

Determinants of subjective wellbeing in Brazil: a two-stage estimation strategy for spatial correlated data¹

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Resumo

Este trabalho analisa os determinantes da insuficiência de renda declarada no Brasil, destacando a importante contribuição das características regionais nas avaliações subjetivas de bem-estar das pessoas. As análises baseiam-se em indicadores auto-declarados da Pesquisa de Orçamentos Familiares de 2003 e 2009. A insuficiência de renda foi definida como a falta total ou parcial de renda para permitir uma vida normal. É proposto um procedimento de estimação em dois estágios a fim de obter estimadores mais eficientes das relações entre as características regionais e o bem-estar declarado. No primeiro estágio, modelos logísticos estimam os determinantes socioeconômicos familiares da insuficiência de renda. O segundo estágio estima os determinantes regionais da insuficiência de renda considerando autocorrelação espacial nos erros (Modelo de Erros Espaciais). Os resultados revelam a relativa eficiência do Modelo de Erros Espaciais e destacam a importante contribuição da renda e da educação regional nas auto-declarações de bem-estar das pessoas. A insuficiência de renda depende tanto da renda absoluta das famílias quanto da renda regional relativa. Por sua vez, o nível educacional afeta desde as percepções individuais de bem-estar até as aspirações regionais para uma vida normal. Os resultados revelam ainda que os residentes rurais são mais propensos a declarar insuficiência de renda que os residentes urbanos, após controladas as demais características socioeconômicas das famílias.

Palavras chaves: indicadores subjetivos; desigualdade; Modelo de Erros Espaciais;

Abstract

This paper analyzes the determinants of the stated income insufficiency in Brazil, highlighting the important role of regional characteristics in the subjective measures of wellbeing. Analyses are based on self-reported indicators of the Brazilian Family Budget Survey 2003 and 2009. Income insufficiency was defined as the self-reported lack of income, partial or total, in order to have a normal life. A two-stage estimation strategy is proposed in order to obtain more efficient estimators of the relation between regional characteristics and stated wellbeing. In the first stage, logistic models estimate the family socioeconomic determinants of the income insufficiency. The second stage estimates the regional determinants of income insufficiency by considering spatial relations in the unobservable errors (Spatial Error Model). Results confirm the relative efficiency of the Spatial Error Model and highlight the important role of the level of regional income and educational attainment in the stated perception of wellbeing. Income insufficiency depends both on family absolute income and on relative regional income. In turn, educational attainment affects both individual perceptions of wellbeing and regional aspirations for a normal life. Moreover, results also indicate that urban residents are more likely to declare income insufficiency than rural residents, holding constant other socioeconomic characteristics.

Key words: subjective indicators; inequality; spatial error model;

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JEL: I31; D31; D12; C23

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Introduction

A common feature observed in inequality and poverty analysis is that they are usually based on objective concepts of living, such as absolute or relative levels of per capita income (GUSTAFSSON, 1995; UNDP, 2003). In addition, there is a growing interest in subjective concepts concerning how people feel about their material conditions or their participation in society (GARNER and DE VOS, 1995).

Subjective poverty lines are usually assessed through the minimum income question: asking family heads what they consider a minimal income level for their own family (GOEDHART *et al.*, 1977). Subjective indicators of wellbeing can also be obtained by asking family heads about their satisfaction with the resources they possess, such as income or food, or asking directly about the level of contentment with his/her life (DIENER and SUH, 1997; ALESINA *et al.*, 2003).

New and important elements to understand the levels of poverty and inequality could be achieved by assessing the satisfaction of the people as to the sufficiency of their income. Although purchasing power is a fair proxy for people's welfare, there are concepts that go beyond the possession of products or goods. For instance, poor people can present different levels of income sufficiency which, in addition to the family income, depend on access either to production for own consumption or to social benefits, such as school meals or basic food basket (HOFFMANN, 2008).

This paper examines the personal and spatial determinants of self-reported perceptions of income insufficiency in Brazil. Specifically, this paper contributes to literature in three ways. First, it highlights that relative wages do matter in self-reported perceptions of wellbeing. Second, the paper proposes a two-stage estimation strategy in order to obtain more efficient estimators of the relation between regional characteristics and stated wellbeing. In the first stage, logistic models estimate the family socioeconomic determinants of the income insufficiency. The second stage estimates the regional determinants of income insufficiency by considering spatial relations in the unobservable errors. The third contribution is that the paper provides a new and comprehensive measure of regional subjective wellbeing, which represents the minimum income necessary to limit the share of the population with income insufficiency.

