

Voting Patterns and Socio-Economic: A Twenty-Year Analysis of Brazil's Developmental Dynamics*

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February 12, 2024

*Code and data are available at: <https://github.com/groundUofT888/Term-Paper-2.git> ; Replication on Social Science Reproduction platform available at: <https://doi.org/10.48152/ssrp-qxvj-fz21>

Abstract

The paper replicates data to analyze economic indicators such as income per capita, the low-income rate, and the unemployment rate during two-round elections in Brazil, while considering the dropout rate as a main educational indicator and exploring the impact of electoral provisions on citizens, the country's economy, and society. We conduct secondary research on Brazil's economic and education data and find that politicians' campaign strategies influence voters in two-round electoral systems, further affecting the local economy and policy implementation.

We hope that by analyzing the Brazilian electoral system, we can provide new perspectives and ideas for studying the impact of the world's political electoral systems. We call for future investigations in this area to provide more information, and we also look forward to offering useful suggestions and inspirations for Brazil's social development and economic construction.

1 Introduction

In 2022, Brazil's presidential election broke new grounds with an unprecedented turnout of over 150 million voters, capturing the attention of national and international media. The world had seen not just about the political tactics of the candidates, but also the public's vested interest in how these elections could shape their day-to-day lives. This paper aims to study the influence of Brazil's electoral system on three critical socio-economic indicators: income level, unemployment rate and educational resources. With a comprehensive look at recent data and trends, we will investigate how the details of voting and representation create a chain reaction throughout the economy, affecting everything from job opportunities to the quality of education. By collecting together statistical analysis with real-world implications, we'll provide a clearer picture of the electoral system's impact on the Brazilian populace and discuss the broader implications of these findings on social equality and economic stability.

2 Background

2.1 Two-round elections in Brazil

Brazil's two-round electoral system is a relatively common electoral method. The mode of election is to select the winner after two votings. In the first-round voters can choose the candidate they support among multiple candidates. If one of the candidates gets more than half of the votes in the first round, then he can be directly elected. If no candidate receives more than half of the votes in the first round, a second round will take place. In the second round of voting, voters will choose between the two candidates who received the highest votes in the first round. Election regulations 1. Voters must be registered at least 151 days before the election. 2. Voting is compulsory for all literate Pakistani citizens between the ages of 18 and 69. 3. The election is held on the first Sunday in October.

2.2 Economic and social issues in Brazil

Major social and economic issues in Brazil. First, Brazil's poverty gap. There are many depressed areas in Brazil. Many people live below the poverty line and lack basic living conditions such as housing, education, medical care, and jobs. This leads to social instability. Second, the high crime rate. Some cities in Brazil have high crime rates and violence problems, such as robberies, gun proliferation, and drug trafficking. These problems mainly stem from poverty caused by uneven distribution of wealth and the deterioration of local security. Third, Brazil has high unemployment. The number of unemployed people is increasing in Brazil, and many structural unemployment results in high unemployment rates for a large number of low-skilled laborers. Also lower wages for many people worsen poverty and inequality. Fourth, there are issues with the education system. Brazil's education system has many problems, such as uneven education quality, uneven allocation of government funds for education, shortage of professors, and high dropout rates.

3 Data

3.1 Source

This paper replicates the survey data that was originally collected by Moya Chin, AMERICAN ECONOMIC JOURNAL: APPLIED ECONOMICS VOL. 15, NO. 3, JULY 2023 (pp. 183-209).

It uses data sets constructed from four data sources: - 1) Brazil municipal election data (Tribunal Superior Eleitoral, 1996-2016); - 2) Brazil demographic censuses (Instituto Brasileiro de Geografia e Estatística, 1980, 1991, 2000, 2010); - 3) Brazil school census (Ministério da Educação, 1997-2016); - 4) nighttime lights (National Oceanic and Atmospheric Administration, 1997-2016a,-)

R(R Core Team 2023) is the language and environment used for this analysis,supported by the robust features of Posit Cloud as our primary integrated development environment (IDE). Library includes `ggplot2`(Wickham 2016), `here`(Müller 2020).

