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"It is the economy, companheiro!": an empirical analysis of Lula's re-election based on municipal data

Claudio Djissey Shikida
IBMEC-MG

Leonardo Monteiro Monasterio
UFPEL

Ari Francisco de Araujo Jr.
IBMEC-MG

Andre Carraro
UFPEL

Otávio Menezes Damé
UFPEl

Abstract

This paper discusses the reasons that led to the Lula's 2006 re-election. Spatial analysis methods revealed that, contrary to 2002, the President had more votes in less developed municipalities of Brazil. The econometric results cast doubt on the analyses that attribute to Bolsa Família Programme total responsibility for the re-election. Lula's electoral success results from changes in the labor market, low inflation and an export boom that have reduced inequality and improved the real wages of the Brazilian poor.

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1. Introduction

The last decade witnessed the rise of cash transfer programmes (CTP) as the main tool of social policy in less-developed countries, mainly in Latin America. At the same time the growth of the world economy has caused a surge in regional exports. What are the electoral consequences of these processes?

Brazil is a good example of these trends. In just four years (2002-2006) the value of its exports more than doubled and about one-fourth of its families receive monthly transfers from Programa Bolsa Família (PBF, Family Grant Programme), the federal government CTP. On the 29th November 2006, more than 59 million Brazilians voted for president Lula's re-election, in the largest number of votes in the history of the country. One year before, this result could have been predicted by few, even among the "*companheiros*"¹. Starting from a very high level of popularity, Lula saw his popular approval drop during his first administration, amid corruption denunciations, and recovered during the months preceding the re-election. In 2006, he got 61% of the valid votes in the run-off, the same percentage that he had got four years earlier (TSE, 2006).

This electoral performance has generated a more intense discussion on voter's behavior than in other campaigns. The profile of Lula's electorate has changed. Based on state-level data, analysts have realized that candidate Lula won especially in less developed regions of the country. This evidence was interpreted in different ways, according to individual electoral sympathies. For the Partido dos Trabalhadores (Workers Party) voters, such pattern would be the result of an administration committed to Brazilian poorest populations. The opposition, on its turn, understood this pattern as the result of Lula's paternalist policies and/or a sign that the candidate was the choice of the less educated, the Brazil of the past. Others emphasized the geographic differences between those who supported or not the president's re-election, suggesting a north-south split in the country. We argue that all of these views are insufficient for understanding the phenomenon.

Despite some exceptions, e.g, Hunter and Power (2007); Nicolau and Peixoto (2007), still little empirical effort has been made in order to investigate the factors that lead to candidate Lula's voting. Thus, the objective of this note is to test how social and economic variables determined the vote for candidate Lula in the presidential election of 2006, using spatial econometrics and spatial analysis.

In order to reach those objectives, this note is structured in more four sessions. In the next one, we present a review of the hypothesis on Lula's election. The third section is dedicated to the application of spatial econometric analysis methods, as well as its application to the 2006 election. In the following section, the determinants of Lula's re-election are discussed based on the empirical results obtained. Final considerations end this note.

2. The hypotheses on Lula's election

Lula's unexpected recovery and the brutal change in his electoral profile demand a response. Hunter and Power (2007) divide the explanations for these phenomena in three categories:

a) Different responses of the voters to scandals: poor and less educated voters would have less access to the denunciations or would not repudiate corruption as boldly as other segments of the population.

b) Economic factors: voters from lower income strata would have paid back the amelioration of their standards of living during the Lula administration with their votes.

¹ This was the usual term of address among the Brazilian left in the 1970s and among the members of the union movement that founded the Workers.

c) Focused social policies: especially PBF would have been the key to understand Lula's victory.

Let us analyze each one of those hypotheses at a time. PBF belongs to the group of CTP that was disseminated in Latin America since the 1990s. Heir to the programmes that already existed in the Fernando Henrique Cardoso administration, PBF, supported by the World Bank, became the most important social policy of the Lula administration². According to the Ministério do Desenvolvimento Social e Combate à Fome (2006), PBF is a direct income transfer programme, subject to conditionalities, that benefits poor families (monthly income per capita between US\$ 27.50 and US\$ 55³) and extremely poor families (monthly income per capita up to US\$ 55). Still according to official information, PBF would be guided by the articulation of three dimensions for overcoming famine and poverty: poverty reduction through direct income transfer to the families; strengthening the exercise of social rights in the areas of health and education through the fulfillment of the conditionalities; complementary programmes for overcoming the situation of vulnerability and poverty. Depending on the family's monthly income per capita and the number of children, the importance paid by PBF can vary between US\$ 6.88 and US\$ 43.58. In July 2006, the programme reached more than 11 million families with an average benefit of US\$ 28.18. In effective terms, PBF's most significant dimension was undoubtedly direct income transfer⁴.