1. Subjective indicators of wellbeing

Although income per capita is the most used proxy for wellbeing, there are substantial differences that may arise even in families with relatively homogenous earnings (MAIA, 2009). For example, the access to food depends not only on family income, but also on a number of social benefits, life styles and living conditions (HOFFMANN, 2008). Factors such as school meal and production for self-consumption may play an important role attenuating food insufficiency within the poorest population.

In this sense, the quality of life encompasses not only the objective domains of the standard of living (for example, employment, consumption and housing). It is also related to how people feel about their own lives and, in a narrower sense, to subjective perception about their objective living conditions (PESSOA and SILVEIRA, 2009).

In addition to objective measures of wellbeing, such as family income or expenditures, subjective measures would play an important role in the poverty and inequality analysis. One can assess, for instance, what a representative citizen considers as being the minimum levels of command over resources or what people believe to be a minimal level of income necessary for themselves (GOEDHART *et al.*, 1977; DIENER and SUH, 1997). Specific questions about happiness have also been used as a subjective measure of wellbeing, showing a strong

relation with objective measures of economic, psychological or social behavior (EASTERLIN, 2001; ALESINA *et al.*, 2004).

One of the advantages of self-declared indicators is that they incorporate both objective and subjective perceptions of wellbeing without explicitly needing of an objective diagnose of the family standard of living (VEENHOVEN, 1993). Furthermore, some incongruity between objective and subjective quality of life indicators may arise when people suffering greater material deprivation do not necessarily report lower satisfaction with their lives. Differences due to the subjectivity of self-declaration can be grouped into *differences in expectations* and *relative income perception* (PESSOA and SILVEIRA, 2009).

Differences in expectations arise when a subjective evaluation of wellbeing is influenced by the expectations, goals and aspirations that each person judges to be reasonable. Because people are free to define wellbeing in his/her own terms, subjective measures of wellbeing may vary directly with income and inversely with material aspirations (EASTERLIN, 2001). Thus, people with similar material conditions may have different perceptions of wellbeing depending on their life cycle or aspirations in relation to the standards they deem as ideal.

In turn, relative income perception means that the subjective evaluation of people about their income also depends on their relative position within a social group of reference (LUTTMER, 2005). Usually people compare their income and consumption with richer members of the same social group. The greater the extent and complexity of a social group needs, the greater the income and consumption to ensure a living condition considered normal for its members.

The impacts of regional inequalities on subjective indicators of wellbeing also deserve attention. Alesina *et al.* (2003), for example, suggest that individuals tend to declare lower happiness levels when inequality happens to be high. Glaeser *et al.* (2008) find similar relations analyzing differences between countries and suggest that, among other hypotheses, the existence of high levels of envy in more unequal regions may reduce stated wellbeing.

2. Material and methods

Data source

Results were based on information provided by POF 2002/2003 and 2008/2009 (IBGE, 2002; IBGE, 2008). The reference period is January 2003 and 2009 and monetary values from POF 2002/2003 were deflated to January 2009 using the National Consumer Price Index (INPC)².

Besides providing valuable socioeconomic information of families, POF also asks family members about their self-perceived standards of living. For example, subjective questions investigate the degree of sufficiency of the family income. The question presented in POF that was used as indicator of subjective wellbeing in this study is the following:

Income insufficiency: in your opinion, your total family income allows you to sustain your life until the end of the month with: great difficulty, difficulty, some difficulty, some ease, ease or great ease;

Model especification

Cumulative logistic functions were adjusted in order to find the main determinants of lack of income. The dependent variable was represented by the probability that a family head states any kind of income insufficiency. In other words, the dependent variable of the lack of income (Y) was defined as:

² From January 2003 to January 2009, the cumulative inflation measured by INPC was 39.1% (values obtained from IPEADATA website. Available at: <<http://www.ipeadata.com.br>>. Access in: November 2010).

$$Y_i = \begin{cases} 1, & \text{if great difficulty, difficulty of some difficulty} \\ 0, & \text{otherwise} \end{cases} \quad (1)$$

In the first stage, the income insufficiency was adjusted as a function of the socioeconomic characteristics of the individuals and the households (X) as well as fixed effects controlling differences between the FUs. The logistic equation representing such relation is:

$$\ln\left(\frac{Y_i}{1-Y_i}\right) = \alpha + \sum_j \beta_j X_{ij} + \sum_p \theta_p UF_{ip} + e_i \quad (2)$$

The dependent variables in this model - $\ln(Y_i / 1 - Y_i)$ is the natural logarithm of the odds, i.e., the ratio between the probability of success ($Y=1$) and the probability of failure ($Y=0$). This ratio expresses how many times the chance of stating insufficiency is greater than the chance of not stating insufficiency.

