

Correlating Public Debt and Development in Brazil: A Theoretical-Empirical Analysis for the Public Administration (2003-2023)

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1. INTRODUCTION

1.1 Statement of the problem

Over the years, the federal public debts of countries worldwide have been questioned. Reflected on public administration, two lines of thought have divided this debate since the 1970s, creating two policy branches and considerations on the public debt, and the role of the State (Schramm *et al.*, 2018).

Brazil had a General Government's Gross Debt stock of over R\$8,1 trillion in 2023, 74,3% of its GDP (BNDES, 2024; Central Bank, 2024), and a Public Sector Net Debt of R\$6,6 trillion, around 60,8% of the GDP (BNDES, 2024). The orthodox economic line claims that public debt harms the State's development capability, alleging that austerity measures are required when the government's expenditure level surpasses the level of tax collection in order to achieve budget balance (Alesina, 2012). On the other side, a heterodox perception claims that the public debt is a legit State financing mechanism (Deos & Ultramare, 2022), and especially in times of recession or crisis, financial injection in the economy powered by government borrowing, guarantees its primary (mandatory and discretionary) expenses, and boosts families' expenses, consequently increasing tax collection based on consumption - as observed in the period of economic and sanitary crisis of the Covid-19 virus (Ponte & Benegas, 2021).

These economic lines of thought have influenced different policy branches in the Brazilian public administration, sometimes applying austerity measures influenced by the orthodox line and sometimes inducing a higher level of public spending under the influence of the heterodox line. These different paths have brought different results to the national development in Brazil, pointing to a correlation between both economic theories and the different paths that public managers can take to act in the public interest.

The Modern Monetary Theory is a segment of the heterodox field that has delved deeply into themes like employment, currency, government, fiscal and monetary policies, inflation, economic development, and others, which complements the debate brought in this article and will serve as theoretical grounds for explaining the statistical results observed in targeting the research problem.

1.2 Research Objectives

This study aimed to understand how public debt and other development variables in Brazil are associated through Pearson Correlation testing, Simple and Multiple Linear Regression, also using MMT and heterodox economics as theoretical grounds. Through literature appreciation and statistical testing, the present work aimed to verify whether the public debt Brazil held from 2003 to 2023 served as an impeding factor for its development, an inducing factor, or neither.

As the literature states that the year 2014 had a policy alteration that brought several impacts on the economic performance, the analysis is complemented with a subset time series from 2003 to 2014 in order to observe results without the policy alteration implemented from 2014 onward.

3. THEORETICAL FOUNDATIONS

The State has as its major functionality the pursuit of the common good. With political centralization, the State employs norms and regulates the economy being present in the legislative, the judiciary, the police power exercise, and in the provision of public services (Nunes, 2010). Embodying this normative and regulatory nature, Sousa (2024) ratifies that the State will act in monitoring, incentivizing, and planning, being determinant in the public sector and recommended to the private sector.

Over time, the entity has encompassed neutral and non-neutral aspects. It had a neutral nature under a liberal horizon, with limited action in the economy, meeting only fiscal responsibilities, and counting on the private sector as the motor of economic activity. And had a non-neutral characteristic when inclined to interventionism, whether in a capitalist or socialist ruling, also having functional dimensions for its finance, for example (Nunes, 2010; Sousa, 2024).

According to Oliveira & Gennari (2009), the theorists of Classical Economics, based on liberal thought affirmed that State intervention in the production and distribution of wealth should cease, protectionist measures should be revoked, and free competition ought to prevail, the basis for liberalism. Adam Smith, for instance, justified such measures with what he believed to be an autoregulating “natural” mechanism in society, combined with the notion of collective success based on individual accomplishments. It is the “invisible hand” that balances individual and social interests. As affirmed by Blyth (2013: 103) and Oliveira & Gennari (2009). Smith, however, was not against the existence of the State; he understood it held a specific importance (the role of enforcing justice, for example). He believed that the State must hold restricted action, for example, only sustaining legal grounds for the market to fulfill itself, pursuing liberty, and maximizing individual benefits (Sousa, 2024).

David Ricardo, another Classical economist, made his contributions rely on the self-regulation of the markets under no intervention of the State. However, Ricardo believed that the State was needed for times when such mechanisms of self-regulation failed. Ricardo understood that the benefits of accumulation were not distributed but concentrated and uneven, therefore, Ricardo attested that the State must ensure the survival of the capitalist mode of production (Oliveira & Strassburg, 2013).