In Brazil, the hypothesis that attributes Lula's success to his CTP was proposed even before the elections. The NGO Contas Abertas raised it three months before the run-off⁵:

With the elections coming soon, the rush for enlarging the number of people who benefit from Bolsa Família is in accelerated pace. Payments destined to "income transfers with conditionalities" increased 56% within a month, from US\$ 290 million in June to US\$ 454 million in July. The value spent in July was 73% greater than the average budget of the programme during the last six months, which was about US\$ 263 million. (ContasAbertas, 2006)

Nicolau and Peixoto (2007) analyzed the determinants of the vote for Lula in the last elections through econometric tests and were convinced about the CTP effect. Hunter and Power (2007), too, consider the hypothesis that CTP is the most relevant factor in Lula's victory.

As for economic explanations, it is worth observing some changes in the Brazilian economy that may have contributed for Lula's victory. Data recently reviewed by IBGE show that the GDP growth, despite far from spectacular, was more significant than expected. In the first period of Lula's government, GDP increased 3.3% per year, instead of the 2.6% per year from the original data series. Even though it is still low, this growth rate was almost one percentage point above the previous administration by Fernando Henrique Cardoso. In 2006, GDP increased 3.7%. Part of this growth was stimulated by the notable growth of Brazilian exports, which almost doubled in the period, from US\$ 73 billion to US\$ 137.5 billion (AliceWeb, 2007). Motivated by the growth of the world demand, this exports boom possibly had electoral effects. Commenting Lula's voting, Samuel de Abreu Pessôa states:

² For a broad criticism of the PBF, see Hall (2006).

³ Throughout the paper, we have converted the values from Brazilian Reais to US Dollars using the average exchange rate for 2006 (2.18 R\$/US\$).

⁴ For a review of electoral effects of CTPs see, for example, Molinar and Weldon (1994), Bruhn (1996), Dion (2000), Menocal (2001) and De La O (2006).

⁵ Contas Abertas (2006).

The president was well succeeded in the elections because he distributed income without growing, providing the demands of the majority of voters. Most of the life quality improvement resulted neither from Bolsa Família nor from the minimum wage increase. It was a combination of an external shock, with an increase in commodity prices, which appreciated the exchange rate and made food much cheaper, and of a series of technical advances...which also diminished the cost of food in Brazil. (Jornal Valor Econômico, 19 jan. 2007)

Thus, there would be a causal chain through which exports would lead to a real wage increase for the poor, which, recognizing their welfare gains, would support Lula.

Finally, there is the hypothesis that voters would have different behavior towards corruption accusations. Hunter and Power (2007) consider that, due to the broad regional disparities and the low market penetration of magazines and newspapers, part of the voters, especially the poorest, would not get informed about corruption denunciations. A research showed that in region Northeast 43% of the interviewees considered themselves uninformed about those accusations, while in the Southeast this figure was not above 25% (Hunter and Power, 2007, p. 12). Moreover, still according to the authors, pieces of public opinion research would show that tolerance regarding patrimonialism would drop according to the interviewees' educational level. In short, the poor would have voted for Lula due to ignorance or indifference towards the corruption accusations.

3. Econometric Analysis

3.1. Exploratory Spatial Data Analysis

The data here analyzed on the municipal voting for candidate Lula in the presidential election of 2006 have as primary source the Tribunal Superior Eleitoral (TSE, Superior Electoral Court) website. The data are municipal, totalizing 5,507 observations. Exploratory Spatial Data Analysis (ESDA) is the set of techniques used to describe spatial distributions of variables, discovering spatial correlation patterns or identifying the occurrence of clusters, or even indicating outliers (Anselin, 1995). In the present paper, ESDA will be useful in identifying hotspots, that is, municipalities with high participation of votes for candidate Lula.

Figure 1 shows the distribution of the "Votes Lula%" variable by municipality in the 2002 and 2006 run-offs. The difference in the spatial distribution of his votes is evident. In 2002, there was a mosaic, without any large spatial concentration of Lula's voters. In the next election, a distinct spatial pattern becomes clear and there is a central band of low values that cuts Brazil from north to south. It is also noticeable that, even though region Northeast concentrates municipalities with high voting for Lula, there is a broad variation in the percentage of votes for the candidate within each state.

Helping to recognize spatial patterns, the local Moran indicator identifies the municipalities in which there were statistically significant clusters of high or low values. The local Moran's I is (Fotheringham et al., 2005):

$$I_i = \frac{(x_i - x^*) \sum_j w_{ij} (x_j - x^*)}{\sum_i (x_i - x^*)^2 / n}$$

Where: x_i is the observed value of x (Votes Lula %) at the location x , x^* is the mean of x , n is the number of observations and w_{ij} is the element i,j of the contiguity matrix $W(1$

for neighboring municipalities and 0 for non neighbors)⁶. Figure 2 evidences the central cluster of Low-Low Values, while the High-High clusters tend to be located within a large area more to the east of Brazil.

3.2. Spatial Econometrics – Data and Specification

The econometric analysis is based on data from three sources: Brazilian Human Development Atlas, Superior Electoral Court and Ministry of Social Development (PNUD, 2003; TSE, 2006; Ministério do Desenvolvimento Social, 2006). The Atlas offers the explanatory variables incorporated in the regressions and has its primary source in data from the 2000 Demographic Census⁷. Data are presented on a municipal level. Due to the creation of municipalities, there are differences between the municipal limits used in the 2000 Census and present limits. Therefore, there is a lack of information for a small part of the observations. In spatial econometrics, one way of overcoming this problem is by replacing the unavailable value by its spatial lag (Bhati, 2004). This procedure, based on Tobler's Law⁸, has the disadvantage of inserting spatial autocorrelation in the data. In the present case, this cannot be done, since some contiguous observations are missing. Thus, an even simpler practice was adopted: the average of the observations was imputed to the missing values. Since this procedure was necessary in but a small number of municipalities, this imputation is not expected to generate a bias in the estimation.