The second stage of estimation consists in adjusting the fixed effects associated to the differences between regions (θ) as a function of regional determinants of the stated perceptions (R). In other words:

$$\theta_p = \phi_0 + \sum_r \phi_r R_{pr} + u_p \quad (3)$$

Ordinary least square (OLS) can be applied to equation (3) by assuming that the errors u_j are normally distributed, non auto-correlated and homoscedastics. However, the existence of regional factors (local amenities and socio-cultural habits, for example) that affect not only the stated perceptions but also show spatial patterns of distribution would require considering the existence of spatial dependence between the errors of the equation (3).

Assuming the existence of spatial autocorrelation in the errors of the equation (3), more efficient estimators could be obtained by considering the specification of a Spatial Error Model - SEM (LeSAGE and PACE, 2009; ANSELIN, 1988). The SEM would be given as:

$$\begin{cases} \theta_p = \phi_0 + \sum_r \phi_r R_{pr} + u_p \\ u_p = \rho \sum_{q \neq p} w_{pq} u_q + \varepsilon_p \end{cases} \quad (4)$$

Where the error of a spatial unit (u_p) depends on a weighted average errors of its spatial neighborhood ($w_{pq}u_q$) plus a random component, homoscedastic and non-autocorrelated (ε_p). The parameterization used in this work for the spatial weights (w_{pq}) is:

$$w_{pq} = \begin{cases} 1/n_p, & \text{if } p \text{ and } q \text{ are neighbors} \\ 0, & \text{otherwise} \end{cases} \quad (5)$$

Where n_p is the number of neighbors of the spatial unit (FU) p .

Strategy of estimation

This paper takes the advantage of two cross-sectional samples, one for year 2003 and other for 2009. For each year, a logistic regression was fitted for equation (2) considering the odds for income insufficiency as response variable. Analyses were done using the routine PROC LOGISTIC of the SAS software.

Based on previous studies (GARNER and De VOS, 1995; PESSOA and SILVEIRA, 2009), the following explanatory variables were considered in the first stage:

- In (Income per cap): natural logarithmic of the annual familiar per capita income;
- Eight binary variables in order to discriminate nine sources of income: domestic work; agricultural work; non-agricultural work (reference); employer; self-employment; retirement; income transfers; other sources and no income;
- Woman: binary variable which assume 1 if the family head is a woman;
- Education: years of education of the family head;
- Age and age², decades of age of the family head and its quadratic term;
- White: binary variable which assume 1 if the family head is white or Asian;
- Four binary variables which discriminate five family types: single; couple with children (reference); couple with no children; mother with children; others;
- Piped water: binary variable which assume 1 if the family household has access to piped water;
- Sewage: binary variable which assume 1 if the family household has access to sewage;
- Pavement: binary variable which assume 1 if the family household has access to pavement;
- Rural: binary variable which assume 1 if household is in rural area;

Estimates of the fixed effects ($\hat{\theta}$) of the equation (2) were used as instruments for the dependent variables in equations (3) and (4). In this second stage, analyses were based on a pooling sample with 54 observations (27 FUs for each year). Because São Paulo was the reference of analysis in equation (2), the analysis considered $\hat{\theta} = 0$ for this FU. Equation (3) was fitted with routine PROC REG and equation (4) was fitted with PROC MIXED, which allowed considering a non-constant structure of error covariance (equation 5).

Four explanatory factors were tested as regional determinants of the income insufficiency³:

- HDI Income: Human Development Index for per capita income;
- HDI Education: Human Development Index for education;
- HDI Life Expect.: Human Development Index for life expectancy;
- Gini: Gini index for per capita income inequality;

Minimum income

A main concern in welfare analysis comprises the determination of the minimum income necessary to achieve a reasonable standard of living (GOEDHART et al., 1997). This paper proposes a new approach to estimate a subjective indicator of minimum income in each region, based on the share of persons with stated insufficiency for each level of per capita income.

