per capita per day in the poverty basket (see columns d & e).

Table 9 below presents the composition and adjusted quantity of each food item in the basic needs food basket.

[24] It is important to note that we have also tested the sensitivity of the food poverty line by increasing the number of food items in the basket and/or by allowing the composition of the poverty basket to be sensitive to regional differences in food tastes and preferences. For details see appendix 2.

Table 9 The Composition of the Basic Needs Food Basket.

Order	Product	(a) Calories per Kg of product	(b) Unadjusted Average Per capita per day quantities (20 to 40 percentiles) (in kg)	(c) Total calories per capita per day (20 to 40 percentiles) = (a)*(b)	(d) Converted Per capita per day quantities (in kg) = (b)*0.59	(e) Total calories per capita per day =(a)*(d)
1	Pao frances	2690	0.044	117	0.026	70
2	Leite de vaca pasteurizada	606	0.139	84	0.083	50
3	Carne de segunda	1341	0.061	81	0.036	48
4	Frango congelado	1103	0.071	79	0.042	47
5	Arroz polido	3640	0.173	629	0.103	374
6	Tomate	192	0.032	6	0.019	4
7	Cebolha	351	0.025	9	0.015	5
8	Batata inglesa	584	0.043	25	0.026	15
9	Carne de primeira	1341	0.054	72	0.032	43
10	Feijão carioca	3360	0.075	252	0.045	150
11	Biscoitos (doces)	4160	0.015	63	0.009	38
12	Guaraná	310	0.092	28	0.055	17
13	Acucar	3850	0.115	442	0.068	263
14	Carnes suínas	3150	0.017	55	0.010	33
15	Banana prate	623	0.046	29	0.027	17
16	Oleo de Soja	8840	0.048	424	0.029	252
17	Farinha de mandioca	3540	0.125	442	0.074	263
18	Farinha de trigo	3650	0.090	330	0.054	196
19	Café moído	410	0.015	6	0.009	4
20	Ovos	1293	0.013	16	0.008	10
21	Macarrao (pasta)	3880	0.031	121	0.019	72
22	Linguica	3500	0.031	107	0.018	64
23	Po achocolatado	3620	0.011	40	0.007	24
24	Fuba de milho	3540	0.073	259	0.044	154
25	Margarina	7200	0.013	93	0.008	55
26	Queijo Prato	3920	0.014	54	0.008	32
Total in basket			1.4659	3865	0.8722	2300

Source: World Bank estimates using the 2002-03 POF.

The composition of the basic needs food basket turned out the be very similar to the composition of the Basic Basket PROCON (Cesta Básica PROCON) for the state of Sao Paulo, generated, based on the POF surveys from earlier years. by the Center of Studies and Research of the Secretariat of Defense of the Consumer in the State of Sao Paulo. in partnership with DIEESE (*Departamento Intersindical de Estatística e Estudos Socio-Econômicos*).

Next, the food poverty line (or alternative call extreme poverty or indigence line) for each region is estimated by valuing the basic needs food baskets separately in each region. Specifically. the food poverty line in each region is estimated using the expression:

$$FPL^R = \sum_{i=1}^{26} p_i^R \left(q_i^0 * k \right), \tag{2.1}$$

where the superscript R denotes the twenty one different regions, p_i^R is the average unit value of food item i in region R,[25] q_i^0 is the average quantity of food item i in the basket, and k is the conversion factor.[26] The unit values p_i^R are defined as the total expenditure reported for a specific item divided by the total quantities purchased of each item. Ideally, it would be better to use the actual market prices for each food item in each region.

Table 10 The Food Poverty Line (in R$ per person per month)

Regions			Food Poverty Line
1	North	Metro Belem	63
2		Urban	60
3		Rural	59
4	Northeast	Metro Fortaleza	59
5		Metro Recife	62
6		Metro Salvador	63
7		Urban	60
8		Rural	59
9	Southeast	Metro Rio De Janeiro	62
10		Metro Sao Paulo	65
11		Metro Belo Horizonte	59
12		Urban	64
13		Rural	58
14	South	Metro Curitiba	60
15		Metro Porto Alegre	64
16		Urban	57
17		Rural	55
18	Center West	Brasilia	62
19		Goiania Municipality	59
20		Urban	61
21		Rural	60
National			**61**
Metropolitan			**62**
Urban excluding Metropolitan			**61**
Rural			**58**

Source: World Bank estimates using the 2002-03 POF.
Poverty lines are expressed in R$, January 2003.
The numbers in the last four rows are simple (unweighted) averages of the region-specific poverty lines

[25] In Appendix 2, we tested the sensitivity of the estimated food poverty lines by using the median unit values and median quantities in each region; and found no significant changes in the estimates for the food poverty line.
[26] In fact k= (2,300/3,865)= 0.595084.

Since the composition of the food basket is held fixed and the quantity of each food item is not allowed to differ from region to region, it is implicitly assumed that households do not respond to differences in relative prices.[27]

Table 10 presents the regional food poverty lines obtained using the preceding procedures. In general, the food poverty lines are very similar across the twenty one regions, suggesting very small differences in the cost of living across regions.[28] Nevertheless, the food poverty lines are generally lower in rural areas in comparison to metropolitan and urban areas within each region. Also, in metropolitan areas prices are even higher than in urban non metropolitan areas. The highest food poverty line appears in the metropolitan region of Sao Paulo where the value of the basket reaches R$65 per capita per month.

Adjusting the Food Poverty Line for the Cost of Non Food Basic Needs

In principle, one could apply the same general approach in constructing an index for nonfood items. One could determine a bundle of essential nonfood items that enter the basket, and then cost that bundle separately in each region. Unfortunately, there are a number of factors preventing the application of this approach. For example, to determine the composition of the food basket for the poverty line, one can use the recommended food energy requirement as an anchor for food consumption. It is practically impossible to devise an analogous method for determining the specific requirements of each nonfood item (such as housing, transportation needs, utilities and clothing). Moreover, even in the event that one manages to determine the specific requirements of nonfood items, it is difficult to monitor the prices of nonfood items, since the prices of the most nonfood items are rarely available.

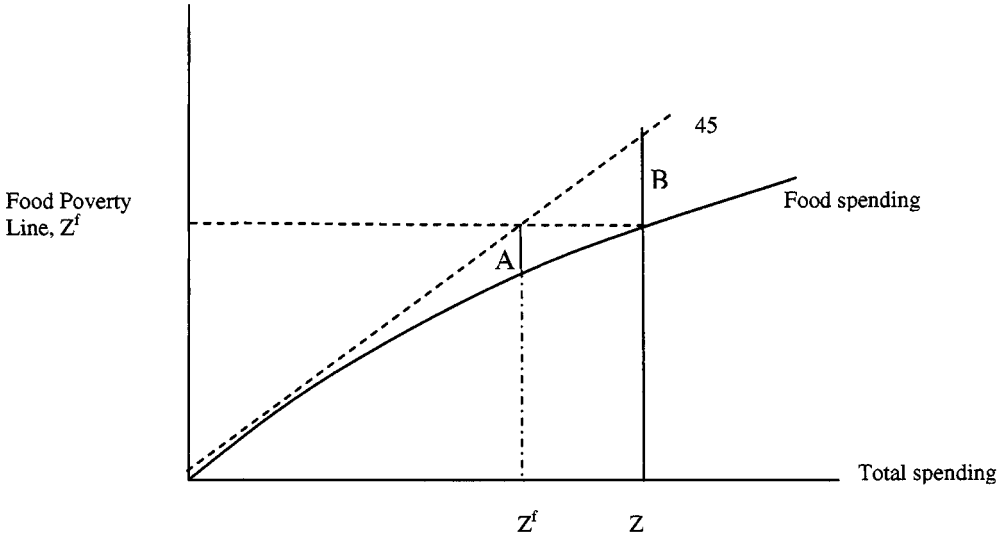
Ravallion (1998) proposes two ways of estimating the upward adjustment (allowance) to the food poverty line to account for basic nonfood needs. Each method is based on an intuitive criterion for defining the basic non food consumption and separately applied they yield a lower and an upper estimate of the (total) poverty line.

The first method (method A) is based on households whose total per capita expenditures are equal to the food poverty line. Provided that households with this level of total expenditures spend something on nonfoods, it follows that they are willing to forego some food spending to satisfy some of their basic non food needs. Graphically, line segment A in figure 3, represents the allowance for basic nonfood needs that should be added to the food poverty line. The line segment A represents the amount of expenditures that households with expenditures equal to the food poverty line (Z^f) forego in order to purchase basic nonfood items. The second method (method B) is based on households whose food expenditures per capita are equal to the food poverty line. As figure 3 displays, these households end up spending an additional amount represented by the line segment B for nonfood items. Clearly, since the adjustment for basic nonfood expenditures with method A is lower than the adjustment with method B, the former adjustment yields a lower poverty line, while the later yields an upper poverty line.

[27] Thus, the food poverty line is analogous to a Laspeyres price index. Note, that the food poverty line can also be interpreted as the cost of achieving a minimum level of utility, if one were willing to assume that utility compensated substitution effects are zero (Ravallion, 1998).

[28] The spatial variability of the food and the overall poverty line are examined in more detail in the next chapter.

Figure 3 Estimating the Cost of Nonfood Basic Need



Following Ravallion (1998), the adjustment to the food poverty line for basic nonfoods was performed by estimating an Engel curve such as[29]

$$w_F^h = \alpha_0 + \sum_{j=1}^{20} \alpha_j R_j + \beta \ln\left(PCE^h / FPL\right) + \gamma X^h + \varepsilon \qquad (2.2)$$

where w_F^h is the share of food expenditures of household h, α_0 is a constant term, R is set of binary dummies for 20 of the 21 regions of Brazil (the Sao Paulo metropolitan area was included in the constant term), *PCE* is per capita expenditure, *FPL* is the Food Poverty Line, and X summarizes a set of demographic characteristics. Specifically, X included the number of males and females of different age groups, and the gender, years of education, and employment status of the household head.

The lower adjustment to the food poverty line for basic nonfoods (line segment A in figure 3) for each region R_j is obtained by first estimating the food share of households with per capita expenditures equal to the food poverty line (i.e., *PCE=FPL*) based on the expression:

$$w_F^R = \hat{\alpha}^R = \hat{\alpha}_0 + \hat{\alpha}_j R_j + \hat{\gamma}\overline{X}^h, \qquad (2.3)$$

where $\overline{X}^h$, denotes the average household characteristics of households in the reference population (the 20 to 40 percentile of the PCE distribution). Armed with an estimate of the food share of households the lower poverty line may be estimated as:

$$PL^R(lower) = FPL^R + \left(1 - w_F^R\right)FPL^R = 2FPL^R - w_F^R FPL^R = FPL^R\left(2 - w_F^R\right). \qquad (2.4)$$

[29] We have also estimated the lower and upper estimates of the food shares using a version of the nonparametric approach suggested by Ravallion (1998). Estimating the food shares nonparametrically did not introduce any major changes in the level and variability of the regional poverty lines. Estimates of the regional poverty lines using a nonparametric approach are presented in Appendix 3.

The alternative approach for estimating the adjustment to the food poverty line for basic nonfoods estimates is also based on the estimates of equation (2). The upper poverty line is based on the estimation of the food share at which the food per capita expenditure equals the food poverty line. Let w_F^R denote food share in region R at which per capita expenditure equals the food poverty line. Then w_F^R may be identified with the value of w_F^R that satisfies the equation[30]:

$$w_F^R(upper) = \hat{\alpha}^R + \hat{\beta}\ln\left(1/w_F^R(upper)\right), \tag{2.5}$$

where $\hat{\alpha}^R = \hat{\alpha}_0 + \hat{\alpha}_j R_j + \hat{\gamma}\bar{X}^h$. Then the upper estimate of the poverty line may be obtained as:

$$PL^R(upper) = \frac{FPL^R}{w_F^R(upper)} \tag{2.6}$$

Table 11 below presents the estimated food shares using methods A (lower) and B (upper). Consistent with Engel's Law, that predicts that food shares decline with total spending, the food share associated with method B is lower than the food share obtained with method A. Table 12 presents the corresponding estimates of the region-specific lower and upper poverty lines for Brazil.

Table 11 Estimated Food shares based on CBN method A (Lower) and B (Upper).

Regions			Predicted food shares for the:	
			Lower	Upper
1	North	Metro Belem	0.343	0.326
2		Urban	0.306	0.288
3		Rural	0.414	0.401
4	Northeast	Metro Fortaleza	0.316	0.299
5		Metro Recife	0.314	0.296
6		Metro Salvador	0.301	0.283
7		Urban	0.352	0.336
8		Rural	0.433	0.420
9	Southeast	Metro Rio De Janeiro	0.266	0.247
10		Metro Sao Paulo	0.239	0.219
11		Metro Belo Horizonte	0.266	0.247
12		Urban	0.285	0.266
13		Rural	0.333	0.316
14	South	Metro Curitiba	0.252	0.232
15		Metro Porto Alegre	0.274	0.255
16		Urban	0.278	0.260
17		Rural	0.372	0.357
18	Center West	Brasilia	0.229	0.208
19		Goiania municipality	0.265	0.245
20		Urban	0.279	0.261
21		Rural	0.333	0.316

Source: World Bank estimates using the 2002-03 POF.

[30] Equation (2.5) is solved by numerically by an iterative method. For further details see Ravallion (1998).

Table 12 Regional Poverty Lines for Brazil based on the CBN method (in R$ per person per month)

Region			Lower Poverty Lines	Upper Poverty Lines
1	North	Metro Belem	105	195
2		Urban	102	211
3		Rural	93	147
4	Northeast	Metro Fortaleza	99	199
5		Metro Recife	104	210
6		Metro Salvador	108	227
7		Urban	100	181
8		Rural	92	140
9	Southeast	Metro Rio De Janeiro	107	253
10		Metro Sao Paulo	115	304
11		Metro Belo Horizonte	103	244
12		Urban	109	242
13		Rural	97	185
14	South	Metro Curitiba	105	263
15		Metro Porto Alegre	111	256
16		Urban	99	224
17		Rural	90	156
18	Center West	Brasilia	109	303
19		Goiania municipality	103	246
20		Urban	105	238
21		Rural	100	191
National			**103**	**220**
Metropolitan			**106**	**246**
Urban excluding Metropolitan			**103**	**219**
Rural			**94**	**164**

Source: World Bank estimates using the 2002-03 POF..
Poverty lines are expressed in R$, January 2003.
The numbers in the last four rows are simple (unweighted) averages of the region-specific poverty lines

One rather surprising finding is the fact that the lower estimate of the poverty line for Brazil is practically identical to the "Administrative Poverty Line" of R$100 per capita per month used widely for determining eligibility for social programs, and discussed in more detail in the previous chapter of this report.

Table 12 also reveals that there is a considerable gap between the lower and the upper poverty lines obtained with the CBN method. The CBN-Upper poverty lines are on average two times as large as the lower poverty lines, and more than three times as large as the food poverty lines (reported in table 10). That is especially the case in metropolitan areas, where the predicted share of food expenditure is lower than in non metropolitan areas.[31]

[31] Given the considerable gap between both lower and upper bounds, and the two different poverty figures that these two extreme lines would entail, an alternative practice found in the literature is to average the lower and the upper estimates of the poverty lines. This would give an intermediate point of estimate for the non food allowance between the two extremes commented in the graph.

THE FOOD ENERGY INTAKE (FEI) METHOD OF SETTING POVERTY LINES[32]

As mentioned in the introductory part of this chapter, another desired feature of a poverty line is "specificity". Specificity is the term used by Ravallion and Bidani (1994) to summarize the extent to which a poverty line is able to reflect the local customs, food tastes and preferences and perceptions of what constitutes poverty in each region of the country. In this section we describe the Food Energy Intake (FEI) method as an alternative approach to setting poverty lines. The emphasis of the FEI approach is on specificity rather than consistency. It is argued that the particular features of the method that allow poverty lines to reflect the region-specific food tastes and preferences also tend to result in poverty lines that are inconsistent across regions. Thus, there is a natural conflict between deriving poverty lines that satisfy the properties of consistency and specificity simultaneously. The remainder of this section describes the FEI method and the main advantages and disadvantages associated with it.

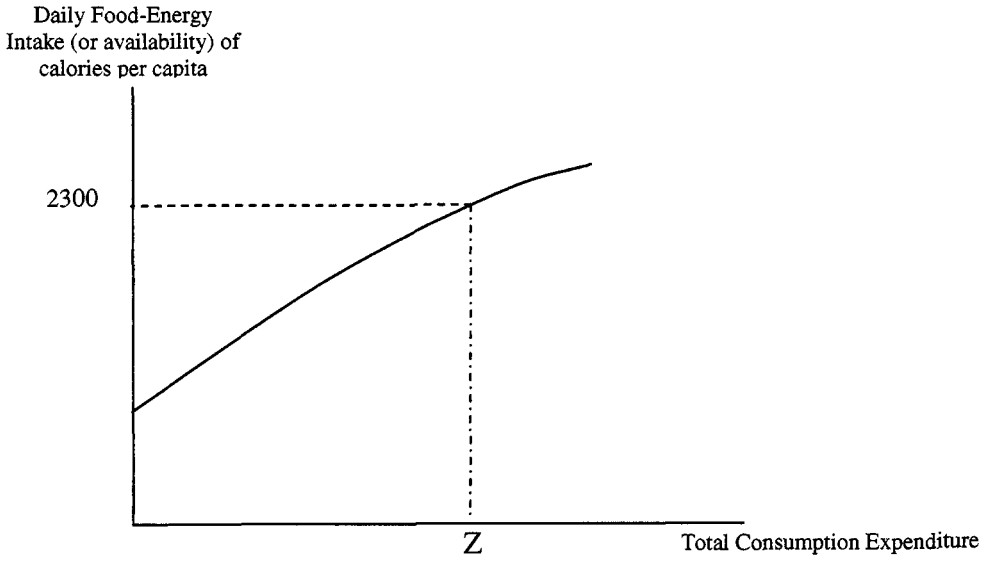
In contrast to the CBN approach, which determines a consumption bundle that is considered adequate for basic consumption needs and then estimates the cost of this basic needs bundle in each region, the FEI method consists of identifying the total consumption expenditure or income at which a person's typical daily food energy intake is just sufficient to meet a predetermined food energy requirement.[33] Figure 4 below displays graphically how the poverty line can be determined using the FEI method. The upward sloping line in this figure depicts the line summarizing the relationship between total daily caloric availability per capita and total consumption expenditure. Given the recommended energy requirement of 2,300 kcal per day per capita, the "calorie-expenditure" line may then be used to find the total consumption expenditure that corresponds to it, in this case point Z in the horizontal axis of figure 4.

The advantages of the FEI method in deriving a poverty line are numerous. First, it is simple and it can be applied easily within each of the twenty one regions of Brazil to derive a region-specific total poverty line. Second, the method does not require an adjustment for the consumption of nonfood, since it yields automatically the level of total (food and nonfood) expenditures that are associated with attainment of the 2300 daily caloric requirement per capita. Third, the method can be easily adjusted to derive either a region-specific food poverty line or determine the composition of the region-specific food poverty basket. For example, a food poverty line may be obtained by identifying the level of food expenditures of households with 2,300 kcal per capita, available per day and total consumption expenditures equal to Z (or plus or minus a small amount around Z). Along similar lines, the composition of the food poverty basket could be determined by including the food items purchased most frequently by the same group of households. Thus, even though the FEI method per se does not necessarily require price data, it can also be used to come up with a list of items of a region-specific poverty basket whose prices could be measured over time to update the poverty line at regular time intervals.

[32] Strictly speaking, in the case of Brazil, the correct description for the method discussed in this section is Food Energy Availability (or FEA) rather than FEI. This is because the POF survey collects information on household expenditures for consumption (i.e. availability of calories) rather than actual caloric intake or actual consumption of food.

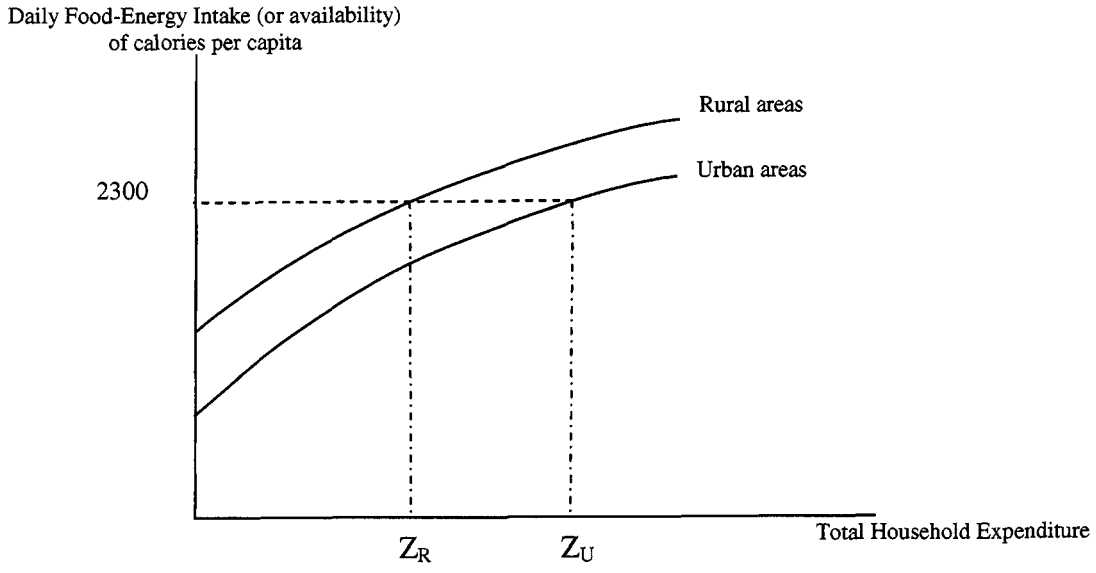
[33] The method has been applied in numerous countries such as Indonesia, (Ravallion and Bidani, 1994), India and Pakistan (see Kakwani 2003, for a summary).

Figure 4 The Food Energy Intake (FEI) Method for Setting a Poverty Line



However, the simplicity of the FEI method comes at a cost. The primary disadvantage associated with the FEI method is that it yields poverty lines that are not consistent. The lack of consitency of the poverty lines arises from the fact that differences in the poverty lines between two regions are attributable to differences in the cost of living between these two regions as well as other factors. These other factors include differences in tastes, levels of activity, relative prices, publicly provided goods and other determinants of affluence.

Figure 5 Setting a Poverty Line with the FEI method in Urban and Rural Areas



To get a better sense of the shortcomings associated with setting poverty lines with the FEI method consider figure 5. This figure illustrates the FEI method for two regions: a rural and an urban region.

According to the FEI method the poverty line for rural areas Z_R is lower than the the poverty line for urban areas denoted here by Z_U. To the extent that other factors, in addition to differences in the cost of living between urban and rural areas, affect the difference between the two poverty lines, then these two poverty lines are not likely to be consistent. The two poverty lines derived by the FEI method in figure 5 depend critically on the positions of the two calorie-expenditure lines for urban and rural areas and the relative positions of these calorie-expenditure lines, depend on a variety of other factors besides differences in cost of living.

For example, the activity level of jobs in urban and rural areas may differ. Activities in the typical urban job may require fewer calories than activities in the typical rural job (e.g. agricultural labor). Thus, regional differences in activity levels may result in caloric intake or availability being lower for urban households at any given level of real expenditure. This, in turn may affect the relative position of the calorie-expenditure line and ultimately the difference between the rural and urban povery lines Z_R and Z_U.

It is also likely that households in urban areas may have more expensive food tastes. Thus even in the unlikely case that the cost of food is the same between between rural and urban areas, households in urban areas may prefer to consume food items of higher quality and thus of higher price (e.g. buy organically grown fruits and vegetables, instead of vegetables from the regular grocery store). As a consequence, urban households may spend more per calorie consumed, or equivalently, the caloric availability obtained for any given level of real expenditure is likely to be lower.