Different from Classical liberalism, Keynesianism was a line of thought that contributed to the Welfare State model. The Keynesian contributions addressed the capitalist crises (Wang *et al.*, 2008). Keynes strongly favored the State as an inducer of investment and creator of employment in society (Elias & Bezerra, 2019; Sousa, 2024). He criticized the self-regulated economy theory and advocated for State intervention. However, he was not a Marxist nor defended a planned economy (Elias & Bezerra, 2019).

Keynesianism was also a theory in favor of the maintenance of the capitalist system, placing on the State the role of keeping it operating by tackling its contradictions. Instead of revolutionizing the system structures, Keynesianism sought to explain the “monetarist economy” (denying self-regulation/self-balanced postulates) and employ policies that avoided cyclical fluctuations in the levels of product and employment (Oliveira & Gennari, 2009: 244-245).

The debate regarding the function of the State is crucial for the hypothesis aimed at in this article, as it connects to the distinct lines of perception of the State that influenced the managerial lines of the public administration in Brazil's recent experience. When the object of argument is the State, whether in academia, electoral processes, or on the news, the debate has surrounded a clear distinction between interventionism vs. liberalism, and State-ownership vs. Privatization, as stated by Mollo (1990).

In Brazil, such discrimination employed two branches of policy in public administration, one being austerity, influenced by orthodox economics (Alesina, 2010; Arellano & Bai, 2017; Alesina *et al.*, 2019: 3, Anzoategui, 2019) and the use or expansion of government expenditure influenced by heterodox economics (ascertained in Aschauer 1990, Krugman, 2010, 2012; Huang, 2020; Tymoigne, 2021; Wray, 2021; Wray & Nersisyan, 2021; Souza, 2023).

Austerity can be characterized as a political framework wherein the State seeks to reduce its expenditure as a means of addressing fiscal challenges (Blyth, 2013: 14). Rossi & Mello (2017) describe austerity as a regressive shock; financial liberalization, the curtailment of public expenses, and the reduction of the size of the State. According to Bramall *et al.* (2016), the cut in public expenses is a common or major criterion to define austerity. Konzelmann (2012) and Alesina *et al.* (2019) state that austerity measures aim to reduce a country's deficit, usually by combining public expenditure reductions and tax increases. When Farnsworth & Irving (2018) define austerity, they give special attention to what they call "a neoliberal dream", determined by the desire to reduce the scope of the social welfare state, loosen labor market regulations and highlight private sector-driven growth, thereby modifying the relationship between capital interests, public needs and the State's function. It had a strong foundation in the Quantitative Theory of Money.

As for the line of thought that upheld the government expenditure as an inducement for development, the policies had strong grounds from Keynesian and post-Keynesian postulates. Following the Modern Monetary Theory postulates, a State that issues its currency holds monetary sovereignty and has the capacity and responsibility to intervene in the economy in order to accomplish social and economic improvement. The State investment is what determines an increase in the aggregate demand, e.g, employment, a consequence of the multiplier effect of the investment (Keynes, 1937; Oliveira & Gennari, 2009: 264).

Public administration is the organization of people and resources to execute government goals, public affairs, and policies (Zia & Khan, 2014). It is a political means (Alford, 1993; Shafritz *et al.*, 2017), and has people at its core, whether being assisted by it or participating in its processes (Olsen, 2004). Shafritz *et al.* (2017) affirm that public administration inherently means attending to the public interest. The discussion of the nature of the public debt, the implications of government expenses on development, and the country's institutional thresholds brings to light that, depending on the model of economic development and the indebtedness format, the State can have different outcomes.

External debt was noticed to be harmful to the country's performance (Cruz, 1984; Pfluck, 2016; Santana, 2003; Silva, 2017; Zini, 1990), once, due to international factors the Brazilian debt levels kept increasing. The interest payments on the debt are the real negative component of holding domestic debt (Dornelas, 2019). Beyond debt nature, the debt composition was also remarkable to the development outcomes the country faced. As observed in literature, the shift from allocating investment in social programs and infrastructure to allocating to fiscal waivers, exposes that the public debt applied can have distinct results, not being a natural boundary to development. Brazil exhibited strong monetary sovereignty to address its issues in crises and other moments, however, bureaucratic mechanisms and political interest articulations are thresholds to effectiveness in the

policy-making process in Brazil.