First, according to the Equation (2), the probability of income insufficiency for a person living in the p -th UF is:

$$P(Y = 1) = 1/[1 + e^{-(\alpha + \delta I_p + \sum_j \beta_j X_{pj} + \theta_p F U_p)}] \quad (6)$$

Where I_p is the per capita income in the FU p and X_p the other regional socioeconomic characteristics. Holding constant socioeconomic characteristics in FU p , the relation between

³ Data provided by United Nation Development Program. Available at <http://hdr.undp.org/en/>. Access on june 2011.

the proportion of person with income insufficiency (p^q) and the level or per capita income (I^q) is expressed by Figure 1.

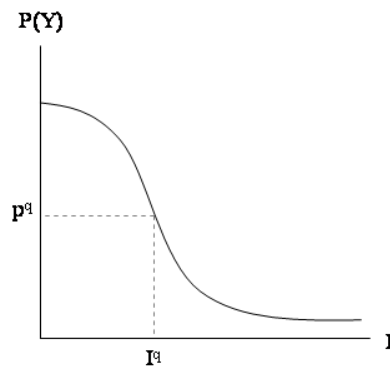


Figure 1 – Probability of insufficiency for specific levels of per capita income

Different levels of per capita income imply different proportions of persons with income insufficiency in each region. Reversely, the minimum income necessary (I^q) to limit the proportion of persons with income insufficiency (p^q) can be computed by:

$$I^q = \left[\ln \left(\frac{p^q}{1-p^q} \right) - \left(\alpha + \sum_j \beta_j X_{ij} + \theta_p UF_p \right) \right] / \delta \quad (7)$$

I^q represents the minimum income necessary to achieve a specific level of subjective wellbeing, which is defined by the proportion of persons with income insufficiency (p^q). It is a useful and comprehensive measure to analyze regional inequalities based on subjective indicators. Two main advantages of this indicator are: i) it is expressed in monetary values, allowing a direct comparison with objective measures of per capita income; ii) it considers the effect of socioeconomic characteristics that, besides per capita income, affect subjective wellbeing.

3. Results

3.1. Descriptive analysis

The levels of income insufficiency in Brazil are extreme, even considering the substantial reduction in the 2000s. In 2009, about 147 million people (78%) had at least some income difficulty and 37 million (20%) reported extreme difficulty to live with their family income (Table 1).

The reduction in the stated perceptions was more intense among the most severe levels of insufficiency, which would reflect a faster income growth of the poorest families due to the expansion of the cash transfer programs in Brazil (MEDEIROS *et al.*, 2007). The number of people with extreme difficulty to live with their family incomes reduced by 40% between 2003 and 2009.

Table 1 – Distribution of persons (%) according to levels of income and food insufficiency – Brazil 2003 and 2009

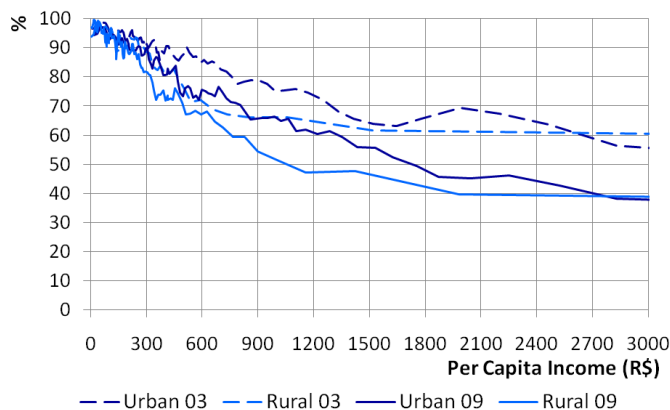
Indicator	2003				2009			
	Urban		Rural		Urban		Rural	
	N (1,000)	%	N (1,000)	%	N (1,000)	%	N (1,000)	%
Income allow you to live with:								
Strong difficulty	40,491	28	11,271	38	29,065	19	8,037	25
Difficulty	34,682	24	7,676	26	33,972	22	8,435	26
Some difficulty	49,447	34	8,258	28	56,776	37	10,577	33
Some facility	12,015	8	1,625	5	20,778	13	3,297	10
Facility	5,946	4	786	3	13,508	9	1,667	5
Strong facility	864	1	146	0	1,323	1	186	1
The quantity of food:								
Usually is not enough	21,720	15	5,881	20	15,306	10	4,474	14
Sometimes is not enough	48,406	34	12,544	42	43,230	28	11,663	36
Ever is enough	73,156	51	11,340	38	96,858	62	16,052	50

Elaborated by the author using data from POF/IBGE.