Another factor affecting the relative location of the calorie-expenditure lines for urban and rural areas is differences in the relative prices of food and nonfood. As Ravallion and Bidani state:

> "To the extent that prices differ between urban and rural areas (say, because of transport costs for food produced in rural areas), different nominal poverty lines should be used. However, relatice prices can also differ, and (in general) this will alter demand behavior at given real expenditure levels (nominal expenditures deflated by a suitable cost-of-living index)." For example, the prices of of some nonfood goods tend to be lower in relation to foods in urban areas than in rural areas, and retail outlets for nonfood goods also tend to be more accessible (so the full cost, including time, is even lower) in urban areas. This may mean that the demand for food and (hence) food energy intake will be lower in urban areas than in rural areas at any given real expenditure level...."

The preceding arguments imply that the difference between the two poverty lines Z_R and Z_U derived by the FEI method is likely to embody more differences than just differences in the cost-of-living between urban and rual areas. As a consequence, these households whose total consumption expenditures equal to these nominal poverty lines may not have exactly the same standard of living (or welfare) as is required by a poverty profile that is consistent.

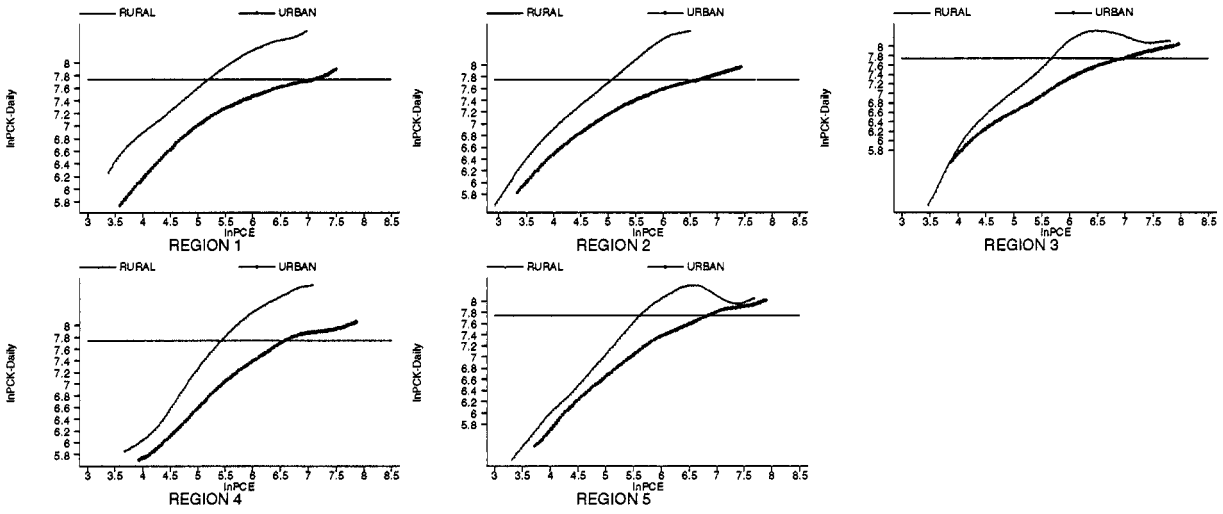
As a means of investigating the issues for the case of Brazil, figure 6 presents non-parametric estimates of the calorie-expenditure curve for urban and rural areas in each of the five main regions of Brazil: North, Northeast, Southeast, South, and Center-West.[34] The vertical axis in each of these graphs is the logarithm of daily caloric availability per capita (lnPCK), estimated from the POF survey, while the horizontal axis is the logarithm of per capita expenditures (lnPCE). The horizontal line in each of these figures depicts the recommended daily caloric requirement of 2,300 kcal per capita. Preliminary estimates of the poverty

[34] Thus, the metropolitan areas in each of these regions are combined with the other urban areas, in order to economize on the number of graphs. For more technical details on how to derive the non-parametric graphs presented herein the reader is referred to Subramanian and Deaton (1996) and Deaton (1997).

lines for the urban and rural areas in each of the five regions can be obtained by tracing down a vertical line from the point of intersection of the recommended daily caloric requirement with the corresponding calorie-expenditure curve. Since the calorie-expenditure curves for urban areas are further to the right of the calorie-expenditure curve for rural areas, it follows that the poverty lines for urban areas will be higher than the poverty lines for rural areas. The consistency of these poverty lines relates to the question of whether the gap between urban and rural poverty lines of the FEI method is capturing cost of living differences as well as other additional confounding factors.

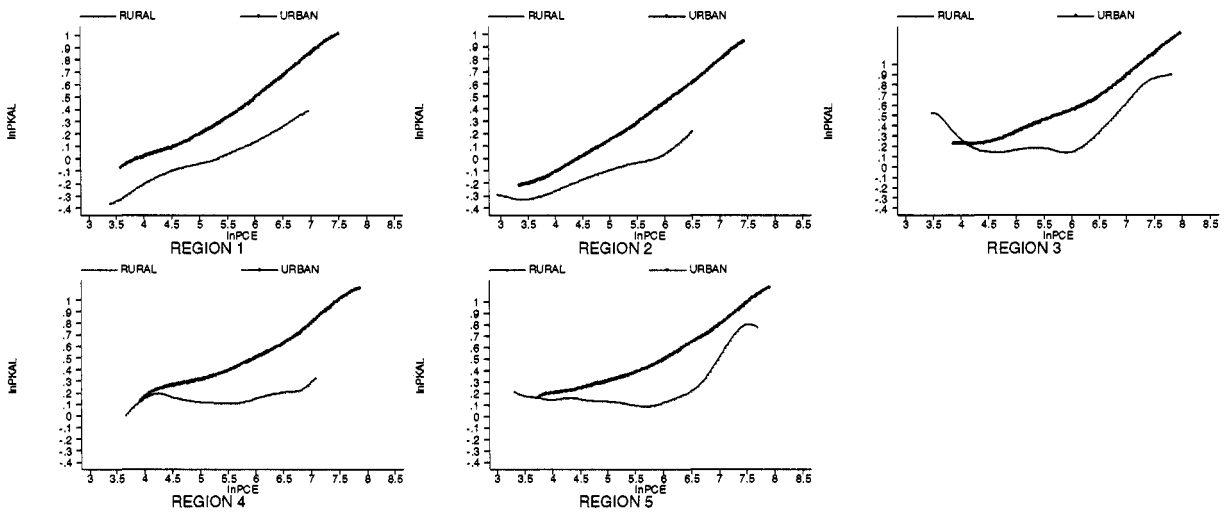
Figure 7 presents the corresponding non-parametric estimates of the calorie price-expenditure curve for urban and rural areas of the same regions. In these graphs the vertical axis is the logarithm of the cost per calorie (lnPKAL) while the horizontal axis is the same as before (i.e. lnPCE). The calorie price is derived by dividing total food expenditures for consumption at home by the caloric content of the food items purchased. The positive slope of these curves implies that increases in household living standards (measured by total per capita consumption expenditure) are associated with a higher price per calorie. Thus, to the extent that the price of calories captures quality, in both urban and rural areas, households with a higher standard of living seem to prefer food of higher quality. In addition, the higher position of the calorie price-expenditure curve for urban areas relative to that for rural areas suggests that urban households pay a higher price per calorie for any given level of real expenditure. Thus, figure 7 provides some strong indications that the poverty lines obtained with the FEI method in figure 6 are likely to embody differences in preferences (or tastes) between urban and rural areas, in addition to cost-of-living differences.

Figure 6 Non-parametric estimates of the calorie-expenditure curve in urban and rural areas of the five regions of Brazil



Note: Region 1=North; Region 2= Northeast; Region 3=Southeast; Region 4= South; Region 5=Center-West

Figure 7 Non-parametric estimates of the price of calorie-expenditure curve in urban and rural areas of the five regions of Brazil



Note: Region 1=North; Region 2= Northeast; Region 3=Southeast; Region 4= South; Region 5=Center-West

COMPARING THE CBN AND FEI POVERTY LINES FOR BRAZIL

The first step towards applying the FEI method on the POF data set is to calculate caloric availability for each food item purchased by each household in the POF survey. To do this, we used quantity-to-calorie conversion factors made available by IBGE. The total calories purchased for consumption at home at the household level were then estimated by aggregating across all the food items purchased. The total caloric availability per capita (PCK) was estimated by adding to the calories purchased for consumption at home, an estimate of the household calories consumed outside the home. The survey collects information only on expenditures for food consumed outside the home (such as restaurant meals, street vendors etc) but not quantities nor prices. Under these circumstances, the estimate of the calories consumed outside the home was derived by dividing the expenditures of food consumed outside the home by 1.5 times the calorie price paid for items purchased for consumption at home.[35] Thus, it is assumed that the cost of calories for food consumed outside the household is 1.5 times higher, in accordance with international evidence (e.g. Subramanian and Deaton, 1996).

Second, for each of the twenty one regions of Brazil we estimated the following regression model:

$$\ln(PCE) = \alpha + \beta * PCK + \varepsilon, \qquad (2.7)$$

where *PCE* denotes total (food + nonfood) expenditures per capita, and PCK denotes daily caloric availability per capita. The poverty line in each region was estimated using the region-specific estimates of the parameters α, and β, and the recommended daily caloric availability per capita i.e., POVLINE=exp($\hat{\alpha} + \hat{\beta} * 2300$). Thus, POVLINE represents the per capita expenditure in any given region at which the per capita energy requirement of 2,300 kcal is met.[36]

[35] The calorie price is derived by dividing total food expenditures for consumption at home by the caloric content of the food items purchased.

[36] An analogous approach was used for the estimation of the food poverty line using the FEI method. Equation (1) was re-estimated by replacing the dependent variable PCE by per capita food expenditures (PCFE). Note that, in principle, it is also possible to apply the FEI method using different minimum daily caloric requirements for different regions (e.g., urban vs. rural). Appendix 4 provides a more detailed investigation of the sensitivity of the poverty lines derived by the FEI method.

Table 13 CBN vs. FEI Poverty Lines

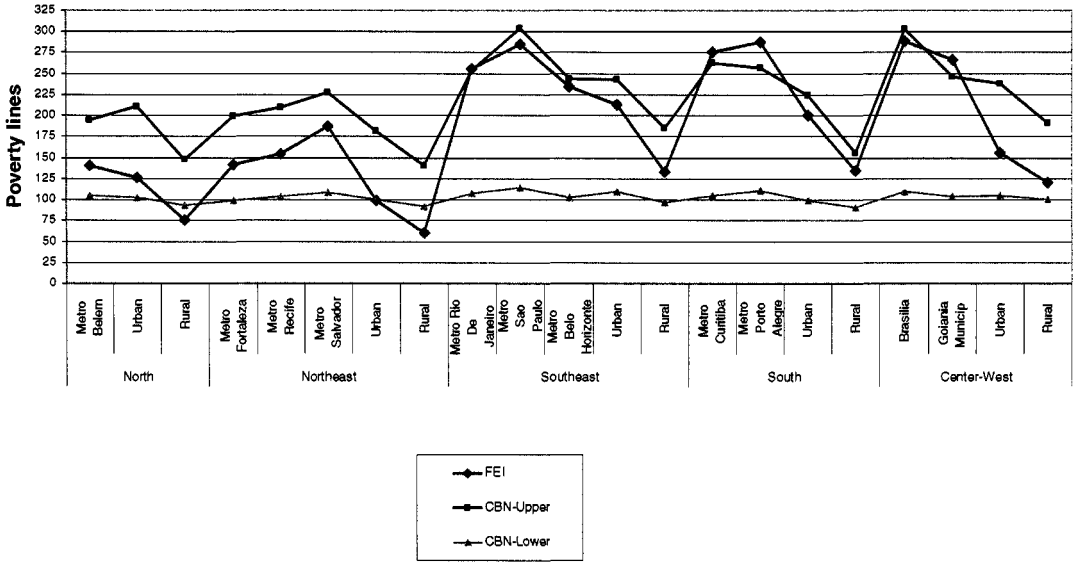
Regions			FEI*	CBN Upper	CBN Lower
1	North	Metro Belem	140	195	105
2		Urban	126	211	102
3		Rural	75	147	93
4	Northeast	Metro Fortaleza	141	199	99
5		Metro Recife	154	210	104
6		Metro Salvador	187	227	108
7		Urban	99	181	100
8		Rural	60	140	92
9	Southeast	Metro Rio De Janeiro	255	253	107
10		Metro Sao Paulo	285	304	115
11		Metro Belo Horizonte	235	244	103
12		Urban	213	242	109
13		Rural	132	185	97
14	South	Metro Curitiba	275	263	105
15		Metro Porto Alegre	287	256	111
16		Urban	200	224	99
17		Rural	134	156	90
18	Center-West	Brasilia	288	303	109
19		Goiania Municipality	266	246	103
20		Urban	155	238	105
21		Rural	120	191	100
National			**170**	**220**	**103**
Metropolitan			**229**	**246**	**106**
Urban excluding Metropolitan			**159**	**219**	**103**
Rural			**104**	**164**	**94**

Source: World Bank estimates using the 2002-03 POF. Poverty lines are expressed in R$, January 2003. The numbers in the last four rows are simple (un-weighted) averages of the region-specific poverty lines

The regional poverty lines obtained from the FEI method are shown in Table 13. To facilitate comparison, the lower and upper poverty lines obtained by the CBN method are presented next to the FEI poverty lines. Figure 6 presents the poverty lines of table 13 in graphical form. The graph makes it more apparent that the upper CBN poverty line is quite similar in both level and variability to the FEI poverty line.

Table 13 and figure 8 suggest that the adjustment of the food poverty line for the cost of basic nonfood needs is very sensitive to the method used.

Figure 8 The CBN and FEI Regional Poverty lines



Source: World Bank estimates using the 2002-03 POF.

A close examination of table 13 and the corresponding figure 8 leads to the following observations:

- On average, the FEI poverty lines suggest that the difference between the cost of living between metropolitan and rural areas is much higher than the cost of living differences obtained with the CBN-Upper and especially the CBN-Lower poverty line. Expressed as a fraction of the value of the poverty line in rural areas, the CBN-Lower poverty lines suggest that on average the cost of living in metropolitan areas is 12.8% higher than in rural areas, whereas the CBN-Upper poverty line yields a cost of living in metropolitan areas that is 50% higher. In contrast, the FEI poverty lines suggest that the cost of living is 120% higher. This finding is consistent with the argument in the earlier part of this chapter that the FEI method is likely to yield poverty lines that embody differences in preferences (or tastes) between urban and rural areas, in addition to cost-of-living differences.
- In each of the five regions of Brazil, and in all sub regions of the North and the Northeast, the FEI poverty line in rural areas is lower than the CBN-Upper poverty line. Thus the FEI approach is likely to yield poverty rates that are "too low" in rural areas and "too high" for urban areas relative to the poverty rates obtained with the CBN-Upper. In fact, in the rural North and Northeast regions, the FEI method is likely to yield the lowest poverty rates, since it results in poverty lines that are even lower than the poverty lines obtained with the CBN methods.
- There is a large difference in the level of the CBN-Lower and the CBN-Upper poverty lines. The explanation behind these large differences is based on the assumptions used to adjust the food poverty line for basic nonfood needs. The starting point of either the lower or the upper adjustment to the food poverty line is the simple fact that there is no explicit information on the basic nonfood needs of poor households. The lower poverty line is obtained under the assumption that the basic nonfood needs of a poor household is best determined by the nonfood expenditures of households with total consumption expenditures equal to the value of the food poverty line. The nonfood expenditures of these households may be considered as absolutely necessary for sustaining the minimum living standards, simply because households are willing to forego some spending on what is required to attain the minimum caloric requirement (the basic needs food

basket) in order to purchase these nonfood items. In contrast, the upper poverty line is derived under the assumption that the essential nonfood needs of a poor household can be determined by the nonfood expenditures of households who are satisfying the basic food needs (i.e., their food spending equals the cost of the basic needs food basket). Even though the reference group of households used by the upper poverty line may sound more appealing, it is important to keep in mind that the nonfood expenditures of households satisfying the basic food needs do not necessarily represent the "basic nonfood needs of poor households". In reality, the "basic nonfood needs of poor households" may be lower than the nonfood expenditures of these households. It is for this reason that the upper poverty line is best considered as setting a limit to the range of admissible poverty lines.

CONCLUSIONS

The analysis of this chapter suggests that the main components of poverty in Brazil can be best captured by three different poverty lines:

- A food or **extreme poverty line** that is determined by cost of the basic needs food bundle that yields the recommended energy (caloric) requirements of 2,300 kcal per capita per day from a sufficiently diverse variety of food. Households with total consumption expenditures per capita less than or equal to the food poverty line may then be considered as households in **extreme poverty**, as they are unable to satisfy the basic food needs. The analysis in chapter 2 determined that the food or extreme poverty line in Brazil is, on average, equal to R$61 per capita per month. Moreover, the extreme poverty line varies only a little from region to region, with the lowest value of R$55 in the rural South region and the highest value of R$65 in metropolitan Sao Paulo (see table 10).
- An intermediate poverty line that is determined by the cost of satisfying the **minimum livelihood needs**. This poverty line is the CBN-Lower poverty line discussed in chapter 2 that adjusts upwards the food poverty line for the cost of essential nonfood needs. In this poverty line, the adjustment for the cost of essential nonfood needs is determined by the nonfood expenditures of households that spend as much as the value of the food poverty line but forego some spending on food in order to purchase these essential nonfood items. The analysis in chapter 2 determined that the minimum livelihood or intermediate poverty line in Brazil is on average equal to R$103 per capita per month, which is very close to the "Administrative Poverty Line" of R$100 per person per month used for eligibility in the *Bolsa Família* program, and the "misery line" of R$108 estimated by Social Policy Center of the Getulio Vargas Foundation (FGV). As is the case with the extreme poverty line, the minimum livelihood poverty line does not vary much from region to region, with the lowest value of R$90 in the rural South region and the highest value of R$115 in metropolitan Sao Paulo (see table 12).
- An upper poverty line that sets a limit to the range of admissible poverty lines. This generous poverty line corresponds to the CBN-Upper poverty line that adjusts upwards the food poverty line for the cost of basic nonfood needs. In contrast to the minimum livelihood needs poverty line, the adjustment for the cost of basic food needs is determined by the nonfood expenditures of households who are able to satisfy the basic food (i.e. their food spending equals the cost of the food poverty basket). The analysis in chapter 2 determined that the upper poverty line in Brazil is on average equal to R$220 per capita per month, almost two times the minimum livelihood needs poverty line.

This report takes the view that the extreme poverty line and the minimum livelihood poverty line are the poverty lines most relevant for policy. This choice is based on two key reasons. First, these two poverty lines are the poverty thresholds most useful for identifying the households with the most pressing needs.

The extreme poverty line is useful for identifying individuals who cannot even afford to satisfy the basic food needs, while the minimum livelihood poverty line is useful for identifying individuals who cannot afford to satisfy the basic food and nonfood needs. The second reason is based on more practical considerations. Both poverty lines are close to the "Administrative Poverty Lines" of R$50 and R$100 per capita per month that are already used to determine eligibility for one of the major poverty alleviation programs of Brazil, the *Bolsa Família*.[37] The fact that on average the upper poverty line is more than three times the average food poverty line suggests that the "basic nonfood needs of poor households" are overestimated.

Based on the observations above it is also quite apparent that the choice of one or more poverty line for Brazil would benefit from further investigation on the regional cost-of living in Brazil. The spatial price indices presented in the next chapter provide some additional considerations useful for choosing among the poverty lines discussed so far.

[37] The Bolsa Família per capita income eligibility thresholds were just raised (in April 2006) from R$100 (upper threshold) and R$50 (extreme poverty threshold) to R$120 and R$60.

CHAPTER 3: SPATIAL PRICE INDICES FOR BRAZIL

Ideally, differences between the economic welfare of households living in different regions can be determined by adjusting for the cost-of-living differences between regions. Cost-of-living differences could be measured by a spatial price index, analogous to the Consumer Price Indices (CPI) used routinely in adjusting for inflation over time. Unfortunately, in Brazil, as in most developing countries, a suitable spatial price index, especially for nonfood items is not available.

A spatial price index is especially useful for deriving more reliable measures of inequality in Brazil. To the extent that cost-of-living differences are substantial between regions, uses of nominal income or consumption measures to measure the inequality in the standard of living in Brazil may be quite misleading. Various expenditure surveys, notably the PPV of 1996, suggest that price variations across this continent-sized nation are substantial. Brazil's earlier detailed expenditure survey of metropolitan areas, the POF 1996, broadly confirms the importance of these differences, even though, by construction, it cannot measure cost-of-living disparities between the metropolitan and rural areas of the country. A spatial price index is also useful for the estimation of consistent poverty profiles. Ferreira et al. (1998, 2000, 2003), for example, use the PPV to construct a spatial price index for Brazil. This index may then used to derive "real" expenditures. Comparing real expenditures with the poverty line for the reference region of the metropolitan area of Sao Paulo, then yields a consistent regional profile of poverty.

In this chapter we conduct a close examination of the spatial price indices that can be constructed from the POF survey. We first present a Laspeyres and a Paasche spatial price index based on the cost of food only. Next, we expand these indices to include the cost of housing as a measure of nonfood costs. Finally we examine the spatial price indices that can be derived from the estimated poverty lines of the previous chapter. Using the ratio of the nominal poverty line of each region to the poverty line of a reference region, one can derive a spatial price index summarizing the cost-of-living in the region relative to the cost of living in the reference region. Provided they represent sufficiently accurately the cost-of living differences between regions, the nominal regional poverty lines derived either by the CBN or by the FEI methods can be used to derive a spatial price index.

A SPATIAL PRICE INDEX BASED ON THE COST OF FOOD ONLY

We begin with a discussion of the spatial food price indices that can be constructed from the food poverty line using the CBN.[38] The CBN food poverty line (FPL) expressed as a ratio to food poverty line in the reference region of the Sao Paulo metropolitan area, may be interpreted as a Laspeyres price index denoted by FPI_L. Using more formal notation:

$$FPI_L = \frac{FPL^R}{FPL^0} = \left(\frac{\sum_{i=1}^{26} p_i^R q_i^0}{\sum_{i=1}^{26} p_i^0 q_i^0} \right) = \left(\sum_{i=1}^{26} \frac{p_i^0 q_i^0}{\sum_{i=1}^{26} p_i^0 q_i^0} \frac{p_i^R}{p_i^0} \right) = \left(\sum_{i=1}^{26} w_i^0 \frac{p_i^R}{p_i^0} \right), \qquad (3.1)$$

where the superscript R denoted the region and the superscript 0 denotes the reference region. Expression (1) implies that FPI_L, is a weighted sum of the relative price of each of the twenty six items in the

[38] It is important to keep in mind that the basic needs food basket is based on the consumption patterns of the 20-40 percentiles of the national distribution of PCE. As it is documented in Appendix 2, the cost of the food basket was not sensitive to changes in the reference population.

poverty basket, using as a weight the expenditure (or budget) share of the each item in the reference region.