The initial step is the estimation of the following linear regression model, by ordinary least squares:

$$llula_i = \alpha + \delta \vec{X}_i + \varepsilon_i \quad (1)$$

in which $i = 1, \dots, n$ are municipalities; $llula_i$ is the natural logarithm of the proportion of votes for candidate Lula in the municipality i in the 2006 election; \vec{X}_i is a vector of explanatory variables expressed in logarithmic form; α , δ are the parameters to be estimated and ε_i is the stochastic error according to the usual hypotheses (non-autocorrelation, homoscedasticity and normal distribution).

The composition of the X vector, followed by its definitions, is as follows:

- a) Distance between the municipality and the state capital – Euclidian distance;
- b) Inequality – Income inequality, measured by the Gini coefficient in 2000;
- c) Demographic density – Municipal demographic density in 2000, in inhabitants per square kilometer;
- d) Income per capita – Municipal per capita income in 2000, in Brazilian Reais (R\$).
- e) Child mortality – Percentage of children dying under five years of age in 2000.
- f) Illiteracy rate – Percentage of people aged 15 and over who were illiterate in the municipality in 2000;
- g) Lula's voting in 2002 – Percentage of the valid votes that the candidate got in 2002 run-off.
- h) Bolsa Família – Number of families assisted by CTP in July 2006 in relation to the total, poor and indigent population. The value was multiplied by four, the average number of

⁶ The neighboring criterion adopted in this work was that of first order Queen contiguity, in which municipalities are considered neighbors when they have at least one common border point.

⁷ In ideal terms, data should be available on the characteristics of the municipal population in the year of the last presidential election. However, since the 2000 Census is the only source of data that is adequate to the present analysis, it is necessary to suppose that the municipal characteristics continued the same or changed without bias in the six years between the Census and the election.

⁸ "Everything is related to everything else but nearby things are more related than distant things" (Tobler, 1970, p.236).

family members, in order to generate an indicator of the number of individuals who benefit from the programme.

Due to the data characteristics preliminarily explained in the previous section, we chose to go beyond traditional econometrics and use spatial econometric tools. When existing spatial effects are ignored, the results are biased estimators and/or erroneous inferences. Two spatial specifications are tested here: the spatial lag model and the spatial error model. Formally:

Spatial Error Model:

$$llula_i = \alpha + \delta \bar{X}_i + \varepsilon_i \quad (2)$$

$$\varepsilon_i = \lambda \left(\sum_j w_{ij} \varepsilon_j \right) + u_i \quad (3)$$

Spatial Lag Model:

$$llula_i = \rho \left(\sum_j w_{ij} llula_j \right) + \alpha + \delta \bar{X}_i + \varepsilon_i \quad (4)$$

In the spatial error model, λ is a scalar of the error coefficient and $u_i \sim N(0, \sigma^2 I)$ and W is the same binary contiguity matrix used in Moran statistics. This model is recommended when there are unmeasured variables that are correlated across space or when there is a poor match between spatial pattern of the phenomenon and the units of observation. In the spatial lag model, the $\rho W llula_i$ component is added among the explanatory variables of the classic model. This component is the average (of the logarithm) of candidate Lula's voting in the neighboring municipalities. This specification implies the existence of substantive spatial dependence, i.e. neighborhood effects in the dependent variable. In both models, the estimation is carried out by maximum likelihood.

In the search for the appropriate specification, the strategy proposed by Florax et al. (2006) has been followed. The authors recommend estimating the classic model and testing for spatial autocorrelation. If it is detected, then it is necessary to choose between the error and the lag model. Still following the recommendations by those authors, when both spatial tests (error and lag) of the Lagrange multiplier are significant, the spatial correction related to the highest value of the test should be made.

3.3. Econometric Results

Table I presents the results of the classic model. The results indicate that Lula's voting is always inelastic in relation to the right-hand side variables. The highest among them, in absolute value, is income per capita (and it is the only one that is inversely related: a 1% increase in income per capita diminishes the candidate's voting in 0.154%), followed by inequality proxies (positive relation with the candidate's voting), Bolsa Família, demographic density, child mortality, illiteracy and distance to the state capital.

In the present case, the diagnosis tests have indicated the presence of spatial autocorrelation in the classic model, suggesting that the spatial error model should be chosen instead of the spatial lag model. The value of the LM test statistic for the spatial error model is much higher than for the lag model. In Table II, Model II presents the results of the spatial error model estimation with the same variables as in the first model. The fact that the spatial error model is the most adequate indicates that the classic specification ignored that the evaluated process does not spatially correspond to the analytical units. In this case, it means

that municipal border lines do not precisely delimitate the phenomenon of Lula's voting determinants⁹.