The income insufficiency is expressive (above 40%) even for people with relatively high incomes (Figure 1). Relative income perception may influence such result: the greater the extent and complexity of a group's needs, the higher the amount of income and expenditures required to ensure a regular perception of wellbeing. Thus, there would be a limit for an objective evaluation of wellbeing, from which people would be more guided by relative perceptions.

In the tails of the income distribution, there are no substantive differences of the stated income sufficiency among rural and urban residents. In the lower tail, the insufficiency is close to 100% of the population, which reflects the hardships imposed by the budget constraints of these families. In the middle range, between about R\$ 250 and R\$ 2500, state insufficiency tends to be higher in urban areas. Differences in expectations formed from different standards of living contribute to explain such results, for example, due to the higher needs of a middle class member in the urban areas.

Figure 1 – Percent of people with income insufficiency according to *per capita* income – Brazil 2003 and 2009



Source: Elaborated by the author using data from POF/IBGE. Values in reais (R\$) of January 2009 (INPC)

Besides differences between urban and rural areas, the spatial distribution of population among FUs also plays an important role determining the standards of living. Figure 2 presents preliminary results to analyze such behavior, mapping the distribution of percentages (color gradation) and absolute number of people (proportional circles) with food and income insufficiency in the Brazilian FUs.

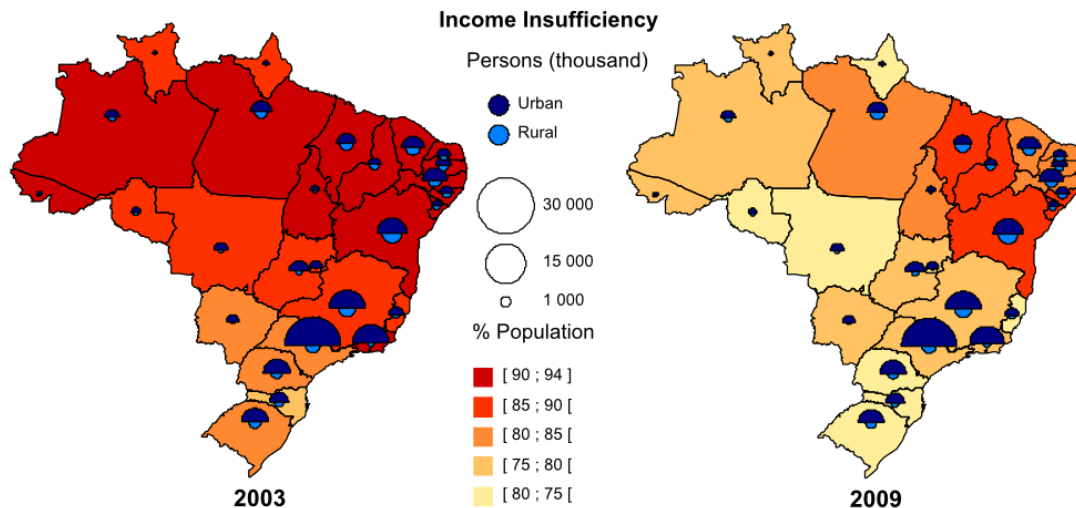


Figure 2 – Spatial distribution of the percent (colors) and number of persons (circles) with income insufficiency – Brazil 2003 and 2009

Elaborated by the author using data from POF/IBGE. Cartographic source: Artique.

There are evident patterns of spatial distribution of income, i.e., the geographical proximity of FUs with similar levels of stated perceptions of wellbeing. The higher percentages of insufficiency occur in the poorest FUs, in the North and Northeast regions. On the other hand, the number of persons with insufficiency is higher in the most populated states of the Southeast region.

Between 2003 and 2009, there was an expressive reduction in the percentage of income insufficiency in all the Brazilian FUs. In addition, there was also a 10 percent reduction in patterns of spatial association of the income insufficiency, as suggested by the Moran coefficient estimates (Table 2). Nevertheless, high levels of inequality among FUs still remains, as well as the levels of spatial patterns of distribution of the income insufficiency.

Table 2 – Moran autocorrelation coefficient for the percentage of persons with income insufficiency – Brazil 2003 and 2009

Area	Income Insufficiency	
	2003	2009
Urban	0.55	0.51
Rural	0.51	0.49
Total	0.60	0.53

Elaborated by the author using data from POF/IBGE.

3.2. Personal determinants of the income insufficiency

Table 3 presents results for the first stage of estimation, which associates socioeconomic characteristics of families to their propensity to income insufficiency. Overall, goodness of fit measures suggest reasonable adjustments, with likelihood ratios significant at 0.01% and adjusted R^2 higher than 0.21 for both years.