A well known limitation of the Laspeyres food price index is that it is based on the assumption that there are no substitution effects among foods even though their relative prices may differ significantly between regions. In order to examine the sensitivity of the food price index to the weights used, a Paasche price index was also estimated for the same twenty-six food items entering the food poverty basket.[39] The expression for the food Paasche price index FPI_P^h is

$$FPI_P{}^h = \left(\frac{\sum_{i=1}^{26} p_i^R q_i^h}{\sum_{i=1}^{26} p_i^0 q_i^h} \right) = \left(\sum_{i=1}^{26} \frac{p_i^R q_i^h}{\sum_{i=1}^{26} p_i^R q_i^h} \frac{p_i^0}{p_i^R} \right)^{-1} = \left(\sum_{i=1}^{26} w_i^h \left(\frac{p_i^R}{p_i^0} \right)^{-1} \right)^{-1}. \qquad (3.2)$$

Contrary to the Laspeyres index, the Paasche index takes into account household spending patterns of each household in the country (e.g., see Deaton and Zaidi, 2002). In the Paasche price index, the relative price of each food item in the basket is weighted by the share of household h's budget devoted to that particular food item. As a consequence the Paasche index is household-specific. The regional Paasche price index for cost-of-living, is derived by taking an average of the household-specific values of the price indices in each region.[40]

Table 14 and figure 9 present the two spatial price indices for food. Figure 9 reveals that the variability in the cost of food across regions in Brazil is quite small. Moreover, there are some discrepancies in the relative costs of food between the two indices. For example, the Paasche index suggests that the cost of food is practically identical between Rio de Janeiro and Sao Paulo (and Brasilia), whereas the Laspeyres index suggests that food costs less in both Rio and Brasilia. Similar discrepancies appear in the Northeast and in the South. Overall, however, the small variability observed for both the Laspeyres and Paasche indices suggests that the low variability in the cost of food with the CBN method is not driven by the fixed quantities of the food items in the basket.

[39] The Paasche index in expression (2) is based on the full sample of households in the POF. Using only households in the 20-40 percentiles of the national PCE yielded a very index values.

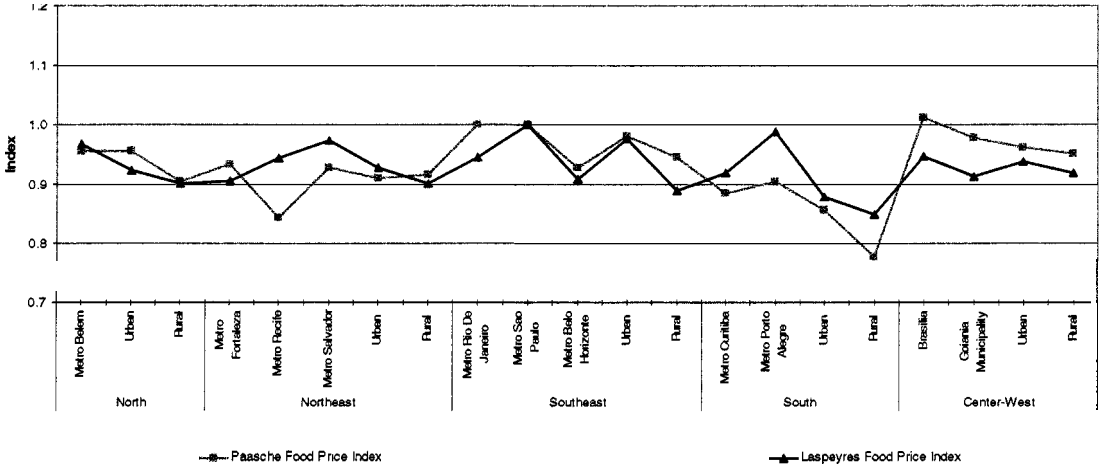
[40] As Deaton and Zaidi (2002) discuss in greater detail, deflating consumption expenditures by a Paasche regional price index yields an approximation of "money metric utility", whereas deflating by a Laspeyres regional price index yields an approximation of the "welfare ratio." The latter approach to measuring standard of living across households is better suited for measuring the redistributive affects of policies.

Table 14 Spatial price indices based on the cost of food: Laspeyres vs. Paasche

Region			Paasche Food Price Index	Laspeyres Food Price Index
1	North	Metro Belem	0.955	0.968
2		Urban	0.955	0.924
3		Rural	0.905	0.901
4	Northeast	Metro Fortaleza	0.934	0.906
5		Metro Recife	0.844	0.945
6		Metro Salvador	0.928	0.974
7		Urban	0.910	0.927
8		Rural	0.916	0.901
9	Southeast	Metro Rio De Janeiro	1.000	0.946
10		Metro Sao Paulo	1.000	1.000
11		Metro Belo Horizonte	0.928	0.908
12		Urban	0.981	0.977
13		Rural	0.945	0.889
14	South	Metro Curitiba	0.885	0.919
15		Metro Porto Alegre	0.905	0.989
16		Urban	0.856	0.879
17		Rural	0.779	0.849
18	Center West	Brasilia	1.011	0.947
19		Goiania municipality	0.979	0.913
20		Urban	0.962	0.939
21		Rural	0.952	0.919
Sao Paulo			**1.000**	**1.000**
Metropolitan			**0.929**	**0.941**
Urban excluding Metropolitan			**0.933**	**0.929**
Rural			**0.899**	**0.892**

Source: World Bank estimates using the 2002-03 POF. The numbers in the last four rows are simple (un-weighted) averages of the region-specific poverty lines

Figure 9 Spatial Price Indices for Food only: Laspeyres vs. Paasche price indices



Source: World Bank estimates using the 2002-03 POF.

SPATIAL PRICE INDICES BASED ON THE COST OF FOOD AND NONFOOD (HOUSING)

The same approach used to derive the Laspeyres spatial price index for food can also be used to derive a spatial price index for both food and nonfood. The more complete Laspeyres index is constructed from the weighted sum of the Laspeyres index for food , presented above, and the Laspeyres index for housing rent, i.e.,

$$PI_L = w_F^0\left(\sum_{i=1}^{26} w_i^0 \frac{p_i^R}{p_i^0}\right) + \left(1 - w_F^0\right)\left(\frac{\hat{r}^R}{\hat{r}^0}\right). \tag{3.3}$$

The weight assigned to the food index, w_F^0, is the average share of food among households in the 20-40 of the national distribution of PCE, residing in the Sao Paulo metropolitan area (the reference region). The estimate of the housing rental rate in region R, denoted by $\hat{r}^R$, with $\hat{r}^0$ denoting the housing rent in metropolitan Sao Paulo, is obtained from a regression of the form:

$$\ln r = \alpha_0 + \sum_{j=1}^{20} \alpha_j R_j + \beta X + \varepsilon, \tag{3.4}$$

where $\ln r$ is the logarithm of the (actual and imputed) rental rates contained in the POF survey[41], α_0 is a constant term, R is set of binary dummies for 20 of the 21 regions of Brazil (the Sao Paulo metropolitan area being the excluded reference region), and X summarizes a set of characteristics of the household residence. Specifically, X includes the number of rooms in the residence, whether the residence has no electricity, and a number of binary variables indicating whether the household has no access to paved road, no electricity, the type of dwelling (4 binary variables), the type of water system (3 binary variables), the type of sanitary service (3 binary variables), and the type of floor (4 binary variables). After estimating the regression equation using the full sample of household sin the POF survey, an estimate of the logarithm of the housing rental rate in region j may be obtained from the expression:

$$\ln \hat{r} = \hat{\alpha}_0 + \hat{\alpha}_j + \hat{\beta}\overline{X}_{20\text{-}40\%} \tag{3.5}$$

where $\overline{X}_{20\text{-}40\%}$ denotes the average characteristics of the residences of households in the 20-40 percent of the national PCE distribution.

The corresponding Paasche price index for the cost of food and nonfood is constructed based on the formula[42]

$$PI_P{}^h = w_F^h\left(\sum_{i=1}^{26} w_i^h\left(\frac{p_i^R}{p_i^0}\right)^{-1}\right)^{-1} + (1 - w_F^h)\left(\frac{r^R}{r^0}\right) \tag{3.6}$$

---

[41] The rent variable in the POF is composed of the actual rent reported by households renting a house and reported implicit rent for households who own their house.

[42] The Paasche index in expression (6) is based on the full sample of households in the POF. Using only households in the 20-40 percentiles of the national PCE yielded a very index values.

where w_F^h denotes the share of food expenditures in total household consumption expenditure, r^R is the average house rent in region R, and r^0 is the average housing rent in Metropolitan Sao Paulo.

Thus, in addition to the differences in the weights used in the Paasche index, another key difference is in the measure of nonfood cost (rent). The Laspeyres price index in equation (3) is based on the regional difference in the rental cost of a residence *with a fixed set of characteristics*, whereas the Paasche index simply uses the average house rent in the region without controlling for differences in the characteristics of the residence.

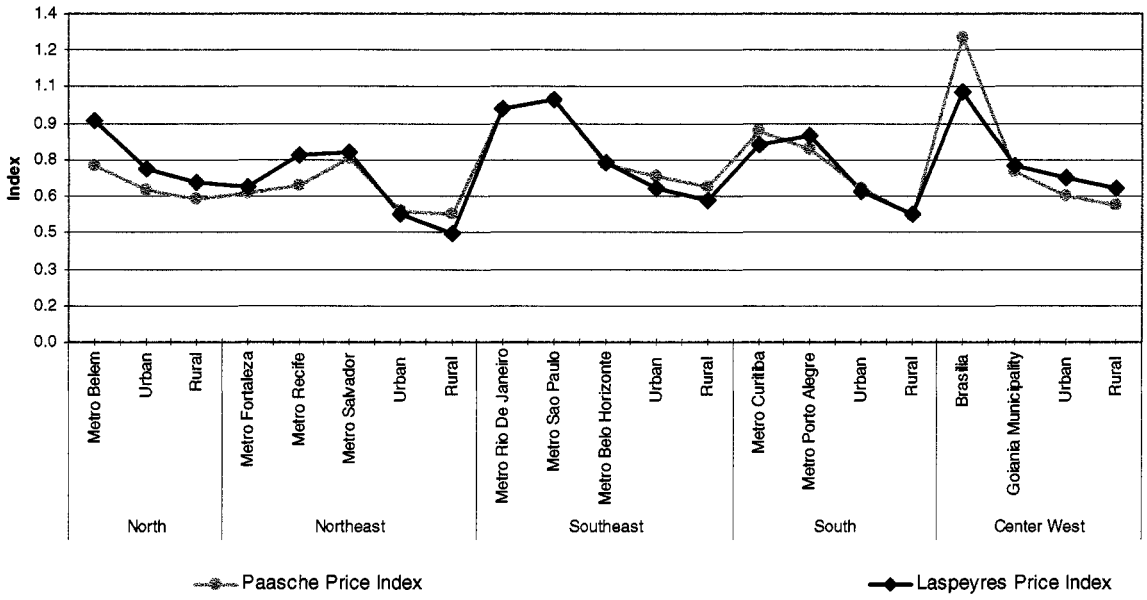
Table 15 Spatial price indices based on the cost of food and housing: Laspeyres vs. Paasche

Region			Laspeyres Price Index	Paasche Price Index
1	North	Metro Belem	0.908	0.723
2		Urban	0.713	0.627
3		Rural	0.654	0.589
4	Northeast	Metro Fortaleza	0.636	0.611
5		Metro Recife	0.770	0.642
6		Metro Salvador	0.780	0.755
7		Urban	0.525	0.541
8		Rural	0.447	0.524
9	Southeast	Metro Rio De Janeiro	0.961	0.957
10		Metro Sao Paulo	1.000	1.000
11		Metro Belo Horizonte	0.736	0.730
12		Urban	0.634	0.680
13		Rural	0.583	0.636
14	South	Metro Curitiba	0.809	0.865
15		Metro Porto Alegre	0.847	0.795
16		Urban	0.620	0.634
17		Rural	0.526	0.521
18	Center West	Brasilia	1.028	1.252
19		Goiania municipality	0.723	0.702
20		Urban	0.672	0.600
21		Rural	0.633	0.565
Sao Paulo			**1.000**	**1.000**
Metropolitan			**0.797**	**0.753**
Urban excluding Metropolitan			**0.633**	**0.617**
Rural			**0.568**	**0.567**

Source: World Bank estimates using the 2002-03 POF. The numbers in the last four rows are simple (un-weighted) averages of the region-specific values.

Table 15 and figure 10 present the Laspeyres and Paasche price indices. As in the case of food, the regional Paasche price index is derived by taking an average of the household-specific values of the Paasche price indices in each region.

Figure 10 Spatial Price Indices for Food and Housing: Laspeyres vs. Paasche price indices



Source: World Bank estimates using the 2002-03 POF.

Even though, there is no particular reason for the values of the Laspeyres and Paasche indices to be similar (e.g. Deaton and Zaidi, 2002), figure 10 reveals that there is a close relationship between the two indices. This suggests that the weights applied to the relative prices are very similar between the two indices. It also implies that differences in household consumption patterns across regions do not play an important role in the estimated cost of living differences across regions. A simple comparison between figures 9 and 10 also reveals that the rental cost of housing is the primary cause of the large cost of living differences across regions.

SPATIAL PRICE INDEX BASED ON THE ESTIMATED POVERTY LINES

The last set of spatial price indices that can be constructed is using the estimated poverty lines of chapter 2. Expressing the poverty lines of the CBN or the FEI methods in terms of the poverty line in the reference region of metropolitan Sao Paulo. For example,

$$PI^{PL} = \frac{PL^R}{PL^0} \tag{3.3}$$

It is important to keep in mind that the spatial price indices, obtained from the ratio of the CBN poverty lines are not necessarily equivalent to a Laspeyres price index. Even though the food component of the poverty line holds fixed the composition and the quantities of the items in the basic needs food basket, the adjustment of the food poverty line for basic nonfood needs does not hold constant neither the composition nor the quantity of nonfood goods (see chapter 2 for more details).

These spatial price indices are presented in Table 16 and in the corresponding figure 11. As already noted in chapter 2, the FEI spatial price index displays the greatest regional variability in comparison to the CBN poverty lines. According to the FEI poverty lines, the cost of living in the rural Northeast is 21.2%

of the cost of living in metropolitan Sao Paulo. In contrast the CBN-Upper (Lower) poverty line suggests that the cost of living in the same region is just over half (51.3%) of the cost of living in metropolitan Sao Paulo.

Taking as given that the Laspeyres spatial price index presents a fairly accurate picture of the regional variation in the cost-of-living, one can compare the regional variability of the CBN poverty lines and the FEI poverty lines against it. This can help determine the extent to which the regional differences in the nominal poverty lines reflect cost-of living differences. Figures 12 and 13 facilitate the comparison of the regional variability of the CBN and FEI poverty lines with the regional variability in the cost of food and housing measured by the Laspeyres index calculated above.

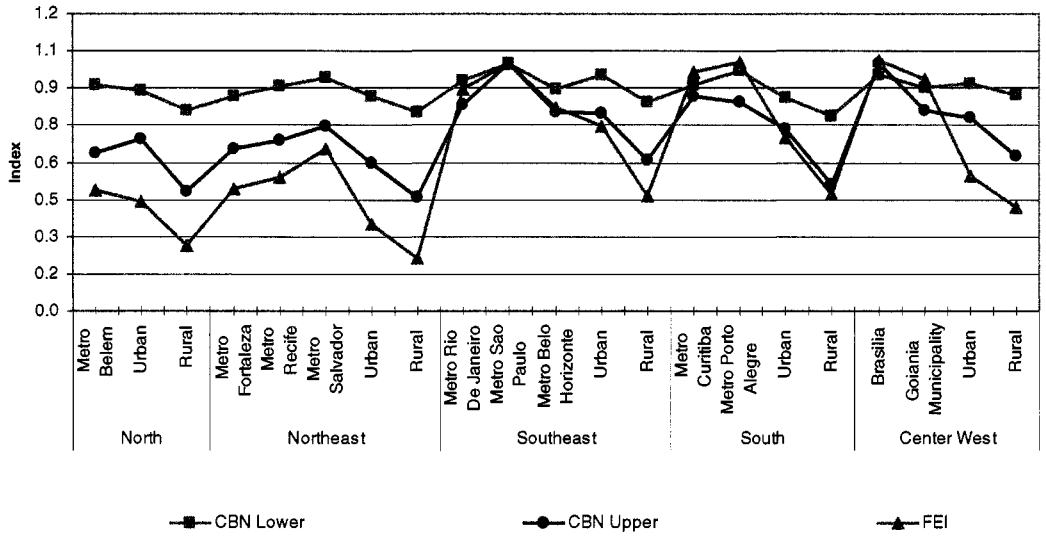
As it is apparent, the CBN-Upper poverty line is able to approximate the regional variability in the cost-of-living better than the FEI poverty line. Thus the CBN poverty line is more likely to yield a consistent poverty profile than the FEI poverty line.

Table 16 Spatial price indices based on the regional CBN and FEI Poverty Lines

Region			CBN Lower Index	CBN Upper Index	FEI index
1	North	Metro Belem	0.911	0.640	0.490
2		Urban	0.889	0.695	0.441
3		Rural	0.811	0.484	0.264
4	Northeast	Metro Fortaleza	0.866	0.655	0.495
5		Metro Recife	0.905	0.689	0.540
6		Metro Salvador	0.940	0.746	0.657
7		Urban	0.868	0.596	0.349
8		Rural	0.802	0.461	0.212
9	Southeast	Metro Rio De Janeiro	0.932	0.833	0.896
10		Metro Sao Paulo	1.000	1.000	1.000
11		Metro Belo Horizonte	0.895	0.802	0.823
12		Urban	0.952	0.796	0.746
13		Rural	0.842	0.607	0.465
14	South	Metro Curitiba	0.912	0.865	0.964
15		Metro Porto Alegre	0.970	0.843	1.006
16		Urban	0.859	0.735	0.701
17		Rural	0.785	0.513	0.471
18	Center West	Brasilia	0.952	0.997	1.011
19		Goiania Municipality	0.900	0.810	0.934
20		Urban	0.917	0.782	0.545
21		Rural	0.871	0.628	0.419
Sao Paulo			**1.000**	**1.000**	**1.000**
Metropolitan			**0.918**	**0.788**	**0.782**
Urban excluding Metropolitan			**0.897**	**0.721**	**0.556**
Rural			**0.822**	**0.539**	**0.366**

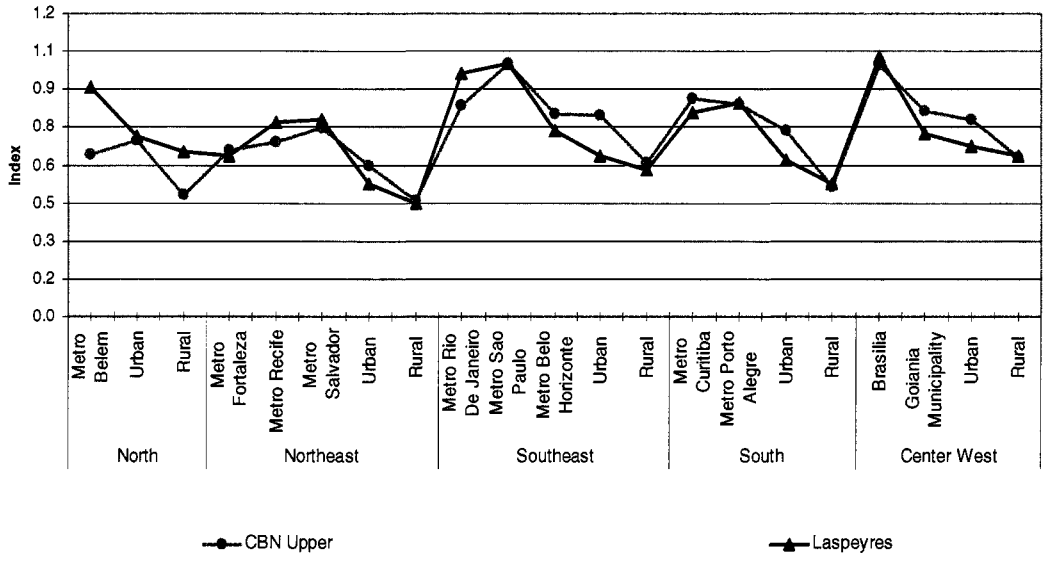
Source: World Bank estimates using the 2002-03 POF.
The numbers in the last four rows are simple (un-weighted) averages of the region-specific values.

Figure 11 Spatial price indices based on the regional CBN and FEI Poverty Lines



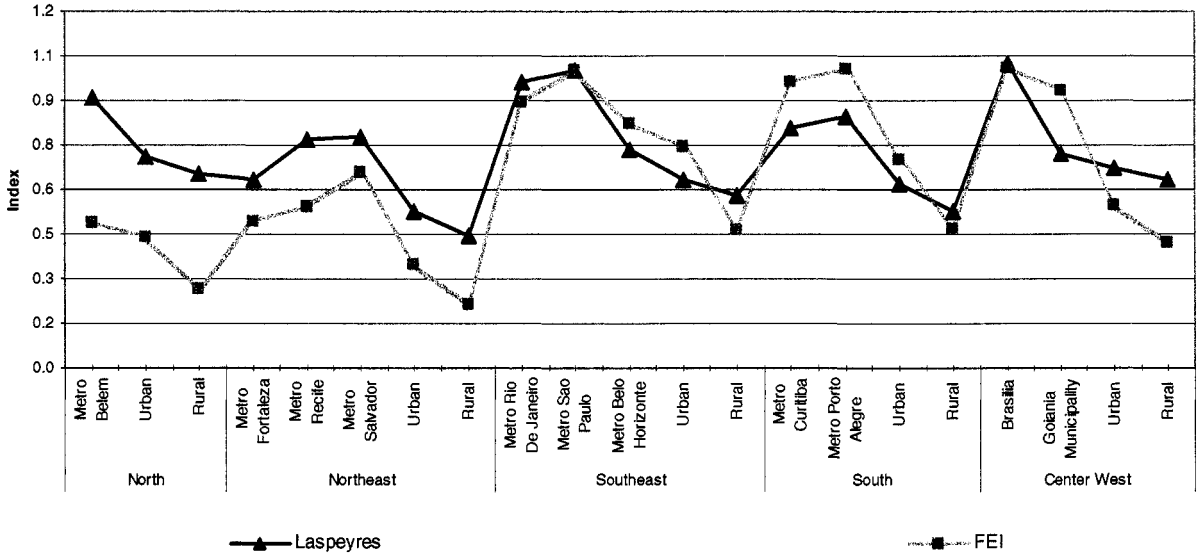
Source: World Bank estimates using the 2002-03 POF.

Figure 12 Spatial price indices based on the regional CBN-Upper Poverty Line and the Laspeyres Food and Housing Index



Source: World Bank estimates using the 2002-03 POF.

Figure 13 Spatial price indices based on the regional FEI and the Laspeyres Food and Housing Index



Source: World Bank estimates using the 2002-03 POF.

THE SENSITIVITY OF INEQUALITY MEASURES TO ADJUSTMENTS FOR REGIONAL DIFFERENCES IN THE COST OF LIVING IN BRAZIL

It is a well known fact that Brazil has one of the highest inequality rates in the world. Using income from the PNAD surveys of Brazil the Gini coefficient is estimated to be between 0.594 and 0.640 in 1999. All of the inequality indices obtained from the PNAD typically do not adjust for differences in the cost of living between regions and instead use nominal household income. In addition, inequality indices based on consumption are typically lower than inequality indices based on income. One important advantage offered by the availability of the regional cost of living indices is the opportunity to investigate how the measurement of inequality in Brazil is affected when one uses real household expenditures or real household income. Real expenditures are a better measure of household welfare especially if one intends to compare individual welfare across space (or time) (e.g. see Deaton and Zaidi, 2002).

However, before we embark with the discussion of how the estimates of inequality are affected one caveat is in order. The consumption aggregate constructed for the purpose of measuring household welfare (discussed in detail appendix 1) with the POF data did not include the flow of services from a number of durable items such as furniture and appliances. Although it could be reasonably argued that he omission of the flows of services from a number durable items from the consumption aggregate matters relatively little to poverty calculations, the omission of services from durable items is likely to be more important for inequality calculations. Thus the PCE from POF I likely to provide an underestimate of poverty, since it excludes items likely to be important in the consumption expenditures of wealthier families. With this caveat in mind, Table 17 presents the Gini coefficients and the General Entropy ($GE(\alpha)$) class of inequality indices using PCE and PCINC from POF and PCINC from the 2004

PNAD.[43] At this point it suffices to say that the GE inequality indices can be allowed to differ in their sensitivities to differences in different parts of the distribution, by assigning different values to the parameter α. The more positive α is, the more sensitive GE(α) is to income differences at the top of the distribution; the more negative α is the more sensitive it is to differences at the bottom of the distribution. GE(0) is the mean logarithmic deviation, GE(1) is the Theil index, and GE(2) is half the square of the coefficient of variation. The Gini coefficient is most sensitive to income differences about the middle (more precisely the mode).