It is worthwhile to reflect on the result regarding CTP. In the initial model, the transfers, measured in per capita terms, would have had a positive effect on Lula's voting. In this sense, the result here is similar to that reached by Nicolau and Peixoto (2007). These statements are rather audacious for a preliminary work based on a questionable econometric specification. The Bolsa Família per capita variable is correlated with the percentage of poor in the population. This, in its turn, is correlated with Lula's voting, and thus it is more than expected that Lula's voting is to be correlated with the percentage of people who benefit from CTP. Correlation does not imply causation and there may be a variable (the percentage of poor by municipality) that intermediates the relation between the Bolsa Família proxy and Lula's voting. The use of the MHDI-Income variable may not be sufficient as a control and it would be more prudent to use other proxies that captured the programme range. Thus, instead of considering only total municipal populations, we additionally considered those assisted by the programme in relation to the poor population (Model III) or to the indigent population (Model IV).

In general, the low elasticities of the variables persist, as in Model I. Besides, it is noticeable that elasticities of demographic density, income per capita and distance to the state capital do not vary much between the models, neither in terms of sign nor in terms of magnitude. There is also some variation in the absolute value of illiteracy and inequality elasticities. The "Lula's voting in 2002" variable is positive and significant. This means that, despite the changes in the electorate's profile, with due controls, there was a spatial continuity in the candidate's support between the elections. However, its impact on the candidate's voting in 2006 is as important as or less important than, for example, the impact of demographic density or child mortality.

As for the electoral effect of the CTP, in Model II the sign is positive and significant, as in the spatial model, but the elasticity is even lower. In Model III, the coefficient for Bolsa Família by poor is positive and significant at the 10% level, but not at 5%. Finally, in Model IV, the parameter estimated for the Bolsa Família by indigents proxy is not statistically different from zero and does not have the same sign as in previous specifications. These results make the positive impact of CTP, with due controls, not as spectacular and statistically reliable as it would seem in a first analysis.

4. Discussion of the hypotheses on Lula's election

According to the econometric results, Lula's voting was higher in poorer, more unequal municipalities with higher illiteracy rates. Still, there were no robust evidences that the Programa Bolsa Família *per se* had an effect on Lula's voting.

Consider Hunter and Power's (2007) hypothesis that there would be distinct responses of the voters to corruption scandals. Actually, it divides into two theses: a) Lula's voters were not informed about the scandals; b) if they were informed, they would not be as bothered with the facts as other social segments. Given our methods and databases, both theses are quite hard to be refuted (or accepted). We tried to test thesis (a) through the inclusion of the variable "distance to the state capital" as a proxy for information accessibility. None of the regressions showed empirical support for this thesis. We admit that our proxy is problematic, but there is no alternative available. However, against thesis (a) we note that 90.3% of

⁹ Classic and spatial lag estimations were carried out for all the mentioned models. The tests always suggest the existence of spatial autocorrelation, and – according to the present criteria – the spatial error model continued to be the most appropriate. For synthesis reasons, we have chosen not to present such results, which can be requested to the authors.

Brazilian households have television (IBGE, 2005) and that accusations against the Lula administration were broadly covered by the country's main communication networks. As for part (b) of the hypothesis, the methods here adopted do not allow us to make inferences about its pertinence.

The economic hypothesis raised by Pessôa (Jornal Valor Econômico, 19 Jan. 2007) and by Hunter and Power (2007) needs to be addressed – that is, the economic welfare gains of the poor would have been determinant in Lula's election. Taking price index variations into account, we notice their differences according to social classes. Observing the period from the moment Lula took up office in January 2003 to the 2005 elections, the official Brazilian index of inflation, “Índice de Preços ao Consumidor Ampliado” (IPCA), which considers household incomes up to 40 minimum wages, increased 24% (IPEADATA, 2007). Over the same period, basic food basket prices calculated by Departamento Intersindical de Estatística e Estudos Socioeconômicos (DIEESE) had smaller increases: in the state capitals of Rio Grande do Sul and São Paulo this index increased 8.5% and 10.4%, respectively. In Recife and Fortaleza, capitals of Pernambuco and Ceará, basic basket prices varied 4% and -3% in this period, respectively. In the first state, Lula got 82% of the votes in the first round and 75% in the second. Even controlling for other factors, the econometric analysis show that these states were the ones that most supported Lula in 2006. A recent paper showed that the inequality in the labor market was already decreasing between 2001 and 2004 (IPEA, 2007, p. 14):

Presented estimations show an annual growth of 7.2% for the poorest 10%, even though the Brazilian income per capita declined 0.9% per year in the same period. Considering the average income of the poorest 50%, we observe that it increased 2.4% per year, while the average income of the richest 50% decreased 1.4% per year.

According to the same study, the most important cause of the inequality reduction occurred in the labor market. It was estimated that greater educational and spatial homogeneity, among other factors, would have been responsible for 42% of the decrease in the Gini Coefficient in the period. CTP would have been responsible for 10% of this reduction.

Still in what concerns the economic hypothesis, we decided to test the direct impact of state exports. The econometric methodology used in this paper does not allow us to test this possibility. We will evaluate a much simpler effect: the possibility that the exports boom, for being concentrated in some states, would have also had concentrated electoral effects. Taking 2003 as the reference year, Table III shows that the exports increase was quite scattered among the federative units.