Git(version 2.39.2) is used as version control.

3.2 Features

3.2.1 Data Sets Overview

Our comprehensive data collection provides a longitudinal perspective on the socio-economic and political landscape of Brazil, spanning from 1996 to 2016. This period covers six Brazilian electoral cycles, offering a unique vantage point for analyzing socio-economic fluctuations and trends through detailed indicators.

3.2.2 1. Election Dataset (`election_cleaned.csv`)

- Path: `outputs/edited_data/election_cleaned.csv`
- Description: Contains socio-economic indicators for Brazil, capturing fluctuations and trends across six electoral cycles from 1996 to 2016.

Table 1: Election Dataset Variables

Variable	Description
<code>cut_dist</code>	Geographical identifier for districts.
<code>elect_year</code>	Year of the election.
<code>inc_post</code>	Per capita income post-election.
<code>inc_0_50_post</code>	Income for the bottom 50% post-election.
<code>edu_univ</code>	Educational attainment/resources.
<code>unempl_post</code>	Post-election unemployment rates.
<code>tse_code</code>	Electoral zones/districts identifier.

3.2.3 2. Schools Dataset (`schools.csv`)

- Path: `outputs/edited_data/schools.csv`
- Description: Offers insights into Brazil's socio-economic and political landscape through educational and economic measures.

Table 2: Schools Dataset Variables

Variable	Description
<code>ibge7_code</code>	Geographic identifier (7-digit IBGE code).
<code>cut_dist</code>	Geographical identifier for districts.
<code>pop_den_pre</code>	Pre-election population density.
<code>dep_pca_ptile_mean</code>	Mean dependency ratio across percentiles.
<code>MAT_DROP_mean</code>	Mean drop-out rate in schools.

4 Result

The sample size, comprising 33,188 observations, was determined to ensure representativeness and statistical validity. The dataset encompasses 5,567 data points per election year, reflecting a robust cross-section of Brazil's population and socio-economic conditions during the study period.

4.1 Income per Capita

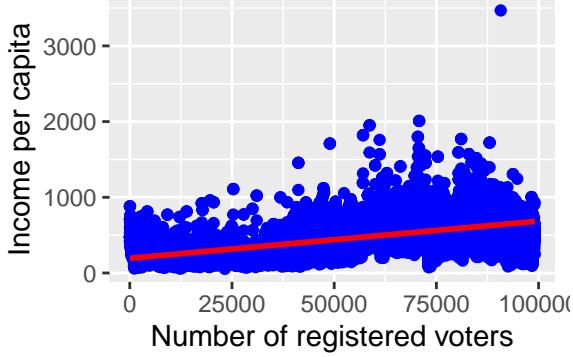


Figure 1: Income per capita

For the above Figure 1, from 1996 to 2016, the trend line indicates a slight positive correlation between the number of registered voters and income per capita. This could suggest that in areas with more registered voters, there may be a slightly higher income per capita.

4.2 Low Income Rate

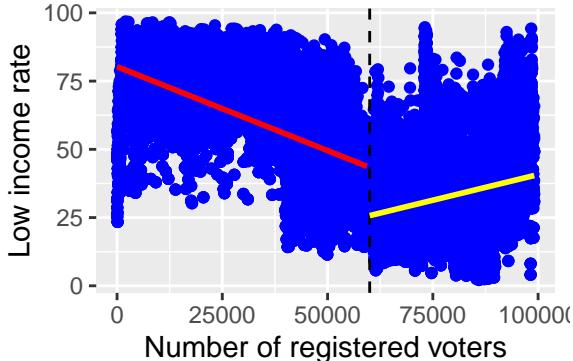


Figure 2: Low income rate

We defined the lowest 50% income as low income. The plot Figure 2 appears to show a slight negative correlation, as indicated by the downward trend line. This suggests that as the number of registered voters increases, the low-income rate decreases slightly. However, the wide spread of the data points indicates that many other factors likely influence the low-income rate beyond just the number of registered voters.