Rows (1), (4) and (7) present inequality measures using the nominal values of PCE and PCINC. As anticipated, consumption inequality (using PCE) is considerably lower than income inequality (using PCINC from POF or from PNAD). Using real PCE, that is deflating nominal PCE by the spatial price index based on the upper poverty line in table 9, results in a decrease of the Gini inequality measure from 0.507 to 0.479. Similar declines occur when nominal expenditures are deflated using the Laspeyres cost of living index in Table 17. Given that the spatial price index obtained from CBN upper poverty line is very similar to the Laspeyres price index it is no surprise that practically identical Gini coefficients emerge (e.g. compare row 2 with row 3).

Table 17 The Sensitivity of Inequality Measures to Adjustments for Regional Differences in the Cost of Living in Brazil

Welfare measure	Gini	GE(0)	GE(1)	GE(2)
(1) Nominal PCE-POF	0.507	0.459	0.477	0.802
(2) PCE deflated by UPPER Poverty Line Price Index	0.479	0.398	0.422	0.688
(3) PCE deflated by Laspeyres Price Index	0.481	0.404	0.424	0.683
(4) Nominal PCINC-POF	0.593	0.659	0.721	1.778
(5) PCI deflated by UPPER Poverty Line Price Index	0.568	0.588	0.666	1.682
(6) PCI deflated by Laspeyres Price Index	0.571	0.596	0.670	1.703
(7) Nominal PCINC- PNAD	0.564	0.591	0.644	1.588
(8) PNAD PCI deflated by UPPER Poverty Line Price Index	0.543	0.534	0.597	1.423
(9) PNAD PCI deflated by Laspeyres Price Index	0.547	0.545	0.603	1.425

Source: World Bank estimates using the 2002-03 POF.

Even larger reductions are observed for the GE inequality measures that can weight different parts of the distribution differently. For example, with the GE(2) that is more sensitive to income differences at the top of the distribution of consumption, the estimate of inequality drops from 0.802 to 0.688. Declines in the inequality measures based on income also occur, but they are less dramatic than the decline in consumption inequality.

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[43] The formula for the Gini coefficient is $\frac{1}{2n^2\bar{y}}\sum_{i=1}^{n}\sum_{j=1}^{n}|y_i - y_j|$ while the formula for the generalized entropy measure is

$$GE(\alpha)=\frac{1}{\alpha^2-\alpha}\left[\frac{1}{n}\sum_{i=1}^{n}\left(\frac{y_i}{\bar{y}}\right)^2-1\right],\ \alpha\neq 0 \text{ e } \alpha\neq 1.$$

CONCLUSIONS

The analysis in this chapter reveals the following:

- Irrespective of whether one uses a Laspeyres or a Paasche price index, the variability in the cost of food across regions in Brazil is quite small. This suggests that the low variability in the cost of food with the CBN method is not driven by the fixed quantities of the food items in the basket.
- Expanding the Laspeyres and Paasche price indices to include the rental cost of housing leads to a greater variability in the cost of living across regions.
- This however, does not alter the close relationship between the two indices across the twenty one regions of Brazil. Thus, differences in household consumption patterns across regions do not seem to have an important role in the estimated cost of living differences across regions.
- The CBN-Upper poverty line is able to approximate the regional variability in the cost-of-living better than the FEI poverty line. Thus the CBN poverty line is more likely to yield a consistent poverty profile than the FEI poverty line.
- The proper measurement of consumption and income inequality in Brazil must definitely take into consideration the cost of living differences between regions. The spatial price indices constructed in this chapter provide a good start in this direction.

CHAPTER 4: AN UPDATED REGIONAL POVERTY PROFILE FOR BRAZIL

THE HEADCOUNT POVERTY PROFILE OF BRAZIL

Using the three poverty lines based on the cost of basic needs method, this chapter derives poverty estimates along the lines suggested by Foster, Greer Thorbecke (1984)[44].

Table 18 The Headcount poverty index (in %) for different poverty lines

Regions			Extreme Poverty	Minimum Livelihood	Upper Poverty Line	FEI Poverty Line
1	North	Metro Belem	3.6	16.7	45.3	28.3
2		Urban	9.5	27.4	63.4	37.1
3		Rural	22.1	45.7	71.1	33.1
4	Northeast	Metro Fortaleza	7.6	20.8	53.1	38.5
5		Metro Recife	5.4	17.7	47.5	33.4
6		Metro Salvador	3.6	14.4	44.3	36.1
7		Urban	15.3	36.8	64.9	36.4
8		Rural	30.6	55.0	76.3	31.1
9	Southeast	Metro Rio De Janeiro	2.4	8.8	40.7	41.0
10		Metro Sao Paulo	1.5	7.2	44.3	41.7
11		Metro Belo Horizonte	0.7	7.1	40.3	39.5
12		Urban	5.0	14.4	46.2	40.7
13		Rural	11.0	28.2	61.9	41.8
14	South	Metro Curitiba	0.9	4.7	38.3	41.1
15		Metro Porto Alegre	0.6	7.2	36.6	42.0
16		Urban	3.4	12.1	45.1	39.3
17		Rural	5.5	15.9	39.0	30.4
18	Center West	Brasilia	0.6	8.1	45.3	41.2
19		Goiania Municipality	1.2	5.1	40.2	42.7
20		Urban	7.1	22.9	62.1	40.2
21		Rural	11.3	30.9	61.0	39.1
National			**8.5**	**21.5**	**52.8**	**38.4**
Metropolitan			**3.1**	**11.4**	**44.0**	**37.9**
Urban excluding Metropolitan			**8.1**	**21.9**	**54.3**	**40.2**
All Urban including Metropolitan			**6.0**	**17.5**	**50.0**	**39.3**
Rural			**20.6**	**41.0**	**66.3**	**34.1**

Source: World Bank estimates using the 2002-03 POF.

Table 18 presents the regional profile of poverty based on the Headcount poverty index, which is equivalent to the percentage of the population that is below the poverty line in each region. According to these estimates, approximately 8.5% of the Brazilian population did not have a total consumption

[44] Poverty indexes belonging to the FGT class are defined as: $FGT(\alpha)=\frac{1}{n}\sum_{i=1}^{n}\left[\frac{(z-y_i)}{z}\right]^{\alpha} S_i$, where z is the value of the poverty line and S_i is the indicative variable that is equal to 1 if the i-th individual is below the poverty line and 0, if not. For α=0, 1 and 2, FGT(α) represents, respectively, the incidence (proportion of poor), the intensity or depth (poverty gap) and the severity of poverty (squared poverty gap). The larger the coefficient α, the greater the weight attributed to the poverty gaps.

expenditure sufficient to buy the basic needs food bundle. Given the total population of Brazil of 175,331,797 the estimate of extreme poverty in Brazil implies that 14,903,203 individuals are in extreme poverty.[45]

The poverty rates increase substantially when higher poverty lines are used to take into account basic nonfood expenditures. The minimum livelihood poverty line implies poverty rate of 21.5% for Brazil which amounts to 37,696,336 individuals being unable to meet basic food and nonfood expenditures. Clearly, the distribution of consumption is very steep between these two poverty lines. An increase in the average poverty line from R$61 to R$103 increase the poverty rate from 8.5% to 21.5%. Similarly, an increase in the average poverty line from R$103 to R$220, the upper poverty line, increases the poverty rate from 21.5% to 52.8%, resulting in more than 92.5 million individuals being classified as poor.

One key result obtained from the poverty rates associated with the upper poverty line is that the adjustment of the food poverty line for "basic" non food needs makes a tremendous difference on the estimated poverty rate for Brazil.[46]

The aggregate statistics for Brazil conceals very large regional disparities. One of the striking characteristics of poverty in Brazil is that it varies dramatically across geographic regions and areas. According to Ferreira, Lanjouw and Neri (2003), poverty incidence is higher in small and medium towns than in metropolitan regions.

Table 18 confirms that this is also the case in the 2002-03 POF survey. Extreme poverty is concentrated in the rural areas of Brazil which have a headcount poverty index of 20.6%. Urban areas (excluding metropolitan areas) have an extreme poverty rate of 8.1%, followed by metropolitan areas with an extreme poverty rate of 3.1%. The same pattern holds for the intermediate poverty line and the upper poverty lines.

Table 19 displays how the poverty rates increase as the poverty line is increased from the extreme poverty line to the minimum livelihood poverty line and then to the upper poverty line. The columns of this table are estimated by differencing the poverty rates associated with the different poverty lines in table 10. For example, column (1) of table 11 displays the increase in the poverty rate when the poverty line is increased from the extreme poverty line to the minimum livelihood poverty line. This table is useful for determining how steep is the distribution of per capita expenditures (PCE) in each region.

Table 19 makes more apparent the source of the increased poverty rates associated with an increase in the poverty line. For example, at the national level an increase in the poverty line from the extreme poverty line to the minimum livelihood poverty line increase the national poverty rate by 13 percentage point (21.5-8.5=13). The large increase in the poverty rate of rural areas, i.e. by 20.4 percentage points implies that the distribution of consumption in rural areas is very steep between these two poverty lines and less steep in the metropolitan and urban areas where the poverty rate increases by 15.9 percentage points. However, the increase in urban areas is considerably greater (36.9 percentage points) than the increase in the poverty rate in rural areas (25.3 percentage points) when the poverty line is increased from the minimum livelihood poverty line to the upper poverty line. Thus, the potential increases in the official poverty line are likely to entail a shift in scope of poverty alleviation programs as more of the new poor are likely to be located in urban areas.

[45] This estimate is remarkably close to the number of people estimated by the Ministry of Planning and the Ministry of Social Development of Brazil to experience food insecurity (Brazil: Seguranca Alimentar 2004).

[46] Even though the poverty rates with the upper poverty line may appear to be "too" high, they are not unique. Ferreira et al (2003) report a national poverty rate of 45.29% using a similar method on the 1996 PNAD.

Table 19 Increases in the Headcount poverty index associated with increases in the poverty line

Regions			(1)*	(2)**	(3)***
1	North	Metro Belem	13.1	28.6	41.7
2		Urban	17.9	36.1	54.0
3		Rural	23.6	25.4	49.0
4	Northeast	Metro Fortaleza	13.1	32.4	45.5
5		Metro Recife	12.2	29.8	42.1
6		Metro Salvador	10.8	29.9	40.6
7		Urban	21.5	28.1	49.6
8		Rural	24.4	21.3	45.7
9	Southeast	Metro Rio De Janeiro	6.3	31.9	38.2
10		Metro Sao Paulo	5.7	37.1	42.8
11		Metro Belo Horizonte	6.4	33.2	39.6
12		Urban	9.4	31.8	41.2
13		Rural	17.3	33.7	50.9
14	South	Metro Curitiba	3.9	33.5	37.4
15		Metro Porto Alegre	6.6	29.4	36.0
16		Urban	8.7	33.0	41.6
17		Rural	10.3	23.1	33.4
18	Center West	Brasilia	7.5	37.2	44.7
19		Goiania Municipality	3.9	35.0	39.0
20		Urban	15.8	39.2	55.0
21		Rural	19.7	30.1	49.7
National			**13.0**	**31.3**	**44.3**
Metropolitan			**8.2**	**32.6**	**40.9**
Urban excluding Metropolitan			**9.4**	**36.9**	**46.2**
All Urban including Metropolitan			**15.9**	**28.1**	**44.0**
Rural			**20.4**	**25.3**	**45.7**

Source: World Bank estimates using the 2002-03 POF.

* Column (1) is the poverty rate with the minimum livelihood poverty line in table 10 minus the extreme poverty rate in table 10.

** Column (2) is the poverty rate with the upper poverty line minus the poverty rate with the minimum livelihood poverty line in table 10.

*** Column (3) is the poverty rate with the upper poverty line in table 10 minus the extreme poverty rate in table 10.

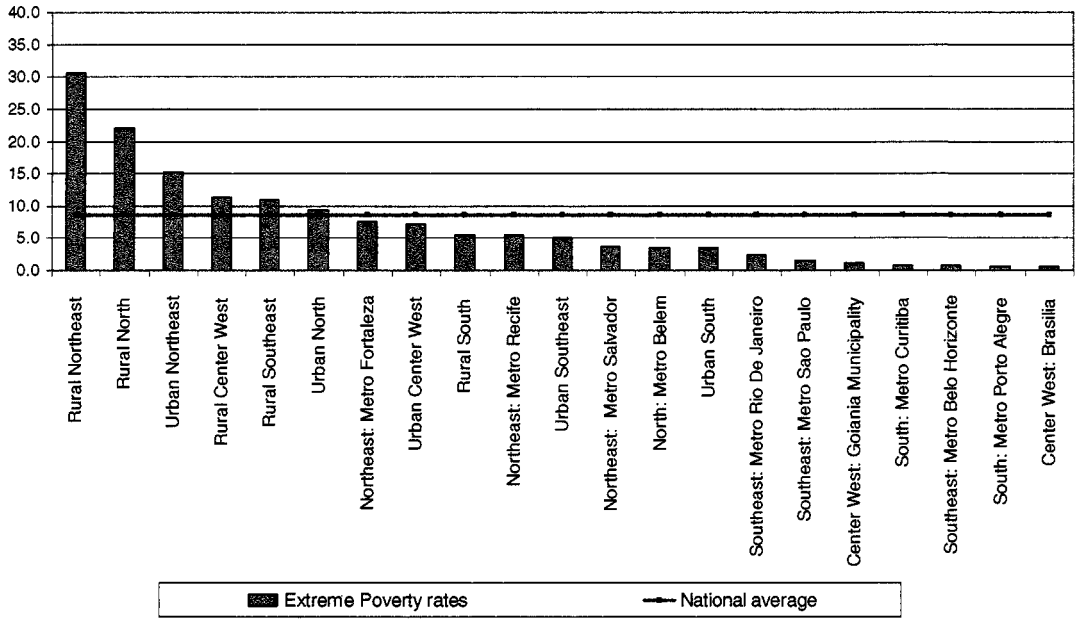
Figures 14 through 17, based on table 19, present the rankings of the different regions of Brazil resulting from the four different poverty lines. As it is apparent, the six regions with the highest extreme poverty and minimum livelihood poverty are the rural areas in the Northeast, with an extreme poverty index of just under 31%, followed by the rural North, urban areas in the Northeast, rural areas in the Center-West region and Southeast region, and urban areas in the North, which has an extreme poverty of 9.5%. The same six regions rank at the top using the more generous upper poverty line with the only difference being that urban areas in the North switch rank with rural areas in the Center-West (see figure 16).

However, the poverty ranking of regions changes considerably when one applies the FEI poverty lines that emphasize specificity. As figure 17 shows, the FEI poverty line results in poverty rates that are very similar between regions, ranging between 35 and 40% in the majority of the regions. More importantly, the rural North and Northeast regions, the two regions ranked as the poorest regions by the other poverty lines emphasizing consistency in terms of command over basic consumption needs, end up being ranked among the regions with the lowest poverty rates in Brazil.

The observed differences in the regional poverty rankings of regions suggest that there is a considerable conflict between consistency and specificity. Although, in principle, a basic needs bundle should reflect the regional specificity of preferences, the regional standard of living, and the regional perceptions of what constitutes poverty, it turns out that an effort to do so, yields a regional poverty profile that may not be as useful for policy. Thus, ultimately, the choice of the method used to set poverty lines and measure poverty depends on the purpose of the poverty profile.

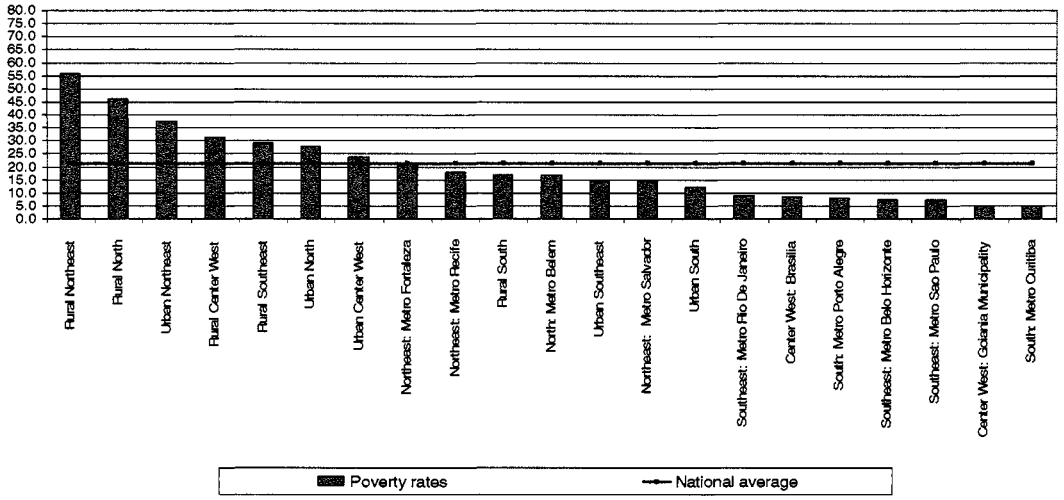
The remainder of this report, assumes that the purpose of the poverty profile is to inform policy makers about the regional distribution of poverty so it can facilitate the formulation, design and targeting of social programs aimed at alleviating poverty. For this reason, the poverty profile obtained by using the FEI poverty line is not discussed further.

Figure 14 The incidence of extreme poverty (Headcount poverty index) by region



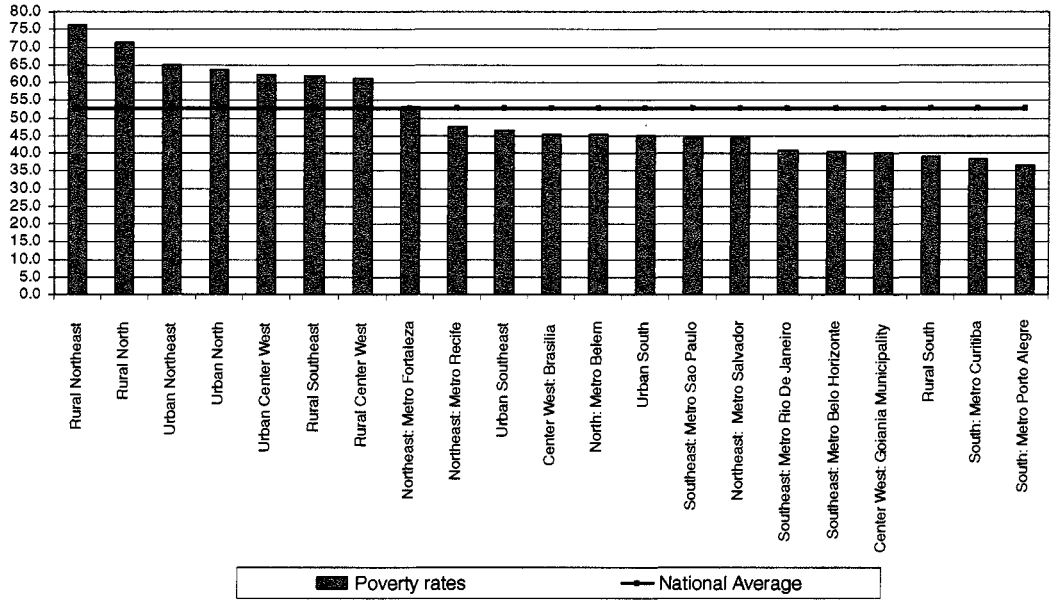
Source: World Bank estimates using the 2002-03 POF.

Figure 15 The incidence of minimum livelihood poverty (Headcount poverty index) by region



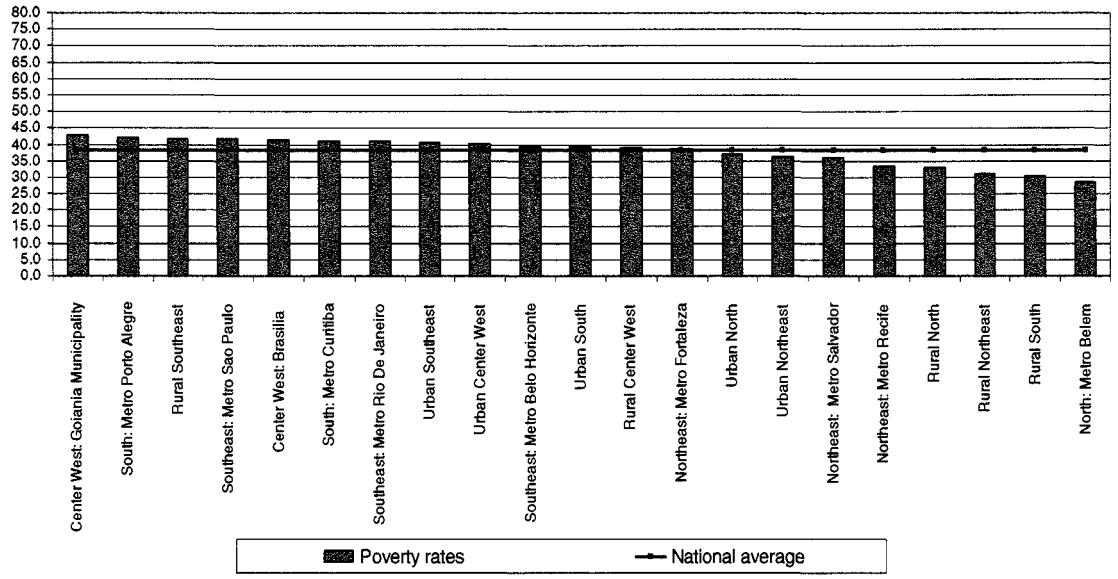
Source: World Bank estimates using the 2002-03 POF.

Figure 16 The incidence of poverty (Headcount poverty index) by region using the upper poverty line



Source: World Bank estimates using the 2002-03 POF.

Figure 17 The incidence of poverty (Headcount poverty rate) by region using the FEI poverty line



Source: World Bank estimates using the 2002-03 POF.

THE POVERTY GAP PROFILE OF BRAZIL

The poverty gap or depth of poverty index, measures the average distance of consumption of poor households from the food poverty line as a proportion of the food poverty line. The aggregate food poverty gap in Brazil, is estimated to be 2.5%. Using the minimum livelihood poverty line of R$103 per person per month, the value of the poverty gap index increases to 7.3%.

Table 20 reveals that the poverty gap profile is similar to the incidence of poverty profile of Brazil[47] The food poverty gap index is higher in rural areas, followed by urban areas and metropolitan areas. Specifically, the rural areas in the northeast region are areas with the highest poverty gap index of 10.6%, followed by the rural areas in the North that register a food poverty overt gap index of 5.9%.

The poverty gap index, can also be interpreted as an indicator of the potential for eliminating poverty by targeting transfers to the poor (Ravallion, 1994). The *minimum* cost of eliminating poverty using targeted transfers is simply the sum of all the household-specific poverty gaps in the population. A government deeply concerned about eliminating poverty would have to spend at least this amount if it were to eliminate poverty. To be able to spend this minimum cost, however, requires that the government have a large amount of information such as the distance (poverty gap) of each poor household from the poverty line. At the other extreme, one can consider the *maximum* cost of eliminating poverty, which can be derived by assuming that the government knows nothing about who is poor and who is not. In this latter case, the government would have to give a transfer equal to the value of the poverty line to all the households in the country so as to ensure that the poor, whoever these are, can afford the cost of the basic needs basket. Then, it can be easily shown that the ratio of the minimum cost of eliminating poverty with perfect targeting to the maximum cost with no targeting is simply the poverty gap.