There are data on exports on a municipal level. However, these data tend to present distortions. For example, municipalities in which there are oil refineries or petrochemical plants show very high values of exports and the data is misleading. It is also worth noticing that it was not possible to use state GDP data, since state-level data are only available up to 2004, and thus two key-years for our analysis would be overlooked. In this case, we have decided to adopt a different strategy. Instead of inserting variables referring to exports in the spatial regressions, we chose to compare the obtained values with the dummies¹⁰.

¹⁰ The reference geographic unit for the dummy is the state of Roraima. That is, all the values on the graph are related to the state effect relatively to that state.

On the Graphs 1 and 2, there are the effects of the state dummies¹¹ versus two proxies for the exports boom: the level of exports per capita by federative unit in 2006 and its growth rate between 2003 and 2006. We observed federative units such as Amapá, in which there were strong exports increases, and which, in fact, massively supported Lula. But the dummy for Amazonas had a similar positive effect, in spite of the low exports growth. In sum, both graphs show that no linear relation between the variables and, therefore, state dummies effects do not seem to be related to the exports boom¹².

The Graphs 1 and 2 lead us to believe that the possible effects of the exports on Lula's election did not occur at a state level. The relation seems to be more connected to Pessôa's thesis, that is, exports generated wage increases by impacting the price level.

5. Conclusions

What determined candidate Lula's re-election as president? The econometric analysis suggests that Lula's voting was inversely related to municipal income per capita and directly related to child mortality, illiteracy and inequality. The distance to the state capital was not statistically significant. Despite the radical change in the spatial pattern of Lula's electorate, his voting in 2002, with due controls, appeared to be related to his voting in 2006. It should be admitted one of the limitations of the present paper (and of other similar studies of PBF as well): no causal relationships were identified in the present spatial econometric analysis. Unfortunately, there were no instrument variables available that could solve the problems of endogeneity that may have plagued the results. Nevertheless, the Bolsa Família Programme showed some evidence of positive impact on the election, but the results did not appear to be robust. Even if it were significant, the value of the estimator would be much smaller than necessary to explain Lula's victory.

Among the groups of explanations presented by Hunter and Power (2007), the one that stresses the economic factors has the strongest data support. The inequality decrease and the income gains in the poorest sectors of the population seemed to be the determinants. As demonstrated by a study carried out by the Instituto de Pesquisa Econômica Aplicada (IPEA, 2007), there is a recent tendency of decrease in the inequality of income distribution, and lower strata would benefit the most from it. A great part of those gains did not directly result from policies carried out in Lula's first administration, but from structural and demographic changes through which the Brazilian economy has been going.

The income gains for the poor were preserved thanks to a very low inflation rate. More than that, it was shown that prices tended to be more stable for products related with the goods consumed by the poor and in the capitals of less developed states. Even though there are no evidences of direct effects of the exports boom on electoral results, this change in relative prices indicates that the mechanism suggested by Pessôa (Jornal Valor Econômico, 19 Jan. 2007) actually occurred. That is, the increase of exports elevated the real wages of the poorest through exchange rate mechanisms.

Further quantitative analysis is surely necessary to identify the precise mechanisms that have lead to Lula's upturn and re-election. However, his electoral success ceases to be such a challenging enigma if the explanations presented here are considered. It seems that voters returned their welfare gains with their votes, in Hunter and Power's words (2007). This gratitude, however, was not totally deserved. The structural, demographic and educational changes that smoothened income concentration were already in progress when Lula came to power and were intensified thanks to a thriving world economy. It is ironic that his electoral success is the result of economic policies that are antithetic to the historical left-wing

¹¹ That is, the antilog-1 of the estimators associated to the state dummies. These values are basically similar among the state models, and specification IV has been chosen as a reference for this section.

¹² The relation between state exports and the dummies has been tested and, again, there was no relation.