4.3 Unemployment rate

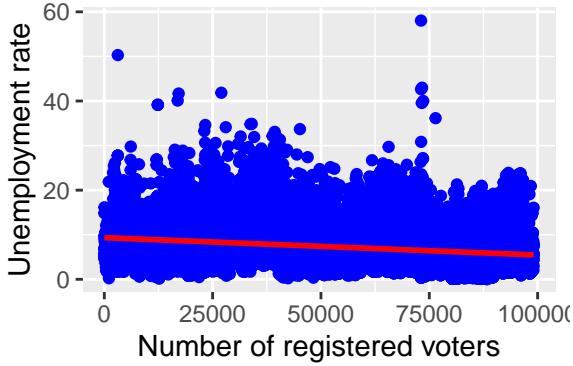


Figure 3: Unemployment rate

Analyzing the Figure 3, there are noticeable differences. The plot shows a vast spread of unemployment rates across varying numbers of registered voters, with a trend line that remains relatively flat. This suggests there isn't a strong or clear correlation between the number of registered voters and the unemployment rate within the represented data set.

4.4 Educational Resources

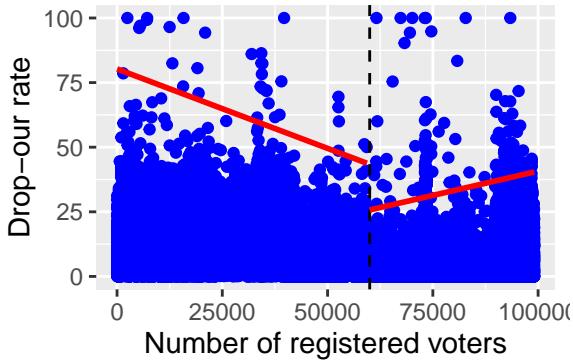


Figure 4: education

Analyzing the plot presented in Figure 4, titled “Educational Resources,” we see a substantial variation in dropout rates across a range of registered voter numbers. The dual trend lines, both descending, suggest that areas with more registered voters tend to have lower dropout rates, yet the change in the slope at around the 50,000 voter mark could imply different dynamics in larger districts. Despite the overall negative correlation, the broad spread of the data points, especially in regions with fewer voters, indicates that voter numbers alone may not be a definitive predictor of dropout rates. The relationship is not uniform across the dataset, highlighting the complexity of factors that influence educational outcomes.