[47] The poverty gap measures the average distance below the poverty line and is expressed as a proportion of the poverty line. The corresponding severity of poverty profile is presented in the Appendix 6.

The aggregate food poverty gap in Brazil represents 0.45% of the country's aggregate consumption of all goods and services.[48] This suggests that the potential gains from targeting are quite large in Brazil. For example, the costs of assuring that everyone in the country can afford the poverty food bundle without targeting is about 40 times the cost with a perfect targeting scheme that transfers an amount equal to household-specific poverty gap to each poor household. It is important to clarify that this estimate represents only the potential gains from "perfect" targeting, where perfect is defined as providing "tailor-made" household-specific transfers. The extent to which such a potential can be realized in practice depends on the constraints and costs faced by policy makers in identifying the household-specific poverty gaps.

Table 20 The Poverty Gap index in (%) for different poverty lines

Regions			Extreme Poverty	Minimum. Livelihood	Upper Poverty Line
1	North	Metro Belem	0.8	4.2	15.5
2		Urban	2.3	8.9	21.0
3		Rural	5.9	16.3	22.0
4	Northeast	Metro Fortaleza	1.3	6.4	20.4
5		Metro Recife	1.6	5.4	16.8
6		Metro Salvador	1.5	4.4	17.0
7		Urban	4.4	13.3	24.4
8		Rural	10.6	22.3	27.8
9	Southeast	Metro Rio De Janeiro	0.4	2.3	13.3
10		Metro Sao Paulo	0.3	1.7	14.9
11		Metro Belo Horizonte	0.1	1.4	15.2
12		Urban	1.4	4.7	17.1
13		Rural	2.8	9.4	19.5
14	South	Metro Curitiba	0.0	1.2	11.2
15		Metro Porto Alegre	0.1	1.6	13.0
16		Urban	0.9	3.6	15.6
17		Rural	1.3	4.7	12.7
18	Center West	Brasilia	0.1	1.5	15.7
19		Goiania Municipality	0.4	1.4	12.2
20		Urban	1.8	7.2	21.2
21		Rural	4.3	10.9	19.7
National			**2.5**	**7.3**	**21.1**
Metropolitan			**0.7**	**3.5**	**14.9**
Urban excluding Metropolitan			**2.2**	**7.4**	**19.8**
All Urban including Metropolitan			**1.6**	**5.6**	**17.8**
Rural			**6.6**	**15.6**	**22.7**

Source: World Bank estimates using the 2002-03 POF.

A POVERTY PROFILE BASED ON HOUSING AND HEAD OF HOUSEHOLD CHARACTERISTICS

Table 21 presents a poverty profile based on some key characteristics of the household residence and of the head of the household. This poverty profile is constructed suing the minimum livelihood poverty line. Similar profiles using the extreme poverty line and the upper poverty line yielded very similar patterns

[48] This number is obtained by the multiplying the value of the food poverty gap index for Brazil by the ratio of the average food poverty line to the mean PCE in Brazil (i.e. 0.025*(61/335.9) = 0.025*0.1816 = 0.454%). Using the minimum livelihood poverty line of R$103 the aggregate poverty gap in Brazil represents 0.767% of the country's aggregate consumption of all goods and services.

(see appendix 5). Irrespective of the measure of poverty used, the Northeast is the poorest region, followed by the North, the Center-West, the South, and the Southeast in that order. This finding is consistent with all of the existing studies on poverty in Brazil. The Northeast region accounts for only 27.9% of the population of Brazil but close to 50% of the poor in Brazil. Combined with the North region, the Northeast and the North region account for over 60% of the poor in Brazil.

Households in non-metropolitan urban areas make up 48.2% of the population and 49.1% of the poor in Brazil. Thus the number of urban poor persons in Brazil is greater than the number of the poor persons living in rural areas. However, the poverty gap and severity of poverty indices are higher in the rural areas than in the non-metropolitan urban areas. The housing status suggests that individuals with or in "ceded" housing, an arrangement predominant in some types o f agricultural contracts and among domestic servants, have the highest incidence of poverty (30.3%) and the second highest contribution to the national poverty (15.9% of the poor).

As for access to services, 13.9% of the Brazilian population does not have access to piped water and 4.4% has no electricity. More than half of these two groups of individuals are poor. Specifically, among those who have no access to piped water 57.2% are poor and among those who have no access to electricity 59.8% are poor. Along similar lines, 36.9 of the individuals classified as poor have live in a residence without piped water, and 12.1% of the poor live in a residence without electricity. Just less than 78% of the poor has no access to the regular sewerage system and have to rely on alternative means for sanitation, such as cesspits, rivers or lakes. In fact, over 21% of the poor have no sanitation means at all. Finally, 40.5% of the Brazilian population resides in houses located on unpaved streets, while the fraction of the poor individuals with homes on unpaved streets is over 63%. It is quite apparent that increasing access to basic services would go a long way towards increasing the living conditions of the poor.

Turning to the partitions based on characteristics of the household head, one finds that individuals from female-headed households are almost as likely to be poor as individuals from male-headed households, (20.7% vs. 21.7%). Thus, gender of the household head does not appear to be a good predictor of the poverty status of an individual. In contrast to gender, race does seem to have a stronger correlation with the poverty status of an individual. The incidence of poverty is the highest among individuals residing in households where the head is an indigenous person (with a headcount of 38.3%), followed by those who reside in households where the head is a Parda (30.8%) and then black (26.5%). More than half of the poor (58.3%) are Parda even though individuals from Parda-headed households are only 40.7% of the Brazilian population.

The age of the household head appears to have a significant and negative correlation with the incidence of poverty. Individuals from households with older (60+) household heads have the lowest incidence of poverty (18.8%) while individuals from households with younger (less than 25 year old) household heads have the highest incidence of poverty (27.1%), with the incidence of poverty declining monotonically with the age group of the head.

As is common in most countries, the years of education of the household head are strongly associated with the incidence of poverty. The incidence of poverty among individuals from households with a head that has 0 to 8 years of education is 27.2%, whereas the incidence of poverty among individuals from households with a head that has 9 to 13 (14+) years of education is 5.3% (0.2%). Moreover, more than 95% of the poor are from households with a head that has less than 9 years of schooling.

The immigration status of the household head is weakly associated with poverty status. The incidence of poverty is the lowest among households where the head is not a migrant, and the highest among households where the head was a migrant last year. However, the contributions of the three migrant categories to the national poverty are in line with their respective shares in the population.

Domestic servants and self-employed workers appear as having the highest incidence of poverty, 29.8% and 25.7%, respectively. Individuals from households where the head is self-employed comprise 39.8% of the population of the poor, which is greater than their share of 33.5% in the total population.

Table 21 A poverty profile based on the 2002-03 POF (Poverty Line: Minimum Livelihood Line)

Household characteristics	Subgroups	Incidence of poverty P0	Poverty gap P1	Poverty severity P2	% of National population	Contribution to national poverty	Av. Pc consumption of subgroup
	Total	*21.5*	7.3	3.5	*100.0*	*100.0*	*335.9*
Region	North	30.7	10.2	4.7	7.8	11.1	219.7
	Northeast	38.3	14.3	7.3	27.9	49.7	206.2
	Southeast	12.7	3.9	1.7	42.7	25.1	427.4
	South	11.3	3.2	1.4	14.7	7.7	378.0
	Center-West	19.6	6.1	2.8	7.0	6.3	335.1
Area of residence	Metropolitan	11.4	3.2	1.4	34.7	18.3	457.7
	Urban excluding metropolitan	21.9	7.4	3.5	48.2	49.1	310.7
	Rural	41.0	15.6	8.0	17.1	32.6	159.7
Housing							
Housing status	Own and already paid	21.5	7.4	3.5	68.3	68.4	337.1
	Own, still paying	8.5	2.5	1.1	5.4	2.2	486.0
	Rented	18.3	5.9	2.8	13.5	11.5	357.0
	Ceded	30.3	10.6	5.2	11.3	15.9	244.8
	Other	28.7	10.6	5.2	1.6	2.1	233.7
Water	Piped	15.7	4.8	2.1	86.1	63.1	372.2
	Not piped	57.2	23.1	12.2	13.9	36.9	110.6
Sanitation	Sewerage system	10.2	2.9	1.3	46.7	22.1	465.7
	Cesspit	15.6	4.6	2.0	16.7	12.2	317.4
	Rudimental Cesspit	33.2	11.5	5.4	23.5	36.2	197.0
	Drain	35.8	12.5	5.9	2.4	4.0	176.5
	River or Lake	24.9	7.8	3.4	2.8	3.3	228.0
	Other	36.3	12.5	6.0	0.5	0.9	172.8
	None	62.5	26.2	14.3	7.4	21.4	102.2
Electricity	Yes	19.8	6.5	3.0	95.7	87.9	346.4
	No	59.8	25.8	14.4	4.4	12.1	105.8
Paved Road	Yes	13.1	4.1	1.8	59.5	36.4	429.9
	No	33.7	12.1	6.0	40.5	63.6	1979
Household head							
Gender	Female	20.7	6.7	3.2	22.7	21.9	366.0
	Male	21.7	7.5	3.6	77.3	78.1	327.1
Race	White	13.1	4.1	1.8	49.8	30.3	440.7
	Black	26.5	9.3	4.5	8.6	10.5	240.4
	Asian	10.5	4.2	2.4	0.6	0.3	677.1
	Parda	30.8	10.9	5.3	40.7	58.3	223.9
	Indigenous	38.3	17.0	9.6	0.4	0.7	261.9
Age group	0-24	27.1	9.1	4.2	4.4	5.5	242.8
	25-44	23.2	7.9	3.8	49.2	53.0	310.7
	45-59	19.4	6.7	3.3	30.7	27.7	378.0
	60+	18.8	6.2	2.9	15.7	13.8	358.1
Education	0-8	27.2	9.4	4.5	75.6	95.6	234.5
	9-13	5.3	1.3	0.5	17.9	4.4	480.1
	14+	0.2	0.0	0.0	6.5	0.1	1124.4
Immigration	Migrant- last year	24.5	8.4	4.0	13.1	14.9	291.4
	Migrant- last 5 years	22.2	7.8	3.8	28.9	29.8	349.5
	Not migrant	20.5	6.9	3.3	58.1	55.4	339.1
Occupational category	Domestic servant	29.8	8.3	3.4	3.5	4.9	201.1
	Employed	19.7	6.7	3.2	55.6	50.6	342.7
	Employer	2.7	0.7	0.3	5.0	0.6	739.7
	Self-employed	25.7	9.1	4.4	33.5	39.8	277.3
	Apprentice	12.9	5.1	2.3	0.5	0.3	478.8
	Worker for self-consumption	45.1	16.5	8.3	1.8	3.8	146.8

Source: World Bank estimates using the 2002-03 POF.

CONCLUSIONS

- According to the estimates, approximately 8.5% of the Brazilian population does not have a total consumption expenditure sufficient to buy the basic needs food bundle. Given the total population of Brazil, the estimate of extreme poverty in Brazil implies that just under 15 million (14,903,203) individuals live in extreme poverty.
- The poverty estimates increase substantially when higher poverty lines are used to take into account basic nonfood expenditures. The minimum livelihood poverty line implies poverty rate of 21.5% for Brazil which amounts to 37,696,336 individuals being unable to meet basic food and nonfood expenditures. Similarly, an increase in the average poverty line from R$103 to R$220, the upper poverty line, increases the poverty rate from 21.5% to %, resulting in more than 83 million individuals being classified as poor. Clearly, the adjustment of the food poverty line for "basic" non food needs makes a tremendous difference on the estimated poverty rate for Brazil. Even though the poverty rates with the upper poverty line may appear "too" high, they are not unique. Ferreira et al (2003), for example, report a national poverty rate of 45.29% and a similar regional poverty profile using equivalent methods on the 1996 PNAD.
- The aggregate statistics for Brazil also conceal very large regional disparities. The six regions with the highest extreme poverty and minimum livelihood poverty are the rural areas in the Northeast, with an extreme poverty index of just under 31%, followed by the rural areas in the North, urban areas in the Northeast, rural areas in the Center-West region and Southeast region, and urban areas in the North, which has an extreme poverty of 9.5%.
- The national estimate of the poverty gap index suggests that the potential gains from targeting are large in Brazil. The costs of assuring that everyone can afford the poverty food bundle without targeting is about 40 times the cost with perfect targeting.

CHAPTER 5: SOME POLICY IMPLICATIONS OF THE REGIONAL DISTRIBUTION OF POVERTY IN BRAZIL

The regional poverty lines estimated in this report and the regional distribution of poverty rates based on household consumption analyzed in the previous chapter are particularly relevant for investigating the coverage and potential impact of the poverty alleviation policies in Brazil. In this chapter, some of these policy implications are presented and discussed in more detail.

A COMPARISON OF THE POVERTY RATES USING THE MINIMUM LIVELIHOOD POVERTY LINE AND THE ADMINISTRATIVE POVERTY LINE OF R$100

As indicated earlier, the Minimum Livelihood poverty line is remarkably close to the Administrative Poverty Line of R$100 per person per month. One key difference is that the Minimum Livelihood poverty line varies from region to region to reflect differences in the cost-of-living of poor households. Table 22 compares the regional profile of poverty obtained with the minimum poverty line that varies from region to region with the poverty profile obtained by applying the fixed nominal poverty line of R$100, which is equal to half the minimum wage. The differences in the poverty rates associated with these two poverty lines provide an estimate of the errors of targeting associated with the *Bolsa Família* program.

Table 22 The regional profile of poverty: The Minimum Livelihood Poverty Line vs. the R$100 Administrative Poverty Line.

Regions			Administrative Poverty Line of R$100 for all Brazil (1)	Min. Livelihood line (2)	Difference (1)-(2)
1	North	Metro Belem	14.7	16.7	-2.0
2		Urban	26.3	27.4	-1.1
3		Rural	50.2	45.7	4.5
4	Northeast	Metro Fortaleza	21.3	20.8	0.5
5		Metro Recife	16.5	17.7	-1.1
6		Metro Salvador	12.5	14.4	-1.9
7		Urban	36.8	36.8	0.0
8		Rural	59.6	55.0	4.6
9	Southeast	Metro Rio De Janeiro	8.0	8.8	-0.7
10		Metro Sao Paulo	4.4	7.2	-2.8
11		Metro Belo Horizonte	6.0	7.1	-1.2
12		Urban	12.1	14.4	-2.4
13		Rural	29.2	28.2	1.0
14	South	Metro Curitiba	4.4	4.7	-0.3
15		Metro Porto Alegre	5.4	7.2	-1.7
16		Urban	12.4	12.1	0.3
17		Rural	20.1	15.9	4.2
18	Center West	Brasilia	6.2	8.1	-1.9
19		Goiania Municipality	4.1	5.1	-1.1
20		Urban	20.7	22.9	-2.2
21		Rural	30.9	30.9	0.0
National			**21.0**	**21.5**	**-0.5**
Metropolitan			**9.9**	**11.4**	**-1.5**
Urban excluding Metropolitan			**20.7**	**17.5**	**3.2**
All Urban including Metropolitan			**16.2**	**21.9**	**-5.7**
Rural			**44.5**	**41.0**	**3.5**

Source: World Bank estimates using the 2002-03 POF.

As it is apparent, the enforcement of the same absolute poverty line as a threshold for eligibility to the *Bolsa Família* program tends to result in certain *leakages* (inclusion errors) in the rural and non-metropolitan urban areas and some *undercoverage* (exclusion error) in the metropolitan areas. Even though these estimates are not intended as an assessment of the targeting performance of the *Bolsa Família* program, they do suggest that improvements in the targeting performance of the program, however good or bad it is, could be accomplished by employing poverty lines that vary from region to region.

A COMPARISON OF THE POVERTY RATES OBTAINED USING HOUSEHOLD INCOME

The POF 2002-03 is the first nationally representative survey to include extensive questions on both consumption and income measures of welfare. Although for a variety of reasons, consumption tends to be a more accurate measure of welfare than income, Brazil's household surveys have traditionally collected data on income. As discussed in detail in chapter 1, past estimates of poverty and inequality have differed significantly depending on which welfare measures and poverty lines were used.

The detailed POF 2002-03 thus presents a significant opportunity to analyze poverty and inequality using both consumption and income measure. As table 7 of chapter 2 shows, in the POF survey the mean value of per capita income (PCINC) is greater than the mean value of per capita expenditures (PCE) in each region. Thus, all else equal, one would expect that using the same poverty line, poverty rates would be higher using PCE than using PCINC.

Table 23 compares the Headcount poverty rates obtained using the per capita income aggregate available in the POF survey (PCINC). The poverty line used is the minimum livelihood poverty line, as this poverty line is more in agreement with the current policies of the Brazilian administration. Contrary to the expectation, poverty rates are higher using PCINC in a number of regions. At the national level, the poverty rate based on POF PCINC is 19.3% which is slightly lower than the poverty rate of 21.5% based on PCE. However this masks large differences between regions. For example, using PCE of POF as the standard of comparison, it seems that using the POF income variable tends to *overestimate* poverty in the non-metropolitan urban areas and *underestimate* it in the rural areas.

For further comparison, the poverty estimates using the per capita income measure from the 2004 PNAD survey are also presented. Unfortunately, aside from being able to match income by type or source, the PNAD and the POF are not really comparable for income measures due to very different reference periods (the PNAD for the last month and the POF for the last year). In addition, it is important to keep in mind that the PNAD survey was collected one year later than the POF survey so differences in poverty could be present for other reasons (e.g. economic growth) besides differences in the variable used to measure household welfare.

Using PCE of POF as the standard of comparison, the PNAD seems to overestimate the poverty rate at the national level and in most regions. The overestimation of poverty is the highest in metropolitan areas by 5.7 percentage points, then in the urban areas by 3.4 percentage pints and then finally in the rural area by 1.4 percentage points.

Table 23 Comparing Headcount Poverty Rates P(0): Consumption vs. Income in POF and Income in PNAD

Regions			POF PCE	POF PCINC	PNAD PCINC
1	North	Metro Belem	16.7	18.0	25.0
2		Urban	27.4	30.8	27.1
3		Rural	45.7	42.6	42.8
4	Northeast	Metro Fortaleza	20.8	21.4	30.5
5		Metro Recife	17.7	15.9	34.7
6		Metro Salvador	14.4	14.3	30.0
7		Urban	36.8	33.9	37.5
8		Rural	55.0	54.8	57.4
9	Southeast	Metro Rio De Janeiro	8.8	10.8	12.1
10		Metro Sao Paulo	7.2	5.4	14.1
11		Metro Belo Horizonte	7.1	4.7	14.9
12		Urban	14.4	11.0	13.8
13		Rural	28.2	19.5	29.4
14	South	Metro Curitiba	4.7	3.9	10.3
15		Metro Porto Alegre	7.2	6.2	11.3
16		Urban	12.1	9.3	9.5
17		Rural	15.9	9.4	17.9
18	Center West	Brasilia	8.1	7.4	16.6
19		Goiania Municipality	5.1	7.2	n.a.
20		Urban	22.9	19.2	14.8
21		Rural	30.9	18.9	31.4
National			**21.5**	**19.3**	**23.3**
Metropolitan			**11.4**	**10.8**	**17.1**
Urban excluding Metropolitan			**17.5**	**19.2**	**20.9**
All Urban including Metropolitan			**21.9**	**15.7**	**19.4**
Rural			**41.0**	**37.1**	**42.4**

Source: World Bank estimates using the 2002-03 POF.

Notes: *In the PNAD survey it was not possible to identify the Goiania municipality separately so it is classified with urban areas.

The PNAD poverty estimates include households with zero reported income. The poverty estimates did not change significantly when households with zero income were excluded.

THE COVERAGE OF THE POOR BY SOCIAL PROGRAMS

The regional poverty lines and the corresponding regional poverty rates based on household consumption offer the rare opportunity of conducting a preliminary investigation of the extent to which some of the social protection programs of the Brazilian government (those that are included in the POF) are successful at covering the households classified as poor.

The POF 2002-03 includes several key **social insurance (SI) programs** in its questionnaire, including: (a) publicly-funded pension benefits, which correspond with the RGPS and RJU pension regimes depending on which sector the worker was employed in;[49] (b) public leave benefits; (c) the salary bonus (*abono salarial* PIS/PASEP); and (d) unemployment insurance.[50] Together, these programs account for 100% of total federal spending on social insurance (Lindert, Skoufias, and Shapiro, forthcoming).

[49] The POF also includes information on public pension contributions, which we are using to analyze "net" public pension benefit receipts.

[50] A more detailed description of these programs may be found in Annex 2 of Lindert, Skoufias and Shapiro (forthcoming). It should be noted that the FGTS is not included in "public social insurance transfers."

The POF 2002-03 also included several important **social assistance (SA) programs** in its questionnaire, including: two of the main pre-*Bolsa Familia* conditional cash transfers (*Auxilio Gas* and *Bolsa Escola*), the child labor eradication program (PETI) and *Renda Minima*, which refers to sub-national programs offered in some localities. Together, these programs account for 22.7% of total federal spending on social assistance. Some notable federal social assistance programs that were not directly covered by the POF 2002-03 questionnaire include: the BPC-LOAS benefits for the elderly and disabled,[51] *Bolsa Família* (which was introduced after the survey was conducted), and school feeding.

Table 24 presents the percentage of the population classified as poor using the three main poverty lines that reports receiving benefits from social insurance and social assistance programs. For example, column (1) of table 23, reveals that more than half (56.14%) of the population classified in extreme poverty (i.e., 14.9 mil persons) reports receiving some type of social protection (SP) benefit. Social protection is defined here as receiving either SA or SI benefits or both. Column (2) of the table reports the coverage of the population with per capita consumption expenditures just above the food poverty line and less than or equal to the Minimum Livelihood Needs Poverty line (i.e. FPL<PCE<=MLPL), whereas column (3) reports the coverage of the populations in columns (1) and (2) combined.

Table 24 The Coverage of the Poor by Social Programs

	PCE<=FPL	FPL<PCE<=MLPL	PCE<=MLPL	MLPL<PCE<=UPL	PCE<=UPL
	(1)	(2)	(3)	(4)	(5)
All social protection (SP)	56.14%	51.70%	53.46%	44.74%	48.29%
All social insurance (SI)	26.68%	30.13%	28.77%	34.15%	31.96%
All social assistance (SA)	37.70%	29.68%	32.85%	15.02%	22.28%
Auxilio Gas (SA)	16.99%	13.08%	14.63%	6.50%	9.81%
Bolsa Escola (SA)	30.20%	23.38%	26.08%	11.39%	17.37%
PETI (SA)	2.17%	1.13%	1.54%	0.47%	0.91%
Abono salarial PIS/PASEP (SI)	3.07%	4.53%	3.95%	8.25%	6.50%
Public Leave Benefits (SI)	0.60%	1.12%	0.91%	1.57%	1.30%
Public Pension receipts (SI)	22.94%	23.86%	23.50%	24.55%	24.12%
Renda minima (SA)	7.33%	5.82%	6.42%	3.24%	4.53%
Seguro desemprego (SI)	1.39%	2.08%	1.80%	3.11%	2.58%
Household Observations	3690	6257	9947	13691	23638
Population	14,916,224	22,770,260	37,686,485	54,860,957	92,547,442
% of Total population	8.5%	13.0%	21.5%	31.3%	52.8%

Source: World Bank estimates using the 2002-03 POF.
Notes: PCE: Per Capita Expenditure
FPL: region-specific Food Poverty Line presented in Table 10 in Chapter 2.
MLPL: region-specific Minimum Livelihood Needs Poverty Line (CBN-Lower) presented in Table 12 in Chapter 2.
UPL: region-specific Upper Poverty Line (CBN-Upper) presented in Table 12 in Chapter 2.
S: Social programs include the set of social insurance and social assistance programs contained in the POF survey.
SI: Social insurance includes: Abono salarial PIS/PASEP, Public Leave Benefits, Public Pension receipts and Seguro desemprego.
SA: Social assistance includes: Auxilio Gas, Bolsa Escola, PETI, and Renda Minima.