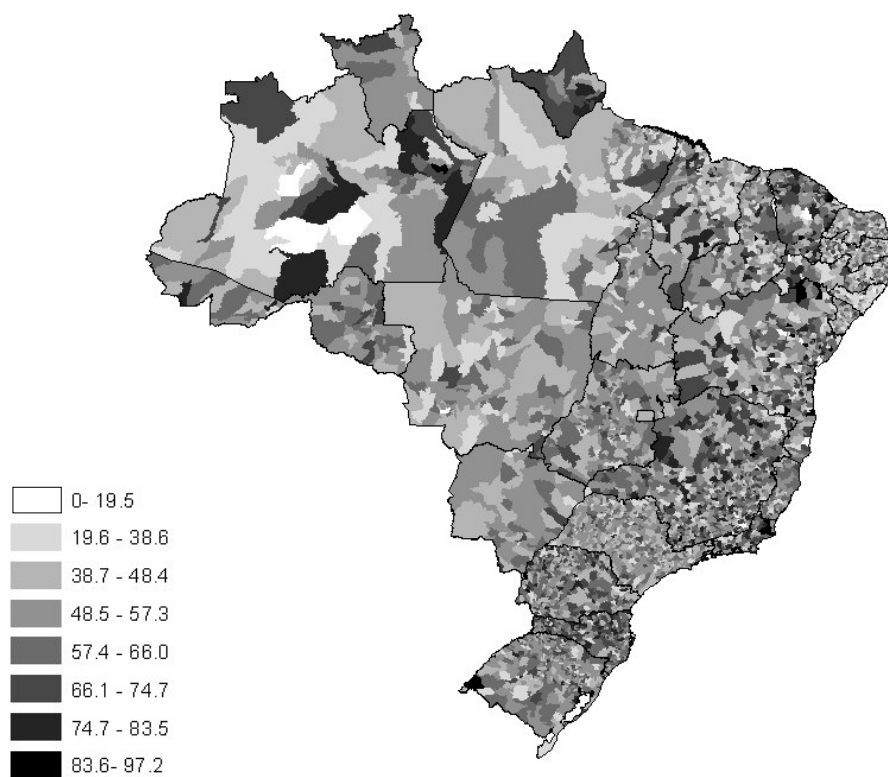
promises of the Workers Party. After all, it was the conservative monetary policy and the broader integration with the international economy that extended the gains of the poor and allowed an electoral victory in 2006.

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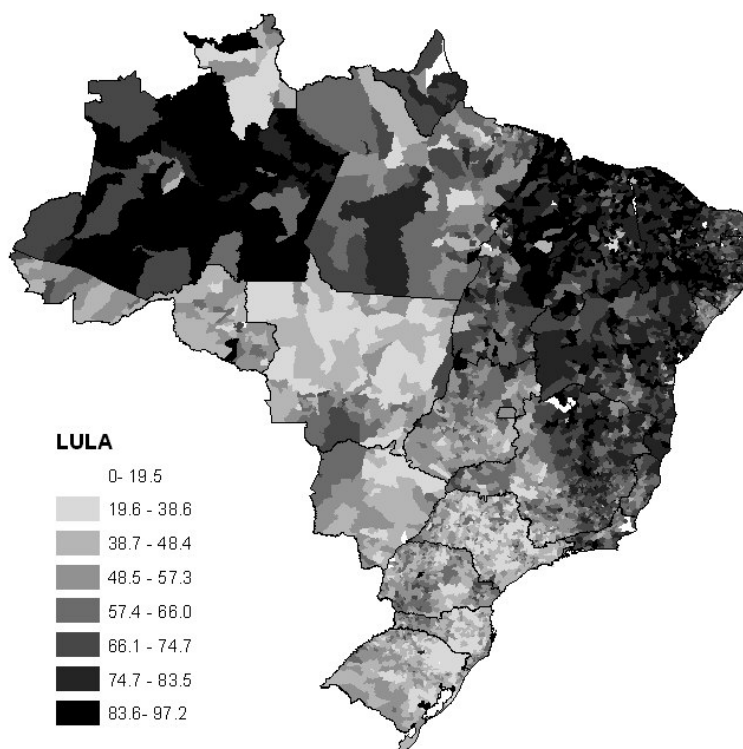
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Figure 1 – Percentage of valid votes for candidate Lula by municipality in 2002 and 2006 run-offs