4. Methodology

The research is quantitative, with descriptive and inferential methods of analysis. The data consists of seven variables related to Brazilian economic development and spans the period from 2003 to 2023. Data collection was performed from public databases from Brazilian research institutions, and data analysis was executed following descriptive and inferential methods. Inferential analyses were conducted using the statistics software named “R/R Studio”. The tests executed were the Pearson correlation testing (r), Simple Linear Regression, and Multiple Linear Regression, precisely contextualized by Draper and Smith (1998).

The data were:

- a) the Public Sector Net Debt and Gross Domestic Product numbers in Brazil from 2003 to 2023, extracted from the IBGE;
- b) the government’s primary result numbers from 2003 to 2023, retrieved from the IBGE;
- c) the rate of real increase in the minimum wage from 2003 to 2023, consulted in DIEESE databases.
- d) the unemployment rate in the country from 2003 to 2023, retrieved from IPEA;
- e) the investment rate (Gross Fixed Capital Formation - GFCF) in the country from 2003 to 2023, retrieved from the IBGE and IPEA;
- f) Human Development Index - HDI of Brazil using the UN Human Development Report annually published.

Bibliographical research served to gather contributions from Modern Monetary Theory and heterodox economics on the topics covered in the research, such as public debt, GDP, employment, primary results, investment, and minimum wage, among others. This method provided this research with a qualified analysis of the quantitative data.

The choice for the period between 2003 and 2023 is explained by this period encompassing periods of primary surpluses and primary deficits, increases in public debt and GDP, and periods of global economic and sanitary crises, which enrich the research analysis based on different scenarios and measures taken parting from public administration. This period consists of Brazil becoming a global leading economy, and having left the UN Map Of Hunger, as well, for example (Freitas & Pena, 2020). The government’s attitude and measures toward the COVID-19 pandemic were crucial to the object of study of this article. Furthermore, the present work sought to be reasonably updated, reaching 2023 as the final year of analysis.

The data analysis was grounded on two processes that built a complementary approach to understanding how public debt and other variables from the economic development experience in Brazil are associated.

The processes were:

- i. description of variables' behavior in the period;
- ii. statistical analysis of association - Simple correlation (r), Pearson test; and effect - Simple and Multiple Linear Regression test;

As pointed out by Draper and Smith (1998), the Pearson correlation coefficient (r) is

used to measure the strength and direction of a linear relationship between two variables. The equation of the coefficient is as depicted below:

$$r_{UW} = \frac{\sum_{i=1}^n (U_i - \bar{U})(W_i - \bar{W})}{\{\sum_{i=1}^n (U_i - \bar{U})^2\}^{1/2} \{\sum_{i=1}^n (W_i - \bar{W})^2\}^{1/2}}$$

where:

U_i and W_i represent the values of variables, and
 \bar{U} and \bar{W} represent the average of variables.

with:

$r = (1)$, indicating a perfect linear positive correlation;
 $r = (-1)$, indicating a perfect linear negative correlation;
 $r = (0)$, indicating an inexistent linear correlation.

Tests were conducted evaluating correlations between each variable to all seven variables. The first time series spanned the years from 2003 to 2023. A second time series was used to analyze the same tests when not including values from variables after what was called in this article as “orthodox inflection”, a great change in the variables due to policy alteration starting in 2014. Hence, the second series covers the years from 2003 to 2014. Such tests were conducted using R software (R Core Team, 2024). The crude values for each variable are found in the Appendix section, alongside charts that depict the graphic demonstration of associations between variables from both time series.

Simple Linear Regression was applied to model the relationship between one dependent, and one independent variable. Its equation is described as follows:

$$Y = \beta_0 + \beta_1 X + \epsilon.$$

where:

(Y) represents the dependent variable;
(X) represents the independent variable;
(β_0) is the intercept;
(β_1) is the angular coefficient (which represents the alteration in the dependent variable to every unit of change in the independent variable; and
(ϵ) is the random error term.

The analysis consisted of evaluating the p -value, which represents the quantification of evidence against the null hypothesis. As the null hypothesis equals zero, affirming the relationship between variables is insignificant; the p -value shows the existence or nonexistence of the relation.

With a p -value inferior to the chosen significance level (p -value $< 0,05$, usually), the null hypothesis is rejected, indicating a significant relationship. If the contrary is perceived, the variable may not influence the dependent variable. The (β_1) values were interpreted as the amount of alteration to every modification of *one* unit in the independent variable.

The Adjusted R-squared is also employed to adjust the number of predictors in the model, providing an accurate measure of model fit. Adjusted R-squared penalizes the addition of irrelevant variables/predictors. It may decrease the quality of the model.