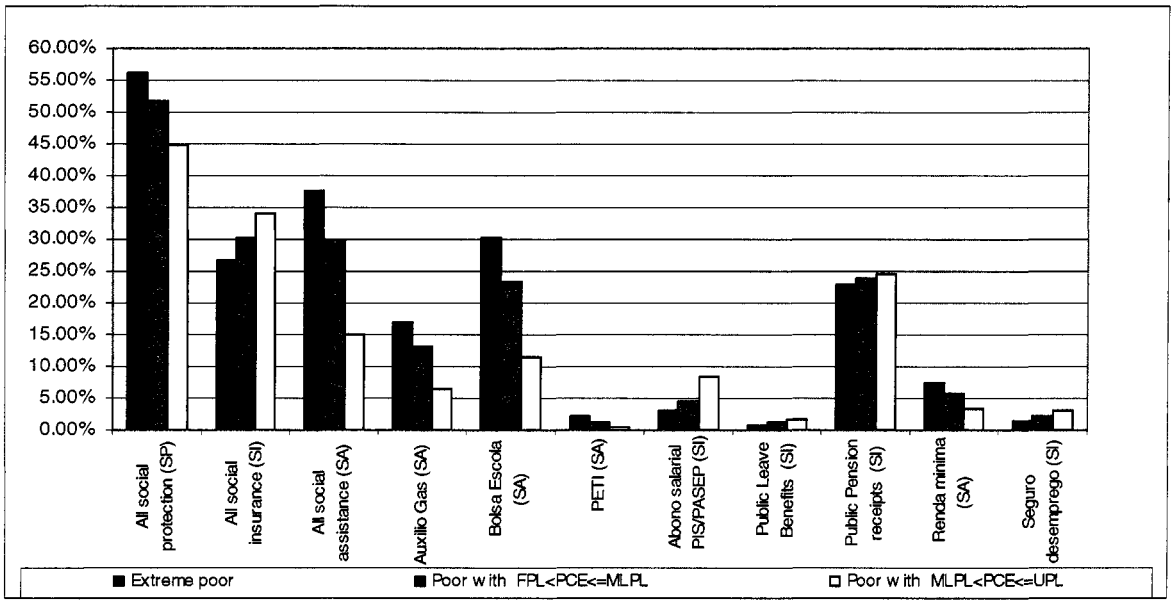
Figure 18 offers a more practical way of assessing the coverage rate of the poor in Brazil by social assistance and social insurance programs. Figure 18 simply graphs the coverage rates of the different

[51] Some respondents did indicate receiving BPC benefits in response to a question regarding receipt of any "other" benefits but the sample was deemed too small for our analysis.

degrees of poor individuals by the different social programs included in POF. Specifically, the set of three columns for each type of program is obtained from the numbers in columns (1) (2) and (4) of table 24. As the first set of bars in the left side of figure 18 reveals, social protection (i.e., the combination of social assistance and social insurance) programs covers a large fraction of the household in extreme poverty with the coverage of the less poor decreasing steadily. However, the aggregate statistics on the coverage rates of the poor by social protection appear to conceal large disparities between the coverage rates of the poor by social assistance and social insurance programs. The coverage rates of the poor by the social insurance system are lower among the extreme poor and higher among the less poor households. In contrast, the coverage rates of the poor by social assistance programs are higher among the extreme poor (37.7%) and lower among the less poor households (15.02%). These patterns confirm that social assistance programs, such as the *Bolsa Escola* and *Auxilio Gas* that are currently merged into *Bolsa Familia*, are much better targeted towards the poor in comparison to the social insurance programs.

Although the objective of social insurance programs is more protection from poverty rather than redistribution of income to the poor, these findings suggest that it is also important to reconsider the level of fiscal resources allocated towards social insurance programs especially in light of the fact that they leave less room in the government budget for spending in better targeted social assistance programs.

Figure 18 The Coverage of the Poor by Social Programs



Source: World Bank estimates using the 2002-03 POF.

CONCLUDING REMARKS AND NEXT STEPS

- A comparison of the poverty estimates that result from these consumption-based poverty lines to the "Administrative Poverty Line" (the R$100 and R$50 formerly used by the Bolsa Família and other programs) reveals that the enforcement of the same poverty line as was used as a threshold for eligibility to the *Bolsa Família* program tends to result in some *leakages* (inclusion errors) in the rural and non-metropolitan urban areas and some *undercoverage* (exclusion error) of the poor in the metropolitan areas.
- One more comparison worthy of serious consideration in the near future concerns the regional distribution of poverty based on the minimum livelihood poverty line and the regional

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distribution of federal funds for poverty alleviation. To the extent that the distribution of federal funds does not match regional distribution of poverty, a re-alignment in the regional distribution of federal funds may be called for.

- Using the POF per capita consumption expenditures as the standard of comparison, reveals that the income per capita measure from POF tends to *overestimate* poverty in the non-metropolitan urban areas and *underestimate* it in the rural areas.
- Lastly, an analysis of the coverage of the poor by the social program contained in the POF confirms that social assistance programs, such as the *Bolsa Escola* and *Auxilio Gas* that are currently merged into *Bolsa Familia*, are much better targeted towards the poor in comparison to the social insurance programs. Although the objective of social insurance programs is more protection from poverty rather than redistribution of income to the poor, these findings suggest that it is also important to reconsider the level of fiscal resources allocated to financing the deficits of social insurance programs especially in light of the fact that less room is left in the government budget for spending on better targeted social assistance programs.

The analysis in this project also provided the foundations for building a consumption-based **poverty map**. Poverty maps are especially useful for identifying the geographic variations in poverty within the twenty one different regions that are represented in POF, and they can be used for the design and better targeting of programs, budget allocation, and for monitoring and evaluation. Micro-area poverty maps are constructed using econometric techniques[52] that combine data from the 2000 census with data from the 2002-03 POF. By combining census and household survey data, the poverty maps benefit from the strengths of each data source: the complete coverage of households in the country with the census, and the more precise measures of household consumption and income from the POF. Statistical models are developed using "explanatory variables" in the household survey that are also included in the census. Once robust models have been identified to predict consumption (and/or income) in the household survey (using this common set of explanatory variables), these models are applied to census data at the household level to predict per capita consumption (or income) in the census (including an error estimate). These household-level estimates are then aggregated to small statistical "micro areas" to obtain robust estimates of the percentage of households living below the poverty line in these areas.

For the work on poverty maps, the Bank adopted a "transfer of technology" and "capacity-building" approach. Specifically, IBGE actually is implementing the work ("learning-by-doing"), with the World Bank providing training and technical assistance (via formal seminars and workshops, on-going training and supervision, regular missions, continuous feedback via email, etc.). This collaboration has already resulted in a significant transfer of technology to build IBGE's capacity for carrying out such work, conducting further analysis, and implementing future updates. In fact, IBGE sees the "poverty map project" as a chance to integrate its own data instruments (census, surveys, GIS, etc.) and staff across the institution. As such, IBGE has adopted the "poverty map project" as an innovative tool for integrating its own staff and management: the IBGE "poverty map team" comprised of some 10-15 people with different professional backgrounds (e.g., statisticians, economists, etc.) and coming from different departments in IBGE (e.g., those responsible for household surveys, the census, the GIS unit, etc.). It is hoped that the completion and publication of official IBGE poverty maps obtained with these methods will be completed in the near future.

[52] These methods were pioneered by researchers at the World Bank in 1996 (Hentschel and Lanjouw, 1996). The techniques have been further refined, mostly under the leadership of researchers at the World Bank in collaboration with universities and in-country partner institutions (e.g., Hentschel et. al. 1998, Hetschel et. al. 2000 and Elbers, Lanjouw and Lanjouw, 2002). These maps have been applied to numerous countries around the world. Henninger and Snel (2002) summarizes experiences with the development and use of poverty maps in several countries.

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APPENDIX 1: CONSTRUCTING A CONSUMPTION AGGREGATE FOR THE PURPOSE OF WELFARE ANALYSIS USING POF 2002-03

The initial step in computing poverty and inequality is to choose an appropriate measure of household welfare. There are both conceptual and pragmatic reasons why consumption expenditures available from household surveys might be preferred for the purpose of poverty and inequality analysis to an indicator such as household income. It is argued, for example, that consumption expenditures reflect not only what a household is able to command based on its current income, but also whether that household can access credit markets or household savings at times when current incomes are low or even negative (due perhaps to seasonal variation or a harvest failure). In this way, consumption is thought to provide a better picture of a household's longer run standard of living than a measure of current income. Further, consumption expenditures for the poor are often better captured than household incomes. While poor households are probably purchasing and consuming only a relatively narrow range of goods and services, their total income may derive from multiple different activities with strong seasonal variation and with associated costs that are not always easily assigned.

The POF has collected expenditures in a very comprehensive list of items. The derivation of a consumption aggregate for the purpose of welfare analysis may not include all of these items. As discussed in detail by Deaton and Zaidi (2002), the reason for the exclusion of expenditures on some categories of items is that some of these expenditures are better considered as investments, or inputs for production, rather than as welfare-enhancing expenditures. Moreover, for correct welfare comparability across households/individuals, it is important not to include in the consumption aggregate the acquisition value of lumpy expenditures on durable items, but rather a measure of the value of the services that these goods provide to the families. The inclusion of such expenditures on durables could drive a large wedge in recorded consumption between those who purchased a durable good, and those who own it but purchased it in a preceding period. This would be inappropriate from the perspective of comparing welfare across such households because in both cases the services of the durable are being consumed. In sum, the process of constructing a consumption aggregate for welfare analysis is guided by a number of considerations.

We went over these considerations presented in Deaton and Zaidi (2002), and scrutinized each specific item in POF in collaboration with IBGE, in order to construct a consumption aggregate that could capture the economic dimensions of well-being in Brazil. In deriving the "preferred" consumption measure from the POF data, there are multiple objectives of comprehensiveness, transparency and credibility that must be retained as central focus. This appendix summarizes the steps and considerations in the procedure for constructing the consumption aggregate used in the process of setting the regional poverty lines and the poverty map for Brazil.

Selection of items from POF for constructing the consumption aggregate

The POF collected information on household acquisitions of goods (purchased for own use or for other households, received as gift, and self-produced) in the previous periods of 7, 30 and 90 days, and 12 months. The 7 days recall includes acquisitions of food, both inside and outside the home, and transport expenses. The 30 days recall was applied to a range of nonfood consumption goods, such as pharmaceutical products, and also leisure and entertainment. The 90 days reference period include clothing and a variety of services, among others. The expenses made throughout the 12 month period comprise the acquisition of durable goods (like houses, cars and electronic appliances).
In order to aggregate the consumption measure, we added the items purchased and acquired (from gifts or self production) that could reflect the standard of living of the household in a longer run than the sum of current expenditures. The exercised consisted of appending 10 groups of items: "Food consumption (including consumption inside and outside the home)"; "Housing"; Health"; "Schooling/Education";

"Transport"; "Clothes"; "Culture/Leisure"; "Personal Services"; "Hygiene and personal care"; and "Others".

Among these groups, there are items which deserve a special consideration. In general, the procedure for scrutinizing the items to include in the consumption aggregate followed the guidelines of not including: a) "lumpy" items purchased sporadically; b) items that serve as inputs into production, or investments; c) items with low elasticity with respect to total expenditure; d) items acquired for other households. The next four bullets summarize the criterion for not including these items in a consumption aggregate for the purpose of welfare analysis.

a) The "lumpy" and infrequent acquisitions

Consumer durable purchases are typically large expenditures that occur very infrequently. A classic example is the purchase of a car or motorcycle. A particular household is likely to purchase a car only once every number of years. With a 12 month recall period, there will be a certain subset of households in the data who do indeed report purchasing a car. They will report spending a considerable sum of money for this item. Other households in the dataset will, in fact, own a car but will have purchased it in some preceding period, and will thus report zero expenditure in a car. Attributing a consumption value of zero to households that own but did not purchase a car in the specific recall period, will understate their welfare because they will in fact be consuming the services of a car. Attributing the purchase value of the car to those households in the data that happened to purchase a car during the reference period will overstate their welfare because they will not be consuming all of the services provided by a car in this one-year reference period. The car's services will be consumed over a period of several years. The attributes of a consumer durable imply that it is unappealing to simply add expenditures over the reference period directly to the consumption aggregate. Where possible a flow of consumption from consumer durables can be added to the consumption aggregate, imputed from the available information on ownership, age and replacement value of consumer durables. Deaton and Zaidi (2002) provide a good discussion of the available methods. In POF, although there is a section on the inventory of durable stocks for households owning goods in a longer period span, the questionnaire does not include information on value (either original purchase value or current replacement value), so it is not possible to calculate the flow of services from the durables.

b) Items that serve as inputs into production, or investments

One key concern throughout the process was to not include expenditures in inputs for production, or investments, as consumption. If one includes expenditures on inputs into household production, and the income from household production is in turn devoted (at least in part) to consumption expenditure, then double counting occurs, and the consumption aggregate is overstating the actual welfare levels achieved by the household. In most circumstances, the distinction between productive inputs and consumption is rather obvious. For example, it is clear that fertilizer expenditures should not be reflected in the consumption aggregate for farming households

c) Items with low elasticity with respect to total expenditure

In some cases, it is difficult to determine the effect on welfare of the expenditure in items like health products and services with their effect on welfare. The analysis of whether to include health expenditures deserves an assessment of the elasticity of health expenses with respect to total expenditure. For instance, it is complex to measure the extent to which health expenditures could increase welfare, since it is not possible to measure the loss of welfare from illness and the increase in welfare from its alleviation. Including only the expenditure is incorrect, though excluding health expenditures altogether means that one may miss the difference between two people, both of whom are sick, but only one of which pays for treatment. Moreover, there are other considerations related to whether the health expenditures may also be discretionary and welfare enhancing, but it is difficult to discriminate "necessary" from "unnecessary" expenditures. Therefore, Deaton and Zaidi (2002) recommend analyzing the elasticity of the expenditure in

health items with respect to total expenditure. The higher the elasticity, the stronger the case for inclusion. We analyze the elasticity of health and education expenditures in POF when explaining the components of the consumption aggregate.

d) Items acquired for other households

Goods acquired for gifts to other households should be excluded from the consumption aggregate, since its inclusion would involve double-counting if, as one would expect, the transfers show up in the consumption of other households. Therefore, it is recommended to include only the goods acquired as a gift from others, which increase the well-being of that household, but not the expenses made in that household for increasing consumption of other households.

Food consumption

The food component of the consumption aggregate comprises the value of expenditures and acquisitions of food items for consumption both inside and outside the home. Aggregating across all items, over the whole week, yields a measure of household weekly food acquisition. Multiplying this by the number of weeks in a month or in a year yields a measure of monthly or annual food "expenditures". While it may not be strictly the case that all food acquired in a given week is consumed that week, the general assumption is that at the monthly or annual level, total food expenditures indicate the value of total food consumed by the household. This procedure provided the first component of the overall household consumption aggregate.
There were 1636 households (3.4% of the total) with no reports on food consumption. A possible explanation to these missing reports could be that the 7 days period may be short to capture the food consumption of families that might not have purchased any food items during the week in which the survey was carried out, since it is expected that many families make their food purchases in a monthly or quarterly basis. To the extent that this problem occurs only with respect to food consumption, one might hope that for those households with significant nonfood expenditures, their overall ranking in the welfare distribution may not be affected too badly by this problem. As a result this issue may be of less concern when trying to identify the rich (in an analysis of inequality, for example). However, amongst those with low incomes, for whom food expenditures are typically particularly important, the presence of noise in the food consumption data is likely to lead to an over-estimate of overall poverty and to make less sharp the distinction between the "poor" and the "non-poor" in terms of household and individual characteristics.

Unfortunately, there is no way of knowing whether these households in fact did not spend anything in food due to difficulties, or whether they happened to have zero expenditures simply because of the short recall period in the survey for food expenditures (7 days). Alternatively, we checked on the sensitivity of the poverty and inequality rates to the imputing of the food expenditures for these missing reports in the calculation of the consumption aggregate.

We predicted the food expenditure of the households with missing reports based on a model for food expenditure as a function of a set of households' housing and demographic characteristics and area of residence. The parameters estimated by the model allowed the imputation of food expenditures equal to zero.[53] The food expenditure was imputed for all 1636 households, except for 97 households with per capita income below the political indigence line of R$50, who were expected to have no reports on food consumption because of difficulties, rather than because of the short recall period. We tested the sensitivity of poverty and inequality measures to this imputation in the final consumption aggregate, and the measures showed almost no sensitivity to the imputation in food expenditure.

[53] We also tried this procedure with Propensity Score Matching and found very similar results for the imputation.

Housing

This component of the consumption aggregate comprises rents; basic services; small scale home renovations; furniture and household items; appliances and appliance repairs; and cleaning materials.

For those households that are renting their home, the rent payments were included as a measure of the consumption of services that derive from housing. Households owning their dwellings do not pay rent, but are clearly consuming housing services, therefore we included the implicit rent from own housing reported by household owners in POF. As respondents are likely to be well informed about the value of their home and the kind of rent they would have to pay for a home with similar quality and location attributes, this estimated response is generally found to be quite satisfactory.

The expenditures on basic services (water, sewage, etc.) were included in the consumption aggregate. They represent a large share of total expenditure for some households. Deaton and Zaidi (2002) generally recommend against the incorporation of expenditures on publicly provided services in the consumption aggregate. This is because finding the proper set of prices with which to value these goods is difficult. Including expenditures on networked water and sanitation, for example, while not being able to properly take account of the fact that some households are not connected to a water network at all, that some households do not receive bills although they are connected, and that some households receive only sporadic supply of water and supplement their publicly provided water with purchases from private vendors, could introduce important biases in rankings of households. If there is any reason to think that expenditures on networked water, electricity and gas is only weakly linked to the welfare that is associated with the actual consumption of those services the general recommendation would be to exclude these expenditures from the consumption aggregate. Other services, such as internet access, telephone expenditures and television subscriptions, are more straightforwardly added to the consumption aggregate.

The expenditures with home renovations in the consumption aggregate include the more frequent expenditures on housing maintenance, such as: upkeep, gardening and home repairs; which were collected as expenditures within the 90 days reference period. The POF survey also collected expenditures on renovations over the 12 months reference period. In this case, the renovations are less frequent and lumpy since include reconstruction and reforms. Therefore, these last expenditures were not included as part of the consumption aggregate. As commented in point a) above, this type of occasional and high expenditures can introduce a wedge between the welfare levels of households which incurred in this type of expenditure in the reference period and the households who spent on them in a previous period. The same consideration was taken for deciding on the inclusion of durable items as furniture, appliances (fridge, televisions) and repair of these appliances. We scrutinized each item in order to decide if the purchase of durable goods was to be considered occasional and lumpy expenditure. We included only the items which were to be considered more frequent and less lumpy.

Health and Education

If one were to include expenditure on health then one should also take into consideration the implicit loss of welfare due to illness (something that is very difficult to do). However, some items related to prevention and care can be considered as more discretionary and welfare enhancing (and thus reasonably included in the consumption aggregate).

The decision to include or exclude these expenditures, according to Deaton and Zaidi (2002), must be based on the analysis of the income elasticity of the health expenditures. These authors have shown that in developing countries, this elasticity is relatively low (varying between 0.74 and 0.86), which does not justify including health related expenditures in the consumption aggregate.

We also computed the elasticities for education, for which there are also concerns about its inclusion (i.e. the inclusion can introduce a wedge in welfare level between households without children going to school

and households with children in school age). As explained in point c), the higher the elasticity, the stronger the case for inclusion in the consumption aggregate.

The results presented in tables 1, 2 and 3 compare the elasticity of health and education with respect to the total expenditures and to family income for Brazil using the POF. As table 1 indicates, the elasticity of education expenditures is larger than the elasticity of health expenditures, which justifies the inclusion of all of the education expenditures. The elasticity of health is 0.97, which is lower than the elasticity of education expenditures, but greater than the elasticity found in the countries analyzed by Deaton and Zaidi (2002).

The elasticity of the health and education expenditures was estimated by income deciles. It is observed that the elasticities are always higher for education expenditures than they are for health expenditures. In the case of health, the elasticity is higher for deciles four and six. For the bottom deciles, this elasticity is lower.

Based on the results for the elasticities, which were not very low for the health expenditures and were greater than one for the education expenditures, the following procedures were adopted:

We included expenditures in health and dental insurance plans, because they provide insurance, which can be related to a higher level of welfare and there is no indication of decrease in welfare from illness in insurance plans. Moreover, these expenses represent an important part of the expenditures incurred by the families. Other type of health expenditures, such as the purchase of pharmaceutical products and analysis were excluded, since in this case it is not possible to capture the welfare loss from the diseases they are supposed to alleviate.

The expenditures in education were included, since the expenditures in private school fees can be directly related to a higher level of welfare of households paying for educational services. Although education can also be considered an investment instead of consumption, the inclusion of education expenditures in the consumption aggregate is unlikely to lead to double counting as the returns from this particular investment will probably not be reflected in current consumption levels. Current practice typically treats education as a consumption item, but it is obviously a matter of judgment.

Table 1.1 Elasticities of health and education expenditures

Variable	Elasticity	Standard deviation	t	P Value
Health * Income	0,81	0,0136	59,64	<.0001
Health * Expenditure	0,97	0,0100	69,80	<.0001
Education * Income	1,13	0,0200	54,88	<.0001
Education * Expenditure	1,30	0,0200	62,59	<.0001

Source: 2002-03 POF.
Note: The sample design of the survey was considered for the calculation.

Table 1.2 Elasticities of health expenditures by deciles of income distribution

Income decile	Elasticity	Standard deviation	t	P Value	Observations
1	0,037	0,061	0,60	0,548	2762
2	0,567	0,222	2,56	0,011	3116
3	0,550	0,276	2,00	0,046	3421
4	**1,589**	0,324	4,91	0,000	3655
5	0,572	0,316	1,81	0,071	3782
6	**1,214**	0,289	4,20	0,000	3968
7	0,953	0,248	3,85	0,000	4122
8	0,921	0,190	4,86	0,000	4338
9	0,964	0,123	7,86	0,000	4502
10	0,655	0,033	19,64	0,000	4633

Source: 2002-03 POF.
Note: The sample design of the survey was considered for the calculation.

Table 1.3 Elasticities of education expenditures by deciles of income distribution

Income decile	Elasticity	Standard deviation	t	P Value	Observations
1°	0,027	0,076	0,36	0,718	2067
2°	0,830	0,278	2,98	0,003	2190
3°	0,730	0,357	2,05	0,041	2397
4°	1,018	0,454	2,24	0,025	2491
5°	1,053	0,424	2,49	0,013	2755
6°	0,907	0,395	2,29	0,022	2852
7°	1,688	0,355	4,75	0,000	3070
8°	1,567	0,289	5,43	0,000	3283
9°	1,382	0,190	7,29	0,000	3619
10°	0,835	0,053	15,79	0,000	3954

Source: 2002-03 POF.
Note: The sample design of the survey was considered for the calculation

Transport services

Expenses in transport services were included as part of the consumption aggregate. Although these expenditures are to be considered "regrettable necessities" for getting to the work place, in this case it was not possible to distinguish them from transportation expenses for other purposes.

Clothing, Culture and leisure, Personal Services and Personal Hygiene and Care

These components of the consumption aggregate comprise all types of expenditures in clothing, leisure (tickets to cinema, etc), personal services (haircuts, beauty, etc) and personal care; which were considered to increase welfare of the households without introducing biases in the comparability of households' welfare levels. Notwithstanding the fact that expenditures in clothing and shoes can be considered infrequent purchases, the value of these purchases is rather modest, so they were included in the aggregate.