First of all, results highlight that income variations play an important role reducing propensity to insufficiency. As might be expected, current income is strictly related to the financial stress of the families. Moreover, binary variables associated to the sources of income were used as proxies to social patterns, and determined significant differences in the levels of subjective wellbeing. First of all, results suggest that families headed by employers present a lower propensity to income insufficiency. On the other hand, families related to vulnerable sources of income, such as domestic workers and income transfers beneficiaries, are more likely to declare income insufficiency.

Table 3 – Maximum likelihood estimates of the logistic regression for the probability to declare income and food insufficiency – Brazil 2003 and 2009

Variable	Income Insufficiency							
	2003				2009			
	Avg Value ¹	$\hat{\beta}$	CL (β , 95%)		Avg Value ¹	$\hat{\beta}$	CL (β , 95%)	
Intercep	-	6.715	6.361	7.068	7.846	7.551	8.141	
ln (Income pc)	706.7	-0.917	-0.954	-0.879	831.0	-1.064	-1.096	-1.033
Source of income								
Employed	0.367	-	-	-	0.367	-	-	-
Domestic work	0.026	0.314	0.030	0.597	0.034	0.145	-0.014	0.305
Agricultural work	0.026	-0.329	-0.575	-0.083	0.017	0.498	0.181	0.815
Employer	0.032	-0.349	-0.471	-0.227	0.026	-0.234	-0.350	-0.119
Self-employment	0.232	0.105	0.021	0.189	0.205	0.066	0.002	0.130
Retirement	0.200	0.106	-0.007	0.219	0.221	-0.066	-0.146	0.013
Income transfers	0.005	2.065	0.083	4.047	0.027	0.168	-0.065	0.401
Other sources	0.111	-0.008	-0.112	0.095	0.103	0.094	0.013	0.176
Woman	0.260	0.300	0.203	0.398	0.305	0.076	0.010	0.141
Education	6.863	-0.003	-0.006	-0.001	6.848	-0.004	-0.006	-0.001
Age	4.578	0.707	0.591	0.824	4.717	0.474	0.386	0.561
Age ²	-	-0.067	-0.079	-0.055	-	-0.038	-0.047	-0.030
White	0.442	-0.271	-0.340	-0.201	0.414	-0.146	-0.196	-0.096
Family status								
Single	0.090	0.038	-0.121	0.198	0.113	0.114	0.000	0.228
Couple + children	0.468	-	-	-	0.456	-	-	-
Couple no children	0.105	-0.180	-0.285	-0.075	0.138	-0.024	-0.099	0.051
Mother + children	0.091	0.108	-0.051	0.267	0.104	0.204	0.102	0.306
Other	0.246	-0.010	-0.087	0.066	0.190	-0.066	-0.127	-0.004
Piped water	0.825	-0.267	-0.422	-0.112	0.898	-0.477	-0.610	-0.344
Sewage	0.520	-0.103	-0.192	-0.015	0.586	-0.113	-0.176	-0.051
Pavement	0.534	-0.105	-0.187	-0.024	0.604	-0.027	-0.092	0.038
Rural	0.219	-0.411	-0.522	-0.300	0.232	-0.422	-0.503	-0.342

Elaborated by the author using data from POF/IBGE.

¹ Average values correspond to reais (R\$) of per capita income for variable ln (Income pc), years of schooling for Education, years for age and proportion for the other variables

Other social characteristics play also important roles determining the propensity to income insufficiency. For example, families headed by women and nonwhite people tend to be more vulnerable to income insufficiency. The higher the educational attainment of the

family head, the lower the propensity to income insufficiency. Families headed by older people have also lower propensity to insufficiency, as indicated by the coefficients of the quadratic relationship. On the other hand, single families and couples with children are more likely to declare income insufficiency.

Household characteristics, such as access to basic items of infrastructure, also contribute significantly to reduce the income insufficiency, especially access to piped water. Moreover, as noted in the previous analysis, rural residents are less likely to declare income insufficiency than urban residents, holding constant other socioeconomic characteristics. Thus, the higher percentage of people with income insufficiency in rural areas is especially due to the worst socioeconomic conditions that these residents are submitted to (income, education, infrastructure, among others). People with similar socioeconomic characteristics are more likely to be satisfied with their income in the rural than in the urban areas.