Multiple Linear Regression was employed to investigate how several independent variables influence the dependent variable simultaneously. The equation is demonstrated below:

$$Y = \beta_0 + \beta_1 X + \beta_{11} X^2 + \epsilon.$$

where:

(Y) represents the dependent variable;

(X_1, X_2, \dots, X_p) represent the independent variables

(β_0) is the intercept;

($\beta_1, \beta_2, \dots, \beta_p$) are the coefficients of independent variables; and

(ϵ) is the random error term.

Such analysis is determinant to grasp how multiple independent variables can be applied to predict the value of a dependent variable.

The interpretation methods took the following steps:

i. ascertaining the existence of a significant association between variables in the first test, with both time series;

ii. establishing linear regressions, using the p -value to determine statistical significance, and the β_1 value to determine the causal relation between variables;

5. RESULTS ANALYSIS

The section below approaches a descriptive analysis of the variables behavior over the years, and empower the debate with the Pearson correlation tests, the simple and multiple Linear Regressions results, determining the empirical relationship between variables in the period evaluated, and the association and cause effect of public debt on GDP, Primary Results, Minimum Wage Real Increase Rate, Unemployment rate, Investment rate, and HDI.

a) Gross Domestic Product

From 2003 to 2023, Brazil's economic output rose significantly, boosted by household consumption, public investment, and favorable international conditions such as the commodity boom. The period from 2003 to 2014 was marked by substantial growth and social gains (Trovao, 2020), but from 2015 onwards, under austerity policies, Brazil experienced economic deterioration (Paula & Pires, 2017). The highest GDP growth rate was in 2010 (7,5%), after Brazil employed fiscal efforts to mitigate the 2008 global crisis by boosting the productive sector with fiscal waivers (Moreira, 2014; Basso-Silva; Mascarin, 2017). The lowest GDP growth rates were negative (recession, in 2015 (-3,5), 2016, and 2020 (-3,3 both)).

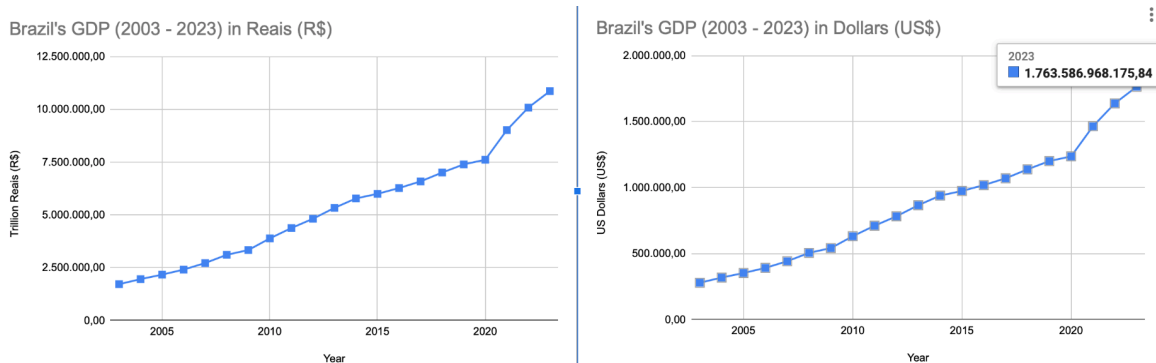
Statistical analysis from both time series shows that Public debt and GDP had a positive association. The first time series shows an '*r*' coefficient of +0.955, and a *p*-value of 1.756e-11 (*p* < 0,05), and the second one shows an '*r*' coefficient of 0.9810885, and a *p*-value of 1.846e-08 (*p* < 0,05). The simple linear regressions depicted a '*β*1' value of 1.478e+00 '***', and a *p*-value of 1.756e-11 (*p* < 0,05) for the first series, and a '*β*1' value of 4.572e+00, *p*-value of 1.846e-08 (*p* < 0,05) for the second time series. As for multiple linear regressions, the values of both time series showed a significant influence of HDI on GDP.