Considerations for Other expenses

The remaining components of the consumption aggregate comprise professional services (such as notaries, lawyers); expenditures in ceremonies, celebrations and anniversaries (that are collected for the 12 month reference period); and expenses related to taxes, contributions, banking fees, among others.

The procedure followed was to include all items except for occasional expenditures (such as occasional ceremonies). As with consumer durables these are often infrequent expenditures that can become very costly and ideally we would like to have some smoothed value rather than actual, total expenditure on the event. Following Deaton and Zaidi (2002), we excluded these items from the consumption aggregate. The sole exception was made with respect to birthday parties and wedding anniversaries – events that occur on an annual basis. For such items the 12 month reference period is the appropriate one and one could thus justify including these items in the consumption aggregate.

Regarding taxes and contributions, following Deaton and Zaidi (2002) expenditures on levies are not part of consumption, but a deduction from income, and should not be included in the consumption aggregate. Therefore the consumption aggregate does not include this type of payments. The authors suggest including property taxes when there is evidence that they could be linked to the provision of a specific service to the households. In this case there were no grounds to relate the property taxes (IPTU and ITR)[54] to a better level of well-being. In contrast, we did include payments that could be linked to service provision, like insurance payments. In particular, we did not include taxes related to the acquisition of goods already excluded (e.g.

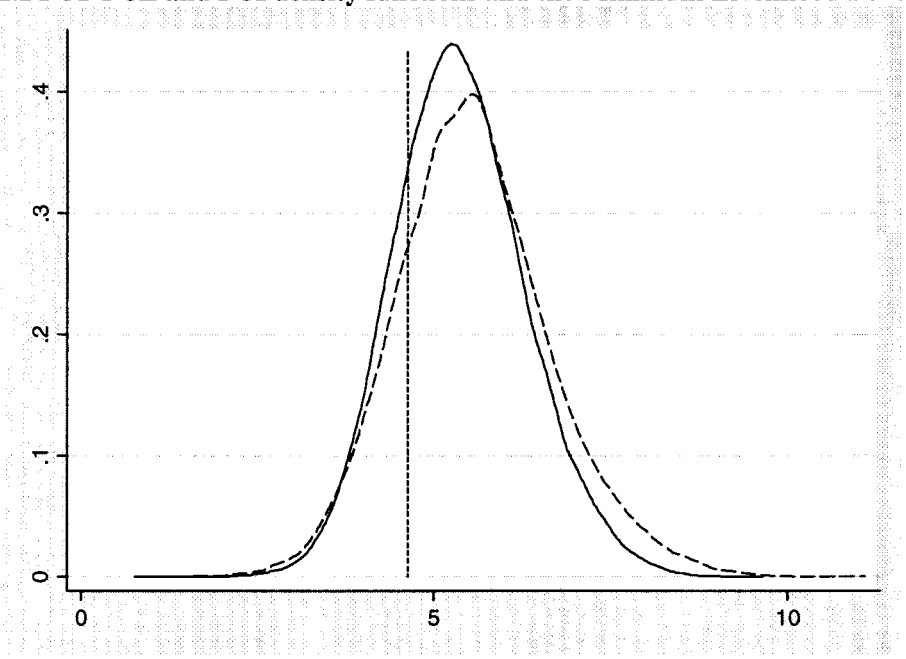
[54] IPTU: Imposto sobre a Propriedade Predial e Territorial Urbana. ITR: Imposto Territorial Rural.

purchases of cars). Expenses related to financial transactions, regarding the paying off of debts were not included as part of the aggregate.

Considering the suggestions in Deaton and Zaidi (2002) for gifts and transfers, these expenditures were excluded from the aggregate. Including them would involve double counting if the transfers show up in the consumption of other households.

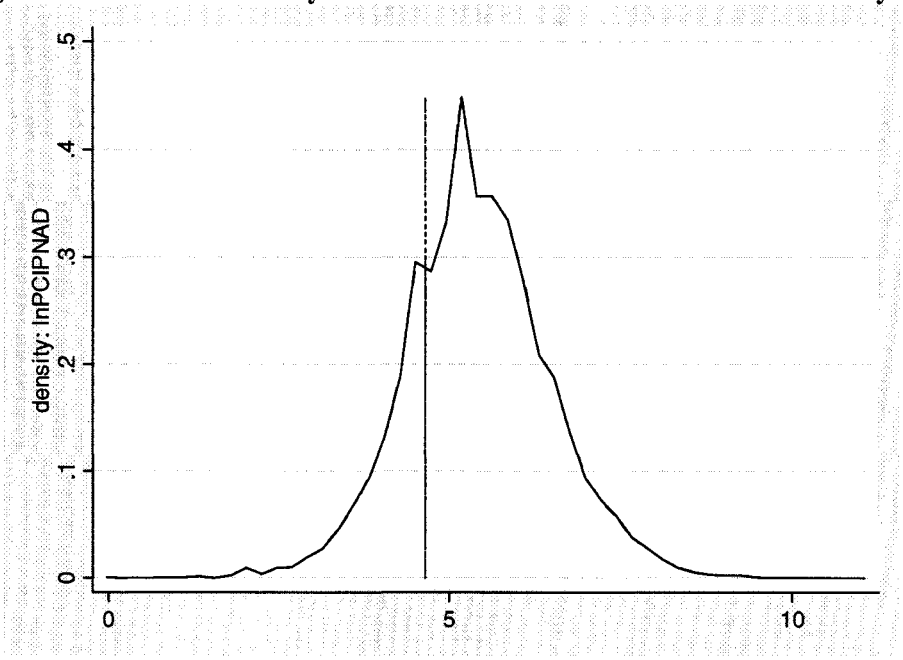
Large expenditures that may be considered investments, such as the purchase of real estate, gold bars, etc. were excluded from the consumption aggregate. They can also introduce bias in the comparison with households already owning these assets.

Figure 1.1 POF PCE and PCI density functions and the Minimum Livelihood Poverty line



Source: World Bank estimates using the 2002-03 POF.

Figure 1.2 PNAD PCI density function and the Minimum Livelihood Poverty line



Source: World Bank estimates using the 2002-03 POF.

APPENDIX 2: TESTING THE SENSITIVITY OF THE FOOD POVERTY LINES WITH THE CBN METHOD

In this appendix we summarize the various tests conducted for the sensitivity of the regional food poverty line to changes in

a) the reference population (for quantities and prices) for estimating the food poverty line. we tried definitions different from the 20 to 40 percentiles of the per capita consumption distribution.
b) In the estimation of the quantities and prices. apart from the mean quantities and prices. we also tested the same procedure taking the median.
c) Changes in the composition of the poverty basket to allow for more variety within each component of the poverty basket.

Table 2.1 summarizes all the procedures followed in estimating the regional food poverty lines. Each raw of this table corresponds to alternative reference population, while each column corresponds to different methods used for estimating the quantities and unit values (prices) of the food items in the basic needs food basket (means vs. medians etc.)

Table 2.1: Summary of all the tests used to investigate the sensitivity of the CBN food poverty line

Alternative reference populations	**Method for estimating the Food poverty line**			
	National Quantities		**Regional Prices**	
20 to 40 percentiles	Mean	Median	Mean	Median
10 to 50 percentiles	Mean	Median	Mean	Median
0.7<PCE/BPL1,2<1.3 where: Benchmark poverty line: BPL1=Half Minimum Wage=R$100 adjusted by prior regional price index*	Regression, quantities predicted where PCE=BPL1		Regression, prices predicted where PCE=BPL1	
BPL2= lower poverty line in Ferreira et al (2003) adjusted to 2003 prices and by prior regional price index	Regression, quantities predicted where PCE=BPL2		Regression, prices predicted where PCE=BPL2	

Notes: * Regional price index in Ferreira, Lanjouw and Neri (2003).
PCE: Per Capita Expenditure
BPL1 is half the Salario Minimo(=R$200 in January 2003).
Half the salario minimo (=R$100) is the poverty threshold set officially for the *Bolsa Família* program.
BPL2 is the lower poverty line in Ferreira, Lanjouw and Neri (2003) for 1996 adjusted to January 2003. (R$223)

The main findings of the set of sensitivity tests on points a) and b) above may be summarized as follows (see Table 2.2):

- Regardless of the reference population used, the food poverty lines were practically identical. Thus is the food poverty line is not sensitive to the choice of the reference population or to differences in the quality of the food products consumed by different reference populations.
- There were no significant changes in estimated regional food poverty lines using median quantities and prices instead of mean prices and quantities.

Table 2.2: Testing the sensitivity of the regional food poverty line

	Regions		Reference population from Consumption distribution*				0.7<PCcons/BPL<1.3 BPL1,2=Benchmark Poverty Lines	
			20 to 40 percentiles		10 to 50 percentiles			
			Mean quantities and regional prices	Median quantities and regional prices	Mean quantities and regional prices	Median quantities and regional prices	BPL1 = R$100 in Sao Paulo	BPL2= R$223 in Sao Paulo
1	North	Metro Belem	63	62	64	65	64	63
2		Urban	60	60	61	63	61	61
3		Rural	59	60	60	63	59	60
4	Northeast	Metro Fortaleza	59	60	60	62	61	60
5		Metro Recife	62	61	62	64	60	60
6		Metro Salvador	63	64	64	66	62	62
7		Urban	60	60	61	63	60	60
8		Rural	59	59	60	62	59	59
9	Southeast	Metro Rio De Janeiro	62	61	63	64	61	61
10		Metro Sao Paulo	65	63	66	65	62	62
11		Metro Belo Horizonte	59	59	60	62	59	58
12		Urban	64	61	65	64	67	66
13		Rural	58	59	59	62	58	58
14	South	Metro Curitiba	60	59	61	61	56	56
15		Metro Porto Alegre	64	64	65	66	57	58
16		Urban	57	57	58	60	57	56
17		Rural	55	54	56	56	55	55
18	Center West	Brasilia	62	61	63	63	61	59
19		Goiania Municipality	59	59	60	62	62	61
20		Urban	61	61	62	63	61	60
21		Rural	60	60	61	62	59	59
National			**61**	**60**	**62**	**63**	**60**	**60**
Metropolitan			**62**	**61**	**63**	**64**	**60**	**60**
Urban excluding Metropolitan			**61**	**60**	**62**	**63**	**61**	**61**
Rural			**58**	**59**	**59**	**61**	**58**	**58**

Source: World Bank estimates using the 2002-03 POF.

Notes: * Per capita Consumption distribution. Food poverty lines are expressed in Reais (R$)of January 2003. BPL1 is half the Salario Minimo(=R$200 in January 2003). Half the salario minimo is the poverty threshold set officially for the *Bolsa Família*. BPL2 is the lower poverty line in Ferreira, Lanjouw and Neri(2003) for 1996 adjusted to January 2003. Both BPL1 and BPL2 were deflated by the regional price index in Ferreira, Lanjouw and Neri (2003) in order to get benchmark poverty lines adjusted for cost of living differences across regions

Changes in the composition of the poverty basket to allow for more variety within each component of the poverty basket

In the POF specific food items are identified by a 7-digit code. In most other surveys in other countries very similar items would classified as the same good (using a 5- or 6-digit code). For example, a 5-digit code may simply identify beans, whereas a seven digit code helps one identify the specific variety of beans. Examining the regional variation of prices of 7-digit code items a better picture of the true variability of

prices of specific food items across regions. However, this comes at the expense of specificity. The specific 7-digit code food item may not be consumed at all in some regions. For example, "feijao carioca", an item in the basic food basket, is not consumed at all in Rio de Janeiro, (in spite of its name).Because of regional tastes and preferences, another variety of beans may be consumed, instead.

Table 2.3. The composition of the two different Basic Needs Food baskets

	Basic Needs Food Basket		Basic Needs Food Basket 2	
	Specific Food item:	POF Item code	Composite Foods	Codpof1 (5 digits) Codpof2(4 digits)
1	Pao frances	9200101	Pao frances and similar breads	92001
2	Leite de vaca pasteurizada	9105101	Leite de vaca pasteurizada	91051
3	Carne de segunda	6901701	Carnes de segunda	7204
4	Frango congelado	9100201	Frango (Frozen and natural chickens)	91002 or 91001
5	Arroz polido	6300101	Arroz polido and similar rices	63001
6	Tomate	6505101	Tomates	65051
7	Cebolha	6505701	Cebolhas	65057
8	Batata inglesa	6305101	Batatas inglesas	63051
9	Carne de primeira	6901601	Carnes de primeira	69016
10	Feijão carioca	6302114	Feijaos	1202-1210
11	Biscoitos	9202301	Biscoitos	6301-6302
12	Guaraná	9300301	Guaraná	93003
13	Acucar	6700201	Acucares	67002
14	Carnes suínas	9207601	Carnes suínas	92076
15	Banana prate	6600201	Bananas	66002
16	Oleo de Soja	9400301	Oleo de Soja	94003
17	Farinha de mandioca	6401401	Farinhas de mandioca	64014
18	Farinha de trigo	6401001	Farinhas de trigo	64010
19	Café moído	9302501	Café moído or soluvel	93025
20	Ovos	9103301	Ovos	91033
21	Macarrao (pasta)	6403401	Pastas (macarrao)	5301-5303
22	Linguica	9207201	Linguicas	92072
23	Po achocolatado	6700819	Po achocolatado	67008
24	Fuba de milho	6400601	Fubas de milho	64006
25	Margarina	9106602	Margarinas	91066
26	Queijo Prato	9106701	Queijos	91067

Source: World Bank estimates using the 2002-03 POF.

To test the sensitivity of the food poverty line to the composition of the basic needs food basket, as well as to allow for different food preferences across regions of Brazil, we constructed another basic needs food basket (Basket 2) of 26 "composite" food items based on the 5-digit codes instead of the 7-digit codes. The 26 "composite" food items were composed of 409 seven-digit code food items. For comparison, Table 1.3

presents the 7-digit codes of the 26 food items in the basic needs food basket, and the 5 and 4- digit codes that make-up the composite foods in Basket 2.[55]

Table 2.4 presents the food poverty lines obtained using the basic needs food basket of composite foods the food expenditures of households in the 20 to 40 percentiles of the national PCE. The unit value of each composite food in Basket 2 was constructed from the ratio of the sums of the total expenditures and sum of the total quantities of the seven-digit code items in each region. Clearly, the value of the food poverty line remains practically unchanged from the food poverty lines presented in the body of the report.

Table 2.4 Regional Food Poverty Lines Based on the Composite Basic Needs Food Basket

	Regions		Basket 2 Food Poverty line
1	North	Metro Belem	66
2		Urban	63
3		Rural	62
4	Northeast	Metro Fortaleza	62
5		Metro Recife	65
6		Metro Salvador	68
7		Urban	63
8		Rural	61
9	Southeast	Metro Rio De Janeiro	67
10		Metro Sao Paulo	69
11		Metro Belo Horizonte	62
12		Urban	66
13		Rural	61
14	South	Metro Curitiba	62
15		Metro Porto Alegre	67
16		Urban	61
17		Rural	55
18	Center West	Brasilia	66
19		Goiania Municipality	64
20		Urban	64

Source: World Bank estimates using the 2002-03 POF.

[55] Actually we used a 5 digit code (codpof1) which contains very similar items to the item with 7 digits. Some food items have more substitutes than others and so for some items we included a more aggregated code of 4 digits rather than 5 (codpof2)

APPENDIX 3: USING A NONPARAMETRIC APPROACH TO ESTIMATE THE LOWER AND UPPER POVERTY LINES

Following Ravallion (1998) the lower nonparametric estimate of the regional food share w_F^R was derived as follows.

1) Household PCE was expressed as a ratio of the regional food poverty FPL multiplied by 100;
2) Arranged households in ascending order of the ratio obtained from step 1;
3) Selected households, by region, with ratios equal or between 90 and 100;
4) Estimated the regional average from the actual food shares of the households obtained from step 3.

In analogous manner, the upper nonparametric estimate of the regional food share w_F^R was derived as follows.

5) Household per capita food expenditure was expressed as a ratio of the regional food poverty FPL multiplied by 100
6) Arranged households in ascending order of the ratio obtained from step 1
7) Selected households, by region, with ratios equal or between 90 and 100
8) Estimated the regional average from the actual food shares of the households obtained from step 3.

Estimating the food shares with parametric or non parametric methods did not introduce major changes in the regional poverty lines.

The resulting lower and upper poverty lines are presented in Table 3.1

Table 3.1: Regional Poverty Lines using CBN (parametric vs nonparametric estimates of the food share)

	Regions		Parametric Non Food allowance		Non Parametric Non Food allowance	
			Lower Poverty lines	Upper Poverty lines	Lower Poverty lines	Upper Poverty lines
1	North	Metro Belem	105	195	97	187
2		Urban	102	211	94	167
3		Rural	93	147	84	111
4	Northeast	Metro Fortaleza	99	199	97	181
5		Metro Recife	104	210	106	189
6		Metro Salvador	108	227	99	221
7		Urban	100	181	96	149
8		Rural	92	140	88	108
9	Southeast	Metro Rio De Janeiro	107	253	109	243
10		Metro Sao Paulo	115	304	120	281
11		Metro Belo Horizonte	103	244	99	245
12		Urban	109	242	109	221
13		Rural	97	185	96	148
14	South	Metro Curitiba	105	263	100	239
15		Metro Porto Alegre	111	256	120	248
16		Urban	99	224	100	204
17		Rural	90	156	91	146
18	Center West	Brasilia	109	303	109	288
19		Goiania Municipality	103	246	103	231
20		Urban	105	238	105	193
21		Rural	100	191	100	144
National			**103**	**220**	**101**	**197**
Metropolitan			**246**	**215**	**105**	**232**
Urban excluding Metropolitan			**103**	**219**	**101**	**187**
Rural			**94**	**164**	**92**	**132**

Source: World Bank estimates using the 2002-03 POF. Notes: Regional Poverty lines are expressed in Reais (R$) per capita per month of January 2003.

APPENDIX 4: INVESTIGATING THE SENSITIVITY OF THE POVERTY LINES DERIVED FROM THE FEI METHOD

In this appendix we examine the sensitivity of the total and food poverty lines obtained using the FEI method. The poverty lines reported in chapter 2 of the report, estimate the calorie income curve with a regression model using the full sample of households in each region. To test the sensitivity of the estimated poverty line using the FEI method, we also tried applying the method using different sub-samples by region such as (i) households with PCE between the 20 to 40 percentiles of the national PCE distribution, and (ii) households between the 20 to 40 percentiles of the region-specific PCE distribution.

The regional variation of poverty lines using FEI turned out to be very sensitive to the reference population used to run the cost of calorie model by region.

Using all percentiles to calculate the poverty lines by region it is found a large gap between urban and rural areas. And food poverty lines are always smaller in rural areas compared to urban and metropolitan areas. In contrast. when using as a reference population the 20 to 40 percentiles of the national per capita expenditure. the pattern varies considerably. The total poverty lines appear almost flat across regions. The food poverty lines also show an unusual pattern in which the rural food poverty lines are higher than the urban and metropolitan areas. This can be explained by the fact that people in the 20 to 40 percentiles nationally and from certain rural regions could be better off than people in urban areas in the 20 to 40 percentiles of the national distribution.

Therefore. they buy more expensive calories even when the cost of living may be lower in the rural areas. Table 3.1 shows an example for some regions which are the percentiles in the regional distribution for households in the 20 to 40 percentiles nationally. The sample composed with the 20 to 40 percentiles of the national per capita expenditure distribution includes households from the 70 to 90 percentiles in the per capita expenditure distribution of Rural Northeast. Similarly for Rural North the 20 to 40 nationally include households from the 64 to 87 percentiles. While the 20 to 40 includes people in the bottom percentiles (9 to 28) of the metropolitan Sao Paulo distribution.

If we estimate the non food component including the non food expenditure as dependent variable it is found that there is more variability in the non food component between urban and rural areas. The non food component is smaller in rural areas but still very close between rural and urban areas in this case.

The last test was to run the Cost of calorie model by region and for the sample in the 20 to 40 percentiles defined in each region. The results are close to the first regression run by region and without restricting for specific percentiles of the PCE distribution. The food poverty lines in metropolitan areas are higher than in rural areas and there is more variability in the non food component and total poverty lines across rural and metropolitan areas. The main difference with the first procedure is in the level of the poverty and food poverty lines, which are smaller in this last test.

Table 4.1: Sensitivity of FEI Poverty Line to changes in the reference population

Regions			FEI PLINES estimated by region for							
			All percentiles		20 40 National percentiles of PCE			20 40 percentiles by region		
			TPL	FPL	TPL	FPL	NF Component	TPL	FPL	NF Component
1	North	Metro Belem	140	33	160	29	133	137	26	116
2		Urban	126	29	160	32	124	105	20	81
3		Rural	75	30	153	47	100	68	25	42
4	Northeast	Metro Fortaleza	141	31	164	29	138	115	25	93
5		Metro Recife	154	29	169	27	148	134	23	115
6		Metro Salvador	187	37	161	27	130	162	26	135
7		Urban	99	26	158	34	122	83	19	62
8		Rural	60	23	151	45	104	56	17	38
9	Southeast	Metro Rio De Janeiro	255	42	169	26	142	205	35	166
10		Metro Sao Paulo	285	39	170	22	145	219	26	191
11		Metro Belo Horizonte	235	39	159	28	126	186	31	155
12		Urban	213	39	164	27	134	164	27	134
13		Rural	132	37	157	36	115	102	24	74
14	South	Metro Curitiba	275	41	166	22	145	220	25	193
15		Metro Porto Alegre	287	53	164	25	138	211	28	184
16		Urban	200	35	163	25	134	157	24	129
17		Rural	134	37	163	37	123	126	28	95
18	Center West	Brasilia	288	41	164	27	133	222	32	186
19		Goiania Municipality	266	41	164	25	143	197	32	171
20		Urban	155	27	162	25	134	124	19	102
21		Rural	120	30	160	34	120	101	19	80

Source: World Bank estimates using the 2002-03 POF.

APPENDIX 5: ESTIMATING SUBJECTIVE POVERTY LINES

In this appendix we present a summary of the estimates obtained regarding subjective poverty measures. Such comparisons allow us to examine the robustness of the "objective" poverty estimates using either consumption or income. Unfortunately, the estimates obtained for the subjective poverty lines appear to be problematic and thus not very useful for investigating the complementarities between subjective measures of poverty and the objective poverty estimates discussed in chapter 2.

Subjective studies of well-being have grown during the last 30 years starting with a research group from Leyden University in the Netherlands which developed the first studies of qualitative questions (see Goedhart et al. (1977) or Van Praag and Frijters (1999)). Early subjective poverty lines were derived from answers to the Minimum Income Question (MIQ), i.e., questions asking what monthly income would be necessary to cover their monthly expenses. However, subjective measures of poverty can also be derived by asking people to define (explicitly or implicitly) their level of satisfaction with life based on their perception of income or consumption adequacy. Respondents are typically asked to classify their level of satisfaction with their expenditures on food, or clothes, with categorical answers ranging from not at all satisfied to very satisfied.

Both types of questions, MIQ or qualitative, have to make an allowance for heterogeneity because individual perceptions of well being are likely to vary even among those with the same level of income and even in the same neighborhood. Some authors, such as Pradhan and Ravallion (2002), even argue that qualitative questions are more promising than Minimum Income Question due to the lower measurement error associated with answers to qualitative questions.

The goal in this chapter is to estimate the subjective poverty line (SPL) for the metropolitan area of Sao Paulo, using the minimum income question (MIQ) and categorical responses of households about their adequacy of their total income and the type of food consumed. In principle, the same method could be applied separately in each region so to derive SPL for each region. However, difficulties encountered in the estimation of the region-specific subjective poverty lines have forced to settle with the estimates of the subjective poverty line in metropolitan Sao Paulo.