3.3. Regional determinants of the income insufficiency

Estimates associated to the differences between FUs (equation 2) were used as response variables and related to regional explanatory factors (equations 3 and 4). OLS and SEM estimates exhibited in Table 4 are no biased and present similar values. In turn, the relative efficiency of the SEM estimators implies that their standard errors are lower than the OLS ones. Overall, there are no substantial differences between OLS and SEM estimates, reflecting the low level of spatial autocorrelation in the residuals after controlling family socioeconomic characteristics.

First, results highlight the positive relationship between self-reported income insufficiency and regional per capita income. In other words, the richer the FU, the higher the propensity to report income insufficiency. Relative income perception help explaining such result: people living in richer regions are less satisfied with their objective per capita income because they tend to compare their income with richer ones of the same region.

On the other hand, the regional education index affects negatively the propensity to income insufficiency. This means that people living in regions with higher levels of educational attainment are less likely to declare income insufficiency. Educational attainment affects both socioeconomic development and socio-cultural habits, impacting on material needs, aspirations and, thus, on different expectations of the life that people deem as ideal.

Moreover, there was a substantial reduction of the stated income insufficiency between 2003 and 2009. This reduction would be related both to changes on unobserved socioeconomic characteristics, such as access to credit or economic stability, or changes on general perception of wellbeing.

Table 4 – OLS and SEM estimates for the determinants of the regional income insufficiency – Brazil 2003 and 2009

Variable	OLS			SER		
	$\hat{\phi}$	$S_{\hat{\phi}}$	p	$\hat{\phi}$	$S_{\hat{\phi}}$	p
Intercep	-0.094	1.467	0.949	-0.094	1.383	0.946
HDI Income	3.826	1.479	0.013	3.826	1.395	0.009
HDI Education	-3.940	1.369	0.006	-3.940	1.290	0.004
HDI Life Expec.	0.294	1.795	0.870	0.294	1.692	0.863
Gini	0.203	1.327	0.879	0.203	1.251	0.872
Year 2003	0.292	0.078	***	0.292	0.073	***

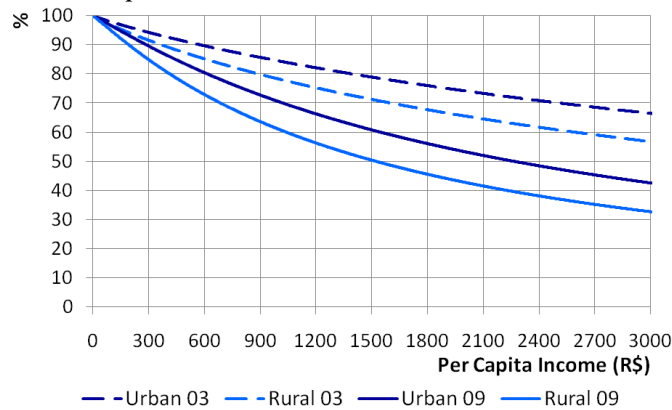
Elaborated by the author using data from POF/IBGE.

*** Significant at 0.01%

3.3. Minimum income for different levels of subjective wellbeing

Figure 3 exhibits the relation between minimum per capita income and the share of the population with income insufficiency, after controlling regional socioeconomic characteristics (Equation 6). The socioeconomic characteristics used as reference in this analysis are the average values observed in 2009 (Table 3). Similarly, the regional distribution of the population among the FUs was used to control the fixed effects on equation (6).

Figure 3 – Probability of a reference family declaring income insufficiency according to *per capita* income – Brazil 2003 and 2009



Source: Elaborated by the author using data from POF/IBGE. Values in reais (R\$) of January 2009 (INPC)

As noted in previous analysis, there was a substantial reduction of the income insufficiency between 2003 and 2009, independent of changes on socioeconomic characteristics. For example, the minimum income necessary to limit in 25% the share of urban residents with income insufficiency fell from R\$ 1904 to R\$ 806. In the rural areas, this minimum income fell from R\$ 1216 to R\$ 542.

Due to the effect of the relative income perception, minimum income increases substantially for marginal reductions in the percentage of persons with income insufficiency. For example, in 2009, in order to reduce the share of urban residents with income insufficiency from 90% to 80%, the minimum income had to increase R\$ 328 (from R\$ 287 to R\$ 615). In turn, in order to reduce income insufficiency from 60% to 50%, the minimum income had to increase R\$ 717 (from R\$ 1546 to R\$ 2263).

The minimum income necessary to limit in 50% the share of population with income insufficiency will hereby be called *median minimum income* and used to compare the levels of regional inequality for subjective wellbeing. The median minimum income for each FU p was computed using equation (7), assuming $q=0.5$ and the average socioeconomic values observed for the whole Brazilian population in 2009.