Such results reinforce that strategic debt use enhances economic performance once it is strategically used towards inclusive and productive models of development. It's crucial to tie the discussion of the composition of expenditure to analysing the quality of the effect on development. The negative rates perceived in 2015 were determined by the pull-down from the industry and services sectors (Paula & Pires, 2017). In 2014 President Dilma Rousseff and her government attempted to induce the private sector to lead growth, reducing public investment and endorsing fiscal waivers and subsidies to the industrial sector. Private investment, however, was not enough to have a positive impact on the aggregate demand (Paula & Pires, 2017; Chernavsky *et al.*, 2020). The productive structure was also impacted by the increase in imports for the transformation industry, such as industry inputs. Another initiative employed was the contraction of the Selic interest rate, which reached 7,5% in 2012 (Rossi & Mello, 2017).

Before 2014, the period presented expenditure levels being below the State's revenue. In 2014, this changed. Following the comprehension of Chernavsky *et al.* (2020), the public expenditure levels were not the cause of the economic recession or fiscal complications as claimed by orthodox analysts and authors, but the alteration of the composition of expenditure and reduction in tax revenues. What was once directed to social programs and public investment later addressed subsidies and tax incentives to sectors that did not bring improvement to the economic situation. Essential for such comprehension is also the multiplier effect at the time, which pragmatically ratifies the hypothesis of the expenditure composition. When calculating the outcomes of the elements on economic growth, social programs and investment are the major expressive components.

Source: Brazilian Institute of Geography and Statistics

Figure 4-1: Brazil's Gross Domestic Product (2003-2023) in Reais (R\$) and Dollars (US\$).



b) Public Sector Net Debt

The behavior of the Brazilian domestic Public Debt importantly contributes to the international debate regarding debt sustainability and the limitations or conditionalities for economic development.

In 2003 Public Debt values were R\$ 932 billion (54,26% of GDP). In 2010 it reached R\$ 1,47 trillion. Although a larger amount, it significantly represented 37,98% of GDP, only, as the economic output demonstrated to grow in expressive amounts compared to the indebtedness.

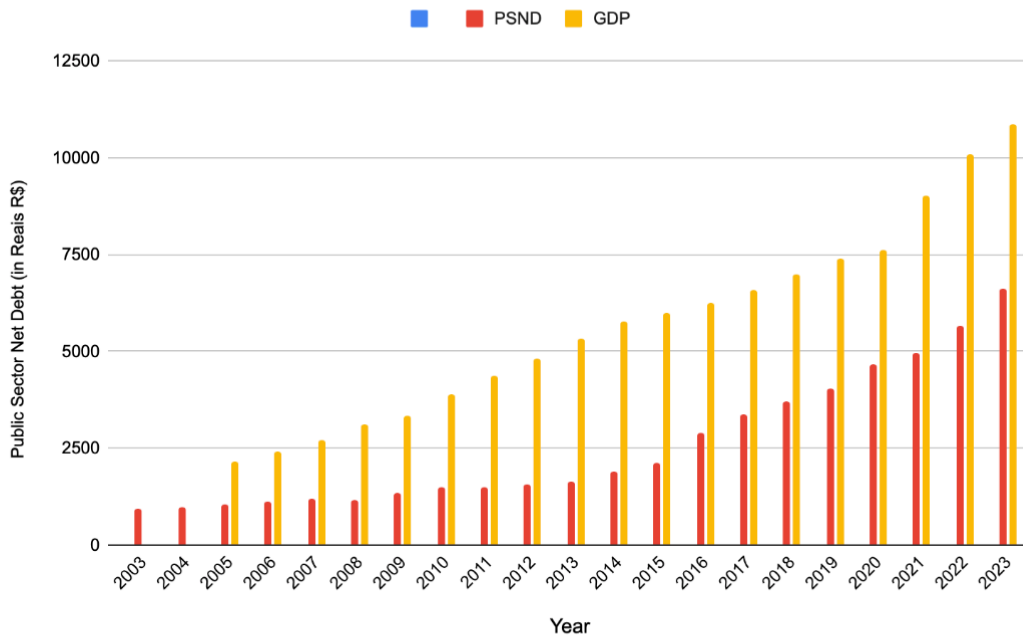
In the year of the orthodox inclination, the debt amounted R\$ 1,88 trillion (around 32,59% of GDP), depicting elevations in the following years. The Debt-GDP ratio went from 35,64% in 2015 to 54,7% in 2019, closing the series analyzed with 56,13% in 2022, and 60,43% in 2023.

The period with favorable national and international scenarios enabled the government to reduce its financial liabilities. The year 2013 represented the moment with the lowest Debt-GDP ratio, with 30,50%. Such a level, as claimed by Law *et al.*, (2021) is below the threshold of a good sustainability level of Debt compared to GDP. It was accomplished with the payment of debt interest payments and continuous economic expansion, which made debt a manageable process.