4.5 Overview

Distribution of Economic Indicators

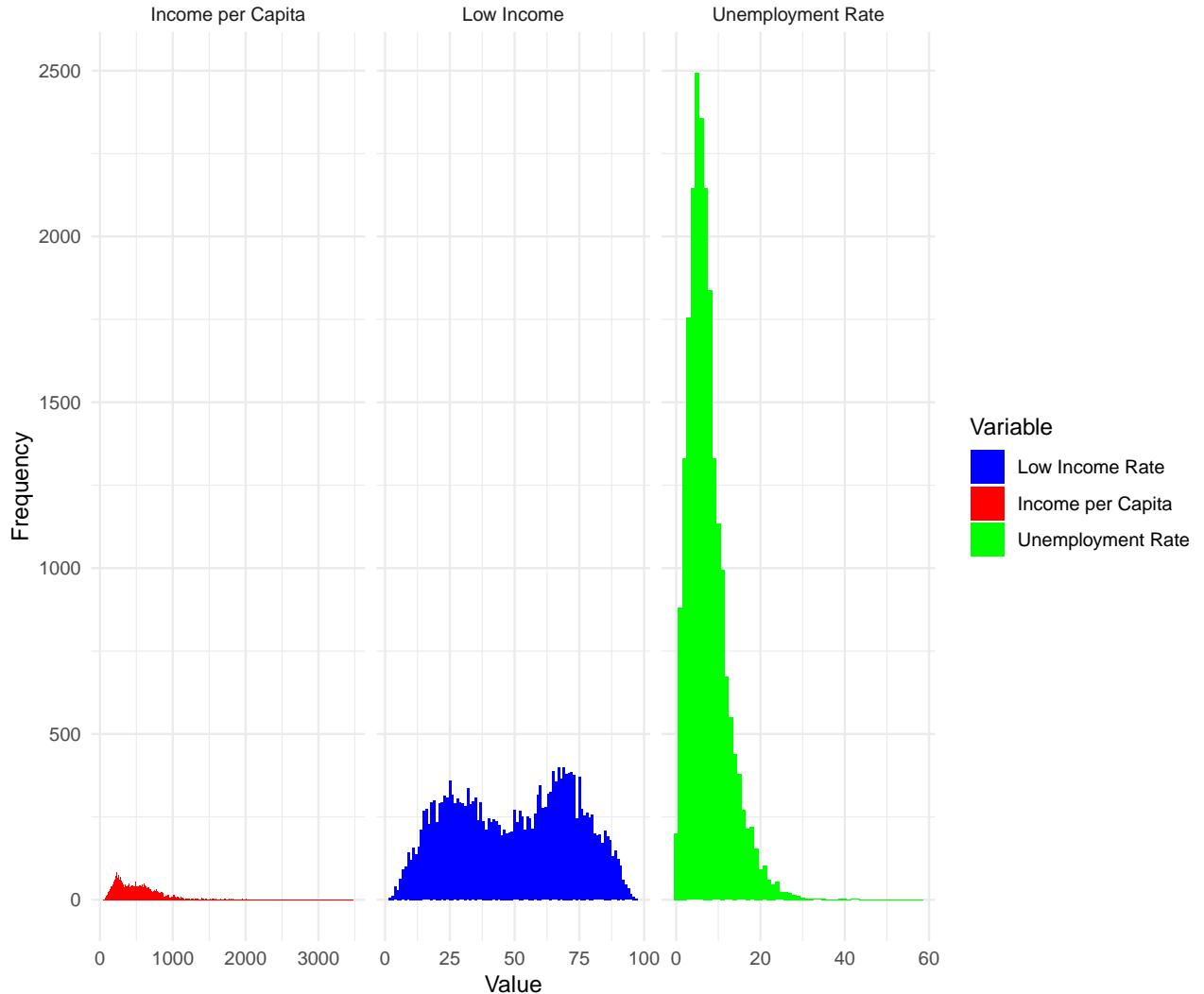


Figure 5: overview histogram

Analyzing the histogram in Figure 5, we see distinct distributions for three key economic indicators. The Income per Capita is broadly spread, suggesting varied economic conditions. In contrast, the Low Income Rate displays a bimodal distribution, hinting at two prevalent income groups within the population. The Unemployment Rate is predominantly concentrated around a lower value but with a long tail toward higher rates, indicating that most of the population experiences lower unemployment, with fewer instances of high unemployment. This visual representation underscores the complexity of economic health and inequality within the dataset.

5 Discussion

5.1 Findings

Our examination of the data presented by Moya Chin through a regression discontinuity design yields nuanced insights into the effects of Brazil's electoral system on socio-economic variables. We delineate two primary findings from our analysis:

- **Electoral Influence on Economic Conditions:** Contrary to the initial reading of the data, the two-round elections in Brazil do not show a definitive positive impact on the broader downstream economy within the period studied. While there is an observable increase in per capita income and a decrease in the number of low-income individuals during election periods, these trends are not statistically significant when considering the larger socio-economic context. The data suggests that any changes in income levels and unemployment rates associated with the electoral process are subtle and may require a more extended period to be fully realized and understood.
- **Campaign Strategies and Voter Demographics:** Our findings align with the hypothesis that candidates during elections strategically target demographics that are most likely to influence the outcome, specifically low-income individuals and those with lower educational attainment. This is reflected in the allocation of resources, such as improvements in school infrastructure and public education facilities, which are more likely to directly benefit these groups. While this approach does translate into immediate educational gains, such as reduced dropout rates and increased literacy rates, it is less clear how these short-term improvements translate into long-term socio-economic development.