The 2002-03 POF includes a variety of questions on subjective perceptions of poverty with respect to income and consumption (see appendix Box 1). Here we report the subjective poverty lines estimated based on the analysis of the answers to thee questions from POF:

A. *"Taking into account the current situation in your family, what would be the minimum monthly value of resources needed to cover spending on food?"* This question corresponds to the minimum income question (MIQ) frequently used by a number studies on subjective poverty.[56]
B. *"In your opinion, does your family's total income permit you to 'make ends meet' by the end of the month with: 1=much difficulty, 2=difficulty, 3=some difficulty, 4=some ease, 5=ease, 6=much ease"* and,
C. *"Which of the following descriptions best describes the type of food consumed by your family? 1=always the type we want, 2=not always the type we want, 3=rarely the type we want."*

A number of difficulties arise with respect to the interpretation of the responses provided. For example, the second question implicitly assumes that the household that responds to the questions already "knows its income." One important question is whether the income measure that households have in their mind

[56] Question A corresponds to question # 3 in the "Quality of Life" module of the POF survey. Questions B corresponds to question # 1, and C to question #3 in the same module.

when they respond to this question, is the same as the estimate of the total income measure derived from the POF survey. Also, in order to respond to the question, households are allowed to use their own personal (and unknown to us) subjective poverty line and based on that "personal" subjective poverty line (SPL) to classify themselves in any one of the 6 categories provided. Also, it is quite possible that relative economic position in the community where the household resides and the age and gender composition of the household and other household variables that might be unobservable can have a strong influence on the personal SPL that is used by the respondent to answer the question.

We begin with a brief description of the household responses to these three questions mentioned above. Tables 5.1-5.3 present the descriptive statistics on the three questions.

Table 5.1: Mean values of household income needed to cover food spending (in R$ per month) (Question A)

Brazil	North	Northeast	Southeast	South	Center-West
412.8	392.8	363.7	447.1	414.8	382.4

Source: World Bank estimates using the 2002-03 POF.

Table 2 suggests that among the total population of Brazil, 27.16% reported having *too much difficulty*, with the higher frequency of this response occurring in the Northeast region of Brazil Overall, eighty percent of the Brazilian population declared themselves as having some kind of difficulty (*too much difficulty, difficulty, some difficulty*) to make ends meets.

Table 5.2: Distribution of responses to Question B

	Brazil	North	Northeast	Southeast	South	Center-West
	%	%	%	%	%	%
Much difficulty	27.16	30.40	40.06	23.71	16.09	24.95
Difficulty	23.73	24.03	26.49	22.91	21.69	23.45
Some difficulty	34.56	34.83	24.67	37.32	41.59	36.28
Some ease	8.86	7.03	4.99	9.89	12.85	8.84
Ease	4.96	3.22	3.27	5.36	6.96	5.56
Much ease	0.72	0.50	0.52	0.81	0.81	0.92

Source: World Bank estimates using the 2002-03 POF.

Finally, based on the answers to question C, about 17% of the households declared they "*rarely consume the type of food they want*," while 55.67% declared that the type of food consumed is "*not always is the type they want*". Combined these numbers suggest that around 73% of the Brazilian population is not satisfied with the food consumed. The relatively lower levels of income in the Northeast and North regions are associated with a higher percent of households not satisfied (81,1% and 80.06%, respectively). In the more developed regions of the Southeast, South and Center West, around 30% of the population satisfied with the type of food consumed.

Table 5.3: Distribution of responses to Question C

	Brazil	North	Northeast	Southeast	South	Center-
	%	%	%	%	%	%
Rarely the type we want	17.17	18.52	23.55	15.68	11.40	15.87
Not always the type we want	55.67	61.54	57.46	54.24	54.44	55.87
Always the type we want	27.16	19.94	18.99	30.08	34.16	28.27

Source: World Bank estimates using the 2002-03 POF.

Estimation and Results

The subjective poverty lines based on the MIQ, i.e., question (A), were estimated based on the methodology outlined in Pradhan and Ravallion (2002). First, an equation such equation (1) below,

$$y_{\min} = \beta_0 + \beta_1 y + \beta_2 x + \varepsilon \tag{5.1}$$

is estimated by ordinary least squares. In equation (1), the dependent variable $y_{\min}$ denotes the answer to the minimum income question, y is the logarithm of PCE of the households, x is a vector of individual characteristics and the $\beta's$ are parameters to be estimated. Given estimates of the parameters, denoted by $\hat{\beta}$, then the subjective poverty line is determined from the equation

$$y^*_{\min} = \frac{\hat{\beta}_0 + \hat{\beta}_2 x}{1 - \hat{\beta}_1} \tag{5.2}$$

The vector x is specified as the logarithm of household size, and a set of variables characterizing the age and gender composition of the household such as the fraction of: boys (and girls, separately) less than 6 yrs old, men (women) 7-14 years old, men (women) 15-24 years old, men (women) 25-59 years old, and men (women) older than 60 years of age.

Along similar lines, the subjective poverty lines based on the categorical answers to questions (B) and (C) were derived by estimating an ordered probit model (for more details see Pradhan and Ravallion, 2002).

Table 4 below presents the estimates of the subjective poverty lines obtained by first estimating equation (1) using the full sample of households from all over Brazil, and then separately for the subsets of households in urban areas (including metropolitan areas), rural areas, and in the five regions of Brazil: North, Northeast, Southeast, South, and Center-West.

Table 5.4: Estimates of Subjective poverty lines based on questions (A), (B) and (C).

	Question in POF		
	A	B	C
All Brazil	192.7	53.1	67.2
Metropolitan & Urban areas	193.6	112.1	111.4
Rural areas	214.5	16.0	20.6
North region	196.8	148.6	51.8
Northeast region	193.6	43.0	75.4
Southeast region	193.9	30.5	65.7
South region	191.2	29.6	380.9
Center-West region	200.5	27.5	69.4

Source: World Bank estimates using the 2002-03 POF.

The SPL derived on the MIQ is estimated to be R$ 193 per capita per month, just under the minimum wage of the period (R$200). Surprisingly, however, and in contrast to the evidence presented in the previous two chapters, the SPL for rural areas is estimated to be higher than the subjective poverty line for urban and metropolitan areas.[57] This strange finding persisted when the subjective poverty line was estimated based on the MIQ, for each of the twenty one regions of Brazil. Moreover, the estimates of the ordered probit models did not yield reliable results (see table 4).

[57] It is also important to keep in mind that the SPL turned out to be very sensitive to whether we used income or consumption in the right hand side of equation (1). For example, replacing consumption by monetary income (not including self-consumption or imputed rent) the SPL line for Brazil increased substantially.

APPENDIX 6: THE REGIONAL PROFILE OF THE SEVERITY OF POVERTY INDEX AND THE POVERTY PROFILE BASED ON THE 2002-03 POF (POVERTY LINE: MINIMUM LIVELIHOOD LINE)

Table 6.1: Severity of Poverty index in (%) for different poverty lines

	Regions		Extreme Poverty	Minimum Livelihood	Upper Poverty Line
1	North	Metro Belem	0.3	1.7	7.5
2		Urban	0.8	4.0	11.2
3		Rural	2.3	7.7	11.2
4	Northeast	Metro Fortaleza	0.4	2.7	10.7
5		Metro Recife	0.8	2.5	8.8
6		Metro Salvador	0.8	2.1	8.9
7		Urban	1.8	6.4	13.5
8		Rural	5.1	12.0	15.6
9	Southeast	Metro Rio De Janeiro	0.1	0.9	6.5
10		Metro Sao Paulo	0.1	0.7	7.4
11		Metro Belo Horizonte	0.0	0.5	7.2
12		Urban	0.6	2.2	9.2
13		Rural	1.1	4.4	10.3
14	South	Metro Curitiba	0.0	0.4	5.1
15		Metro Porto Alegre	0.0	0.5	6.2
16		Urban	0.3	1.6	8.0
17		Rural	0.5	2.0	6.3
18	Center West	Brasilia	0.0	0.4	8.0
19		Goiania Municipality	0.1	0.6	5.6
20		Urban	0.8	3.3	11.4
21		Rural	2.3	5.7	10.8
National			**1.1**	**3.5**	**12.1**
Metropolitan			**0.3**	**1.4**	**7.5**
Urban excluding Metropolitan			**0.9**	**3.5**	**10.7**
All Urban including Metropolitan			**0.6**	**2.6**	**9.4**
Rural			**3.0**	**8.0**	**12.3**

Source: World Bank estimates using the 2002-03 POF.

Table 6.2: A poverty profile based on the 2002-03 POF (Poverty Line: Extreme Poverty Line)

Household characteristics	Subgroups	Incidence of poverty P0	Poverty gap P1	Poverty severity P2	% of National population	Contribution to national poverty	Av. Pc consumption of subgroup
	Total	*8.5*	*2.5*	*1.1*	*100.0*	*100.0*	*335.9*
Region	North	11.9	3.0	1.1	7.8	10.9	219.7
	Northeast	17.8	5.6	2.5	27.9	58.4	206.2
	Southeast	4.1	1.0	0.4	42.7	20.5	427.4
	South	3.1	0.7	0.3	14.7	5.4	378.0
	Center-West	5.9	1.7	0.7	7.0	4.8	335.1
Area of residence	Metropolitan	3.1	0.7	0.3	34.7	12.7	457.7
	Urban excluding metropolitan	8.1	2.2	0.9	48.2	45.9	310.7
	Rural	20.6	6.6	3.0	17.1	41.4	159.7
Housing							
Housing status	Own and already paid	8.5	2.5	1.1	68.3	68.5	337.1
	Own, still paying	2.8	0.6	0.3	5.4	1.8	486.0
	Rented	6.6	1.9	0.8	13.5	10.5	357.0
	Ceded	12.7	3.8	1.7	11.3	16.8	244.8
	Other	13.5	3.5	1.5	1.6	2.5	233.7
Water	Piped	5.0	1.2	0.5	86.1	50.6	372.2
	Not piped	30.3	10.0	4.6	13.9	49.5	110.6
Sanitation	Sewerage system	2.9	0.7	0.3	46.7	15.8	465.7
	Cesspit	4.7	1.1	0.4	16.7	9.3	317.4
	Rudimental Cesspit	13.2	3.7	1.6	23.5	36.4	197.0
	Drain	15.6	3.7	1.5	2.4	4.4	176.5
	River or Lake	8.5	1.9	0.6	2.8	2.8	228.0
	Other	17.9	4.3	1.5	0.5	1.1	172.8
	None	34.9	12.2	5.8	7.4	30.2	102.2
Electricity	Yes	7.3	2.0	0.8	95.7	81.7	346.4
	No	35.8	12.5	6.1	4.4	18.3	105.8
Paved Road	Yes	4.3	1.1	0.5	59.5	29.9	429.9
	No	14.7	4.4	1.9	40.5	70.1	197.9
Household head							
Gender	Female	7.6	2.1	0.9	22.7	20.3	366.0
	Male	8.8	2.6	1.1	77.3	79.7	327.1
Race	White	4.4	1.1	0.5	49.8	26.0	440.7
	Black	10.6	3.1	1.4	8.6	10.7	240.4
	Asian	5.9	1.9	1.2	0.6	0.4	677.1
	Parda	12.9	3.9	1.7	40.7	61.9	223.9
	Indigenous	25.9	8.0	3.9	0.4	1.1	261.9
Age group	0-24	11.0	2.6	1.0	4.4	5.7	242.8
	25-44	9.0	2.6	1.2	49.2	52.1	310.7
	45-59	8.1	2.4	1.0	30.7	87.0	378.0
	60+	7.0	1.9	0.8	15.7	13.0	358.1
Education	0-8	11.0	3.2	1.4	75.6	97.5	234.5
	9-13	1.1	0.2	0.1	17.9	2.4	480.1
	14+	0.1	0.0	0.0	6.5	0.1	1124.4
Immigration	Migrant- last year	9.6	2.8	1.2	13.1	14.7	291.4
	Migrant- last 5 years	9.4	2.6	1.1	28.9	32.0	349.5
	Not migrant	7.8	2.3	1.0	58.1	53.3	339.1
Occupational category	Domestic servant	8.1	1.8	0.6	3.5	3.3	201.1
	Employed	7.7	2.3	1.0	55.6	49.7	342.7
	Employer	0.7	0.1	0.0	5.0	0.4	739.7
	Self-employed	10.7	3.2	1.4	33.5	41.8	277.3
	Apprentice	5.1	1.3	0.5	0.5	0.3	478.8
	Self-consumption worker	21.2	6.6	2.9	1.8	4.5	146.8

Source: World Bank estimates using the 2002-03 POF.

Table 6.3: A poverty profile based on the 2002-03 POF (Poverty Line: Upper Poverty Line)

Household characteristics	Subgroups	Incidence of poverty P0	Poverty gap P1	Poverty severity P2	% of National population	Contribution to national poverty	Av. Pc consumption of subgroup
	Total	*52.8*	*21.1*	*12.1*	*100.0*	*100.0*	*335.9*
Region	North	63.0	28.1	15.7	7.8	9.3	219.7
	Northeast	65.0	30.6	18.0	27.9	34.3	206.2
	Southeast	46.0	18.5	9.8	42.7	37.1	427.4
	South	42.1	16.3	8.4	14.7	11.8	378.0
	Center-West	57.0	24.8	13.9	7.0	7.5	335.1
Area of residence	Metropolitan	44.0	17.1	8.8	34.7	28.9	457.7
	Urban excluding metropolitan	54.3	24.0	13.6	48.2	49.6	310.7
	Rural	66.3	30.7	17.9	17.1	21.5	159.7
Housing							
Housing status	Own and already paid	52.2	22.4	12.4	68.3	67.5	337.1
	Own, still paying	38.4	13.6	6.6	5.4	3.9	486.0
	Rented	50.9	22.1	12.3	13.5	13.1	357.0
	Ceded	63.7	29.0	16.6	11.3	13.6	244.8
	Other	67.3	31.4	18.5	1.6	2.0	233.7
Water	Piped	47.8	19.3	10.3	86.1	78.1	372.2
	Not piped	83.4	43.8	27.3	13.9	22.0	110.6
Sanitation	Sewerage system	40.0	15.2	7.8	46.7	35.4	465.7
	Cesspit	49.2	19.3	10.0	16.7	15.6	317.4
	Rudimental Cesspit	66.8	30.8	17.8	23.5	29.7	197.0
	Drain	70.0	34.2	20.4	2.4	3.2	176.5
	River or Lake	67.5	28.7	15.6	2.8	3.6	228.0
	Other	69.4	32.5	18.7	0.5	0.7	172.8
	None	85.1	45.9	29.3	7.4	11.9	102.2
Electricity	Yes	51.4	21.7	11.9	95.7	93.1	346.4
	No	83.5	44.5	28.3	4.4	6.9	105.8
Paved Road	Yes	42.6	16.8	8.9	59.5	48.0	429.9
	No	67.8	31.4	18.2	40.5	52.0	197.9
Household head							
Gender	Female	53.1	22.8	12.7	22.7	22.8	366.0
	Male	52.7	22.7	12.6	77.3	77.2	327.1
Race	White	40.6	16.1	8.5	49.8	38.3	440.7
	Black	64.5	29.0	16.5	8.6	10.5	240.4
	Asian	25.8	11.5	6.8	0.6	0.3	677.1
	Parda	65.4	29.6	16.9	40.7	50.5	223.9
	Indigenous	67.8	34.3	21.2	0.4	0.5	261.9
Age group	0-24	64.5	29.0	16.4	4.4	5.4	242.8
	25-44	56.2	24.8	13.9	49.2	52.3	310.7
	45-59	48.1	20.3	11.1	30.7	28.0	378.0
	60+	48.0	19.6	10.6	15.7	14.3	358.1
Education	0-8	62.9	27.9	15.7	75.6	90.2	234.5
	9-13	28.0	8.9	4.1	17.9	9.5	480.1
	14+	2.6	0.7	0.3	6.5	0.3	1124.4
Immigration	Migrant- last year	59.3	26.6	15.0	13.1	14.7	291.4
	Migrant- last 5 years	53.3	23.4	13.2	28.9	29.1	349.5
	Not migrant	51.1	21.6	11.8	58.1	56.2	339.1
Occupational category	Domestic servant	73.4	33.0	18.6	3.5	4.9	201.1
	Employed	52.9	22.2	12.1	55.6	55.5	342.7
	Employer	15.5	4.4	1.8	5.0	1.5	739.7
	Self-employed	56.0	25.1	14.2	33.5	35.4	277.3
	Aprent	36.6	14.8	7.8	0.5	0.4	478.8
	Worker for self-comsumption	72.6	34.4	20.3	1.8	2.5	146.8

Source: World Bank estimates using the 2002-03 POF.

APPENDIX 7: THE RELATIVE APPROACH TO MEASURING POVERTY

The reported has focused its attention exclusively to the absolute approach to measuring poverty. To complete the picture, in this appendix we also present some poverty line and poverty rate estimates using the relative approach to measuring poverty. Overall the relative approach to poverty measurement yields regional poverty estimates and rankings that are very similar to those obtained with the FEI method.

Table 7.1 presents the set of "relative" poverty lines for each region. These relative poverty lines are obtained using as a poverty threshold the 40% of the median PCE in each region. Clearly, the choice of the 40% of the median is arbitrary, since any other fraction of the median could also be used to derive a relative poverty line. The relative poverty lines presented here may be considered as a compromise between the properties of consistency and specificity of a poverty profile. The choice of the same fraction of the media PCE in each region may be viewed as providing some consistency in the poverty profile, while the specificity of the poverty line may be attributed to the fact that the regional poverty line is anchored to the region-specific median PCE.

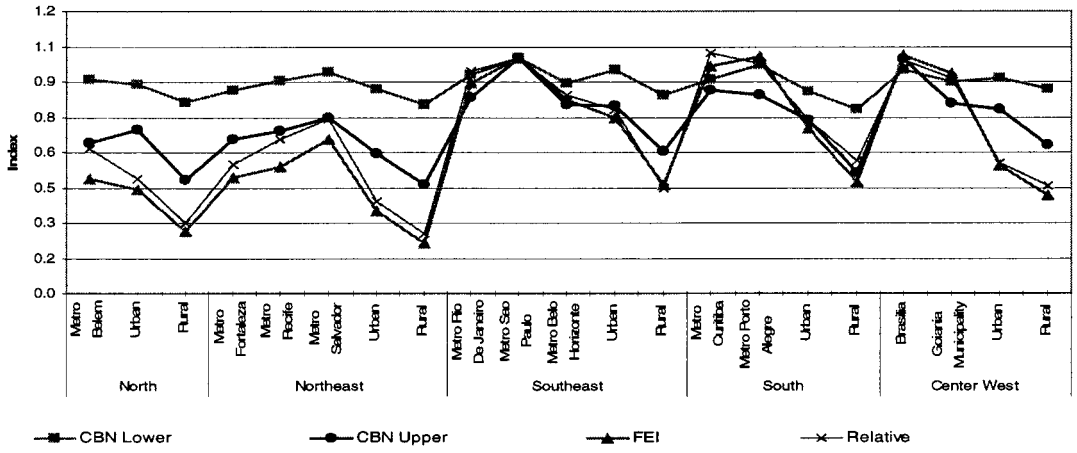
Table 7.1 : Absolute and Relative Poverty lines

	Regions		Extreme Poverty Line	Minimum Livelihood	CBN Upper Poverty Line	FEI*	Relative Poverty Line
1		Metro Belem	63	105	195	140	82
2	North	Urban	60	102	211	126	65
3		Rural	59	93	147	75	40
4		Metro Fortaleza	59	99	199	141	73
5		Metro Recife	62	104	210	154	88
6	Northeast	Metro Salvador	63	108	227	187	100
7		Urban	60	100	181	99	53
8		Rural	59	92	140	60	34
9		Metro Rio De Janeiro	62	107	253	255	127
10		Metro Sao Paulo	65	115	304	285	134
11	Southeast	Metro Belo Horizonte	59	103	244	235	113
12		Urban	64	109	242	213	105
13		Rural	58	97	185	132	60
14		Metro Curitiba	60	105	263	275	137
15	South	Metro Porto Alegre	64	111	256	287	131
16		Urban	57	99	224	200	99
17		Rural	55	90	156	134	76
18		Brasilia	62	109	303	288	133
19	Center-West	Goiania Municipality	59	103	246	266	123
20		Urban	61	105	238	155	74
21		Rural	60	100	191	120	61
National			**61**	**103**	**220**	**170**	**91**
Metropolitan			**62**	**106**	**246**	**229**	**113**
Urban excluding Metropolitan			**61**	**103**	**219**	**159**	**79**
Rural			**58**	**94**	**164**	**104**	**54**

Source: World Bank estimates using the 2002-03 POF.
Poverty lines are expressed in R$, January 2003. The numbers in the last four rows are simple (un-weighted) averages of the region-specific poverty lines.

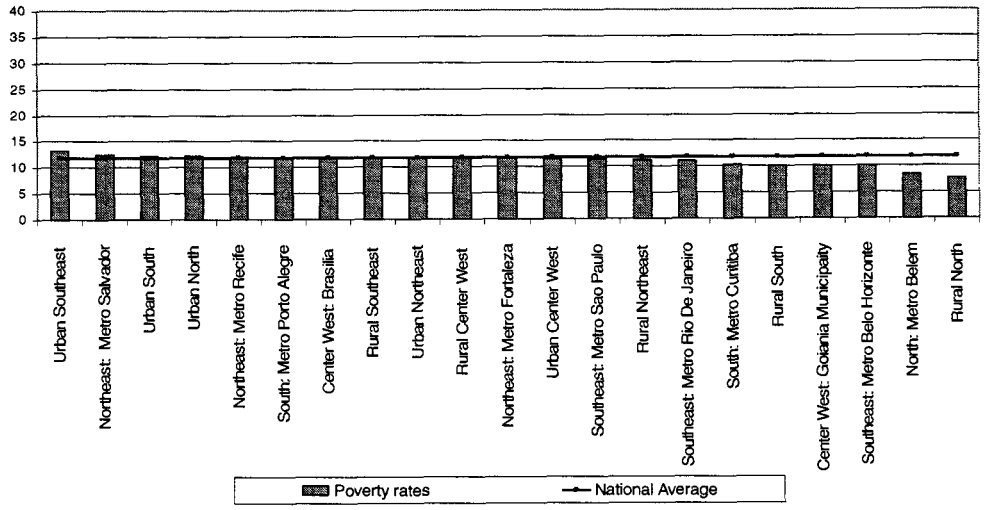
Table 7.1 reveals the use of the 40% of the median PCE as a relative poverty line, yields an average poverty line of R$91 per capita per month which is closer to the national (average) minimum livelihood poverty line of R$103. The variation of the poverty lines from region to region can be best analyzed through Figure 7.1 which presents the spatial price indices that can derived from the various poverty lines in table 7.1 (using Sao Paulo as a base). As it is apparent, the spatial price index derived from the relative poverty lines is practically the same as the spatial indices derived from the FEI poverty lines. This confirms the assertion that was made in chapter 2 that the FEI method to setting a poverty line is more akin to the relative approach to measuring poverty (at the expense of consistency). The poverty ranking of regions based on the relative line (presented in figure 7.2) is also very similar to the relative ranking of regions based on the FEI poverty lines (see figure 17). Poverty rates do not seem to differ much across regions something that was also observed with the FEI approach. In fact the relative approach to poverty measurement suggests that the rural North region is the region with the lowest poverty rate. The FEI approach that the rural North region was the region with the fourth lowest poverty rate in the country (see figure 17).

Figure 7.1: Spatial price indices based on the regional poverty lines of table 7.1



Source: World Bank estimates using the 2002-03 POF.

Figure 7.2: The incidence of poverty (Headcount poverty index) by region using the relative poverty lines



Source: World Bank estimates using the 2002-03 POF.