2002 Elections

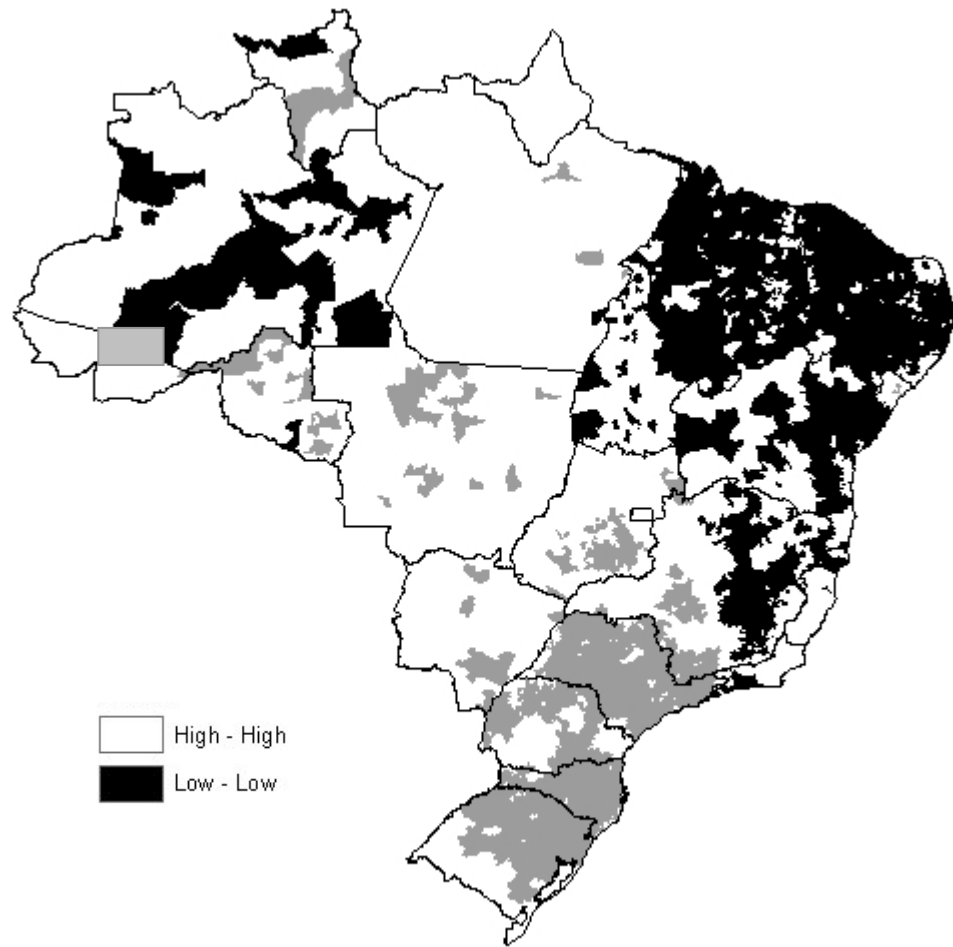


2006 Elections



Source: TSE (2006)

Figure 2 – Clusters with local Moran I significant at 99%, based on the percentage of votes for candidate Lula in the municipalities.



Source: calculations by the authors.

Table I – Determinants of candidate Lula’s voting percentage by municipality in 2006 (classic model)

	I
Constant	-0.043 (-0.658)
Distance	0.009 (0.017)
Inequality	0.124 (0.000)
Demographic density	0.050 (0.000)
Income per capita	-0.154 (0.000)
Child mortality	0.037 (0.000)
Illiteracy	0.024 (0.022)
Bolsa Família	0.066 (0.000)
Lula’s voting in 2002	0.018 (0.063)
LM (<i>lag</i>)	861 (0.000)
LM (error)	1948 (0.000)
R ²	0.677
F test	348
Log Likelihood	2005
Akaike Information Criterion	-3942
Schwarz Information Criterion	-3717

Source: Calculations by the authors.

Note: p values in parentheses. State dummies have been omitted.

Table II – Determinants of candidate Lula’s voting percentage by municipality in 2006 (spatial error model)

	II	III	IV
Constant	-0.448 (0.000)	-0,476 (0,000)	-0,488 (0,000)
Distance	-0.003 (0.656)	-0,002 (0,645)	-0,003 (0,655)
Inequality	0.041 (0.129)	0.075 (0.006)	0.063 (0.025)
Demographic density	0.039 (0.000)	0.039 (0.000)	0.038 (0.000)
Income per capita	-0.109 (0.000)	-0.130 (0.000)	-0.121 (0.00i0)
Child mortality	0.035 (0.047)	0.017 (0.021)	0.025 (0.053)
Illiteracy	0.053 (0.000)	0.069 (0.000)	0.069 (0.000)
Lula’s voting in 2002	0.023 (0.005)	0.023 (0.005)	0.022 (0.005)
Bolsa Família by Population	0.041 (0.000)		
Bolsa Família by Poor		0.012 (0.062)	
Bolsa Família by Indigents			-0.003 (0.549)
λ	0.643 (0.000)	0.650 (0.000)	0.649 (0.000)
Error <i>lag</i> LR	1240 (0.000)	1288 (0.000)	1278 (0.000)
R ²	0.759	0,758	0,757
Log Likelihood	2625	2608	2607
Akaike Information Criterion	-5182	-5149	-5146
Schwarz Information Criterion	-4957	-4924	-4921

Source: Calculations by the authors.

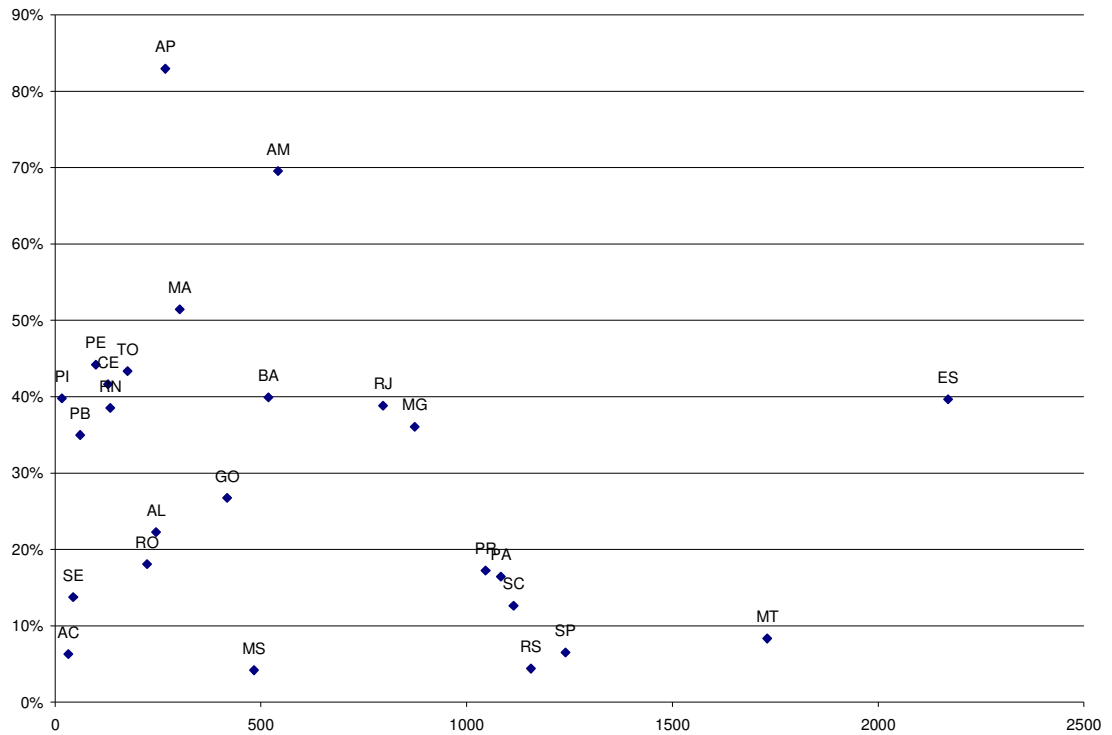
Note: p values in parentheses. State dummies have been omitted.