From Moya Chin's work, it is evident that the behavior of politicians during election campaigns has a tangible impact on the distribution of public resources, which can shift dramatically post-election. While two-round elections may encourage candidates to commit more resources to public education and economic support, this study finds that the long-term economic effects, such as sustained increases in income or reductions in unemployment, are not as immediate or discernible within the data.

Additionally, the presence of political tactics aimed at low-income voters suggests a complex interplay between electoral strategies and voter demographics. Despite the potential short-term benefits to public education and economic assistance that may arise from two-round elections, our analysis indicates that addressing Brazil's economic and social challenges will likely require a more extended and multifaceted approach.

As the conclusion, while the electoral system does have some influence on socio-economic outcomes, the extent and durability of these effects are contingent on a variety of factors and warrant further, longitudinal study to fully comprehend their scope and longevity.

5.2 Ethical Implications

The datasets and original sources used in their paper come from Brazil demographic censuses and Brazil school census. Demography refers to summarizing the demographic characteristics of a community, such as gender, age, race, education level, socioeconomic status, etc. Ethical issues may arise if used improperly during the collection, analysis, interpretation, and dissemination of demographic data.

Demographics impact minority communities, which can lead to structural inequalities. When analyzing demographic variables, the author selected specific variables for analysis based on his research questions and hypotheses. However, these highly characteristic data will have a negative impact on some social groups. For example, high income, low income, dropout rate, etc. This may reinforce social hierarchies in which social groups are compared, exacerbating prejudice and stereotypes and causing harm to minority populations. In the paper, the author compares the interest of high-income people and low-income people in voting. This may cause certain social conflicts and encourage the idea of inequality among different groups. When explaining differences between social groups in the conclusion of the author's paper, it can lead to increased social conflict.

5.3 Accounting for Bias

In the paper, Moya Chin proposes a stylized model that explores the motivations of politicians to appeal to a wider range of voters in elections and to provide public goods in different ways. The author uses this model to observe the Economic Consequences of Electoral Rules in Brazil. The data used by the author mainly comes from Brazil demographic censuses, Brazil school Census, and Brazil municipal election data. Bias can occur when collecting quantitative and qualitative data.

The problem with these data sets and original sources is that the variables used by the authors to construct the equipment index come from the Brazilian School Census and the Brazilian demographic censuses. Considering Brazil's national conditions and the government's influence on the region, Response Bias may exist in the data set of Brazil demographic censuses. Census respondents may choose not to participate in the census or provide inaccurate information because of privacy concerns or distrust of the government. The school census data comes from students in schools. Considering the lack of educational resources in poor areas of Brazil, there will be a sampling frame bias. The earliest census data used by the author is from 1980. At that time, in some remote or poor areas, it may be more difficult for enumerators to reach or collect data due to lack of infrastructure and information technology. This may lead to underestimation or inaccurate population data in these areas, and the sample may not be representative of the characteristics of the entire population.

5.4 Limitations

Our analysis is based on a data set from the Moya Chin literature, so most of our analysis is limited to the original survey situation.

Because the data are not comprehensive enough, we cannot compare with many variables in the original data, such as whether political intervention and media propaganda affect voters' thoughts and voting results. Excessive propaganda of policies and political interference are suspected of manipulating voters and leading to distorted election results. Also the political contributions a politician receives during an election can influence the outcome of the election.

The model created by Moya Chin cannot be fully applied during our analysis, which results in our analysis not being as complete as Moya Chin described. So we have to give up some variables.

5.5 Future Research

We believe that this research direction can receive more investment in the future. We hope that the relationship between electoral systems, education, and socioeconomic outcomes can be further explored in the future. We hope to observe and predict the impacts of elections over the long term to fully understand the impact of the electoral system on economic indicators, and to reveal the possible long-term effects of changes in the electoral system.

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