In 2015, however, with the economic deterioration powered by the end of the Commodities boom, and the alteration of the composition of domestic expenditure, the State's revenue was damaged. With a high Selic basic interest rate, the interest payments of the debt were massively augmented. During Lula's government, the basic interest rate followed a decreasing trend, although kept high (Corsi, 2016), with good primary results, and leveraging social indicators of the population. In 2015, however, the basic interest rate was elevated and brought in 2016, 2017, and 2018 debt levels that reached respectively 46,14%, 51,37%, and 52,77% of GDP.

The public sector net debt kept its levels of elevation until 2023, during the third mandate of the Workers' Party, under the Lula presidency, due to the increase of the Selic basic interest rate. As the debt interest payments are executed according to Selic, the neoliberal policy of the Central bank (which holds autonomy from the government) kept the public expenses directed to paying large amounts of market speculators (Noronha, 2019).

Brazil's Public Sector Net Debt (2003 - 2023) in Reais (R\$)



Source: Brazilian Institute of Geography and Statistics

Figure 4-4: Brazil's Public Sector Net Debt (2003-2023) in Reais (R\$)

c) Primary Results

Primary results increased significantly from 2003 to 2014, with the revenue always surpassing the expenditure levels. In 2015, however, this trend was reversed due to austerity policies (Rossi & Mello, 2017; Dweck *et al.*, 2018; Deos *et al.*, 2021).

In the first ten years of the analyzed period, Brazil faced positive balances between its expenditure and its revenue, excluding the payment of debt interest. National and international conditions, such as the maintenance of an orthodox macro policy to uphold credibility and sustain governability, and the commodities price boom combined, leveraged Brazil's financial sustainability (Conti, 2007; Paula & Pires, 2017). Such positive results were substantial in reducing the public debt (compared to the output), expanding household consumption and the GDP, and tackling social inequality. In 2014, with the ineffectiveness of governmental efforts towards strengthening the effect of private investment on GDP, and the neoliberal inflection from that year on, primary results deteriorated. The year marked the enforcement of austerity measures to diminish the fiscal deficit and revitalize the economy, with emphasis on the constant elevation of the Selic interest rate.

During the following years, primary results did not show improvement. Under Michel Temer's presidency starting in 2017, austerity policies were drastically expanded, regressing several economic indicators. The government and the media strongly endorsed the idea that Brazil "was broken", meaning that it couldn't meet its obligations and, in pursuing to tackle such an issue, fiscal constraints were employed. Impactful measures were adopted, such as the implementation of a spending cap, with Constitutional Amendment 95.

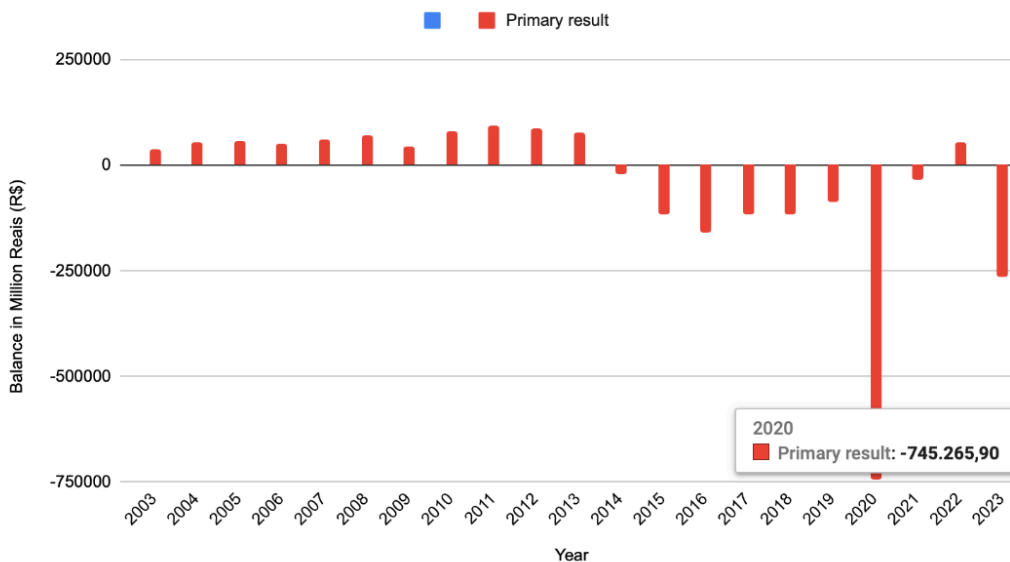
The greatest defiance to the the Amendment 95 legitimacy was the Covid-19 pandemic impacts, which revealed that when legal constraints are collectively weakened and revised by joint political will, and relying on monetary sovereignty (debt on domestic currency, for