Table III – Brazilian exports by federative unit – 2003-2006 in millions of US dollars

UF	2003	2006	Growth Rate 2003- 2006
RONDONIA	98	308	215%
ACRE	5	18	233%
AMAZONAS	1300	1523	17%
RORAIMA	4	15	301%
PARA	2678	6708	151%
AMAPA	20	128	554%
TOCANTINS	46	204	347%
MARANHAO	740	1713	132%
PIAUI	59	47	-20%
CEARA	761	957	26%
RIO GRANDE DO NORTE	310	372	20%
PARAIBA	168	209	24%
PERNAMBUCO	411	780	90%
ALAGOAS	361	693	92%
SERGIPE	39	79	103%
BAHIA	3259	6772	108%
MINAS GERAIS	7434	15638	110%
ESPIRITO SANTO	3535	6720	90%
RIO DE JANEIRO	4844	11470	137%
SAO PAULO	23074	45930	99%
PARANA	7153	10002	40%
SANTA CATARINA	3696	5966	61%
RIO GRANDE DO SUL	8013	11774	47%
MATO GROSSO	2186	4333	98%
GOIAS	1102	2092	90%
DISTRITO FEDERAL	15	66	343%
MATO GROSSO DO SUL	498	1004	102%

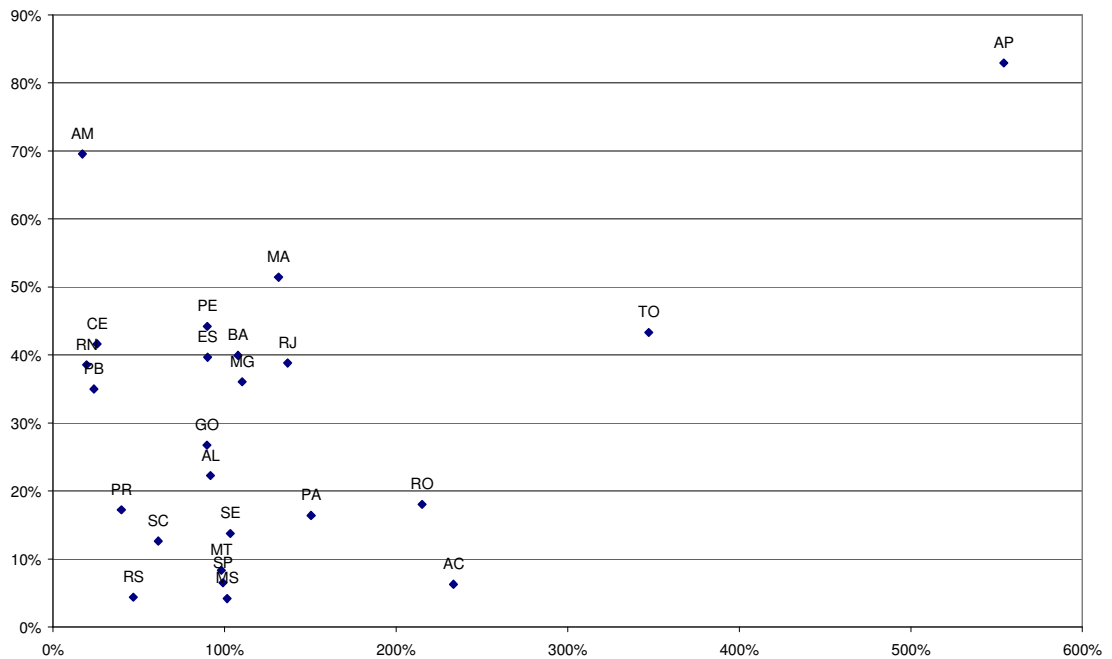
Source: calculations by the authors and Aliceweb (2007).

Graph 1 – Per capita Exports in US dollars, 2006, and the effect of the dummies on Lula’s voting



Source: calculations by the authors and Aliceweb (2007).

Graph 2 – Exports growth rate 2003-2006 and the effects of the dummies on Lula’s voting.



Source: calculations by the authors and Aliceweb (2007).