Figure 4 shows the spatial distribution of the median minimum income between FU. Although differences between FU are hidden by the expressive differences between years, results also highlights that median minimum income is higher in the richer and more developed FU. More specifically, São Paulo and Rio de Janeiro present the higher median minimum incomes and FUs in the North Region the lower.

The levels of spatial autocorrelation reduced substantially after controlling socioeconomic characteristics. Nevertheless, some patterns of spatial distribution still persist, such as the lower levels of median minimum incomes in the North Region and the higher levels in the Southeast and Northeast Region. Overall, Moran spatial autocorrelation coefficient rose from 0.14 in 2003 to 0.34 in 2009.

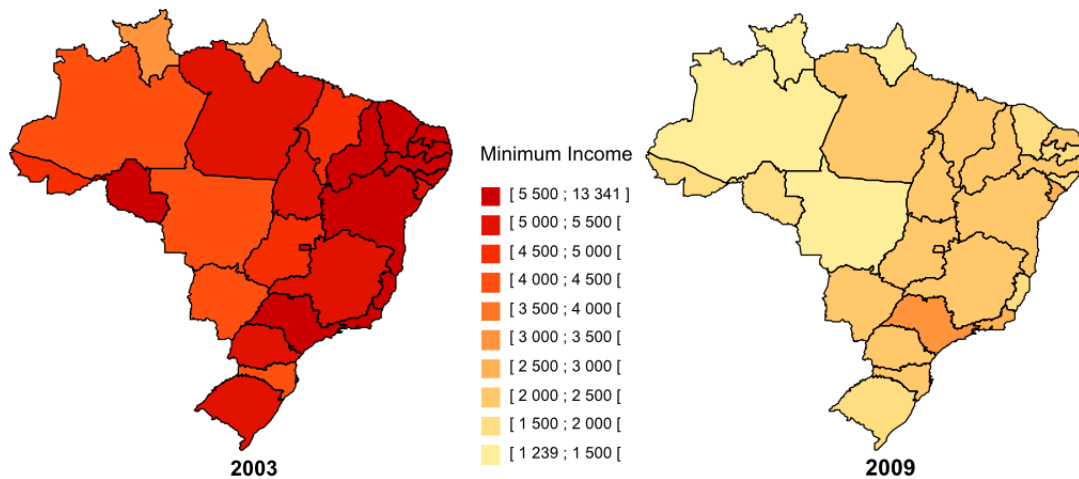


Figure 4 – Spatial distribution of the median minimum income – Brazil 2003 and 2009
Elaborated by the author using data from POF/IBGE. Cartographic source: Articque.

Conclusions

Subjective indicators of wellbeing provide additional and important information to analyze poverty and inequality. In Brazil, the distribution of self-reported measures of income insufficiency highlights the huge degree of exclusion and inequality of its population. There are also evident patterns of spatial distribution of the insufficiency, which can be related to different processes of socioeconomic development in the territory.

One of the advantages of the subjective indicators is that they allow assessing both objective and subjective concepts of how people feel about their living conditions. The income insufficiency, for example, depends not only on objective concepts of current income, but also depends on the access to a range of social benefits, such as basic food basket, or even differences on lifestyles, such as production for own consumption. Similarly, concepts of wellbeing become more complex as essential needs are fulfilled, considering factors such as violence, transportation and social inequality.

The self-reported insufficiency showed a strong relation with the main family socioeconomic indicators. Some relations highlight objective perception of wellbeing, such as current income or household infrastructure. Other relations may be more linked to differences in expectations or relative income perceptions, such as different standards of living of rural or urban residents.

Although the share of people with insufficiency is substantially higher in the rural areas, people with similar incomes tend to be more satisfied in rural areas. Among the poorest people, for example, the needs of urban residents go beyond the food consumption, involving concerns such as transportation, violence and drug traffic. Differences in expectations and aspirations, formed about the different standards of living that these groups are submitted to, may also play an important role determining higher insufficiency in the urban areas.

Holding constant family socioeconomic characteristics, regional income affects positively the self-reported perception of income insufficiency. First, income insufficiency depends both on absolute and on relative income. Thus, the richer the region, the lower the satisfaction of the persons with their per capita income. On the other hand, the regional level of educational attainment affects negatively the stated income insufficiency. Among other reasons, educational attainment improves socioeconomic conditions, reduces material needs and may affect the expectation of the people in relation to the standards they deem as ideal.

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