instance), a nation like Brazil does not hold financial constraints. Such financial unsustainability due to the lack of tax revenue, affirmed by neoliberal agents, was not perceived. With political will and urgent necessity, the State had at its disposal a mechanism of expanding the monetary basis, with a total deficit of more than US\$123 billion (R\$ 745 billion), meaning the expansion of its public debt with title emissions (54,70% in 2019, 61,37% of GDP in 2020, and 55,11% in 2021). Such resources were directed to assisting families with a Cash Transference Program that summed up R\$ 327 billion (Deos *et al.*, 2022). Although it was grounded on the expenditure of great amounts of public funds, it was responsible for heating the domestic market through household consumption and also avoiding a total collapse of the economy, with numbers that reached an increase of 1,803% in tax collection through the “ICMS” (Excise Duty on the Consumption of Goods and Services) to every 1% increment to the compensation of the per-capita income mass (for values of R\$ 600 per beneficiary. When it comes to a reduction of the compensation of the per-capita income mass to R\$ 300, the numbers reached an increase of 1,329% in tax returns) (Ponte & Benegas, 2021).

The first time series showed a negative association between variables (*r* coefficient of -0.5772761, and *p*-value of 0.006142 < 0,05). Simple linear regression depicted a negative effect as well (β_1 value of -6.293e-02 ‘***’, and *p*-value of 0.006142 < 0,05). Multiple linear regression determined that no other variable was influential on the Primary results. As for the second time series, there was no significant association and influence of Public debt on Primary results (*p*-value of 0.6488 > 0,05 for both tests).

The Covid-19 pandemic exposed that the government expenditure doesn’t depend on the State revenue, as under an unfavorable scenario of State tax revenue, the government was able to induce billions of Reais in the economy to employ a cash transfer program to families in need. Thus, challenging the dominant austerity narrative.

Brazil's Primary Results (2003 - 2023) in Million Reais (R\$)



Source: Brazilian Institute of Geography and Statistics

Figure 4-6: Brazil’s Primary Results (2003-2023) in Reais (R\$)

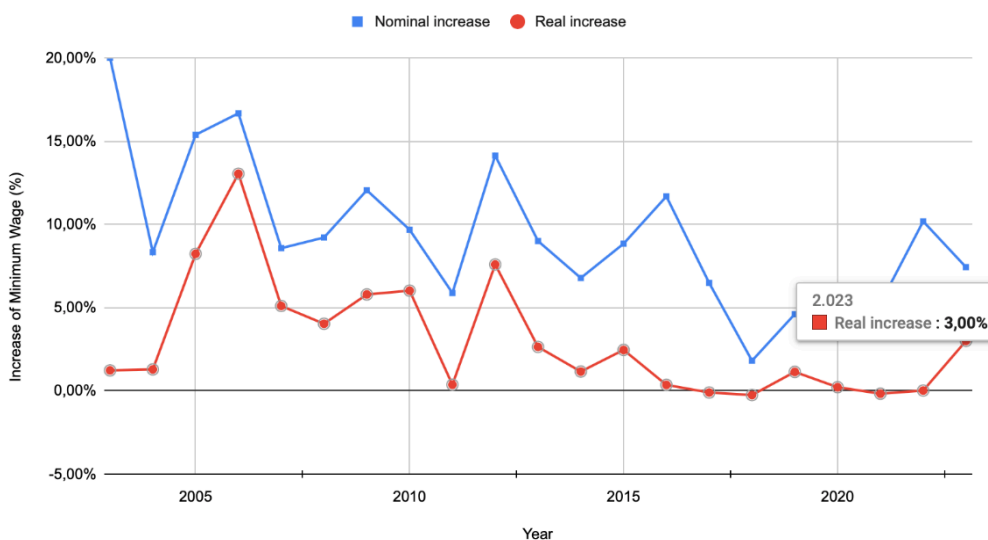
d) Minimum Wage Real Increase Rate

Real increases in the minimum wage during the early 2000s significantly contributed to household consumption and inequality reduction. Minimum wage had a nominal increase over the studied years. However, the real increase (real purchasing power added) was not perceived at all times, being altered by an orthodox inflection in policymaking.

The real increase rate was elevated to 8,23% in 2005, reaching 13,04% in 2006. Such values represent the highest peaks in the historical series evaluated. 2013 had a real increase of 7,59%. In 2017, after Dilma’s impeachment, a deepening of the neoliberal policy occurred. Salaries were not appreciated, being corrected only by inflation (having near-zero values for the years 2017, 2018, 2020, and 2021, respectively -0,10; -0,25; 0,22; and -0,17). With the Workers’ Party back in the government in 2023, salaries were again appreciated above inflation. As perceived in Figure 7, the minimum wage had a nominal increase of 7,43% and a real increase of 3%, endorsing once again a policy of appreciation of the minimum wage targeting economic development.

The association was negative (*r* coefficient of -0.4970564, *p*-value of 0.02188 < 0,05). The Simple linear regression depicted a negative effect on the Minimum wage real increase rate (*β1* value of -1.005e-06, *p*-value was 0.02188 < 0,05). Multiple linear regression showed that no variables had influence on the minimum wage increase rate. As for the second time series, the tests were insignificant, concluding that in the period of expansionist policy in Brazil, the tests lacked statistical significance to demonstrate influence on the variable behavior. Values for association were: *r* of -0.2184427, and *p*-value of 0.4952 > 0,05). Simple linear regression had as values *β1* value of -2.783e-06, and *p*-value was 0.4952 > 0,05). Multiple linear regression showed no influence of other variables on the Minimum Wage real increase rate.

Brazil's Minimum Wage Increase Rate (2005 - 2019) in (%).



Source: Interunion Department of Statistics and Social Economic Studies

Figure 4-7: Brazil's Minimum Wage Increase Rate (2003-2023) in (%).

e) Unemployment rate

In 2003, the government faced a joblessness rate of 11,7%. Over the years, it conducted a policy to leverage employment in order to accomplish sustained growth and improve living conditions for the lower-income population, mostly.

Under the impact of the subprime crisis, unemployment rose to 9% in 2009. In 2012, unemployment had its levels diminished to 6,9%, an outstanding performance towards full employment. The real increase in minimum wage reduced inequalities and boosted household consumption. As the Brazilian economic output held a strong protagonism of families' consumption, it illustrates the importance of the purchasing power and employment to economic development.

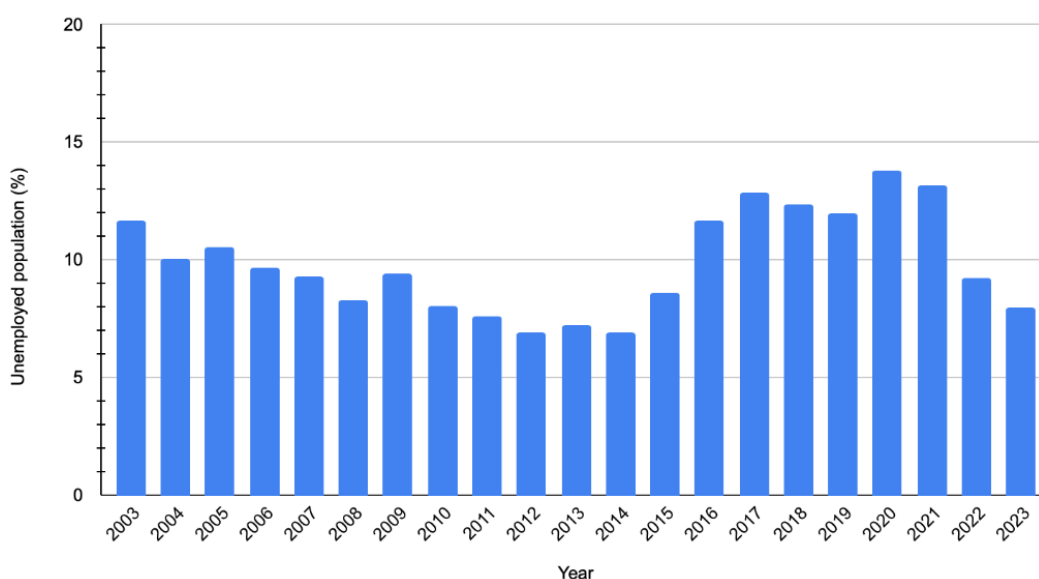
Political fissures among the ruling block were enforced by the conflict of interest regarding the profit margin reduction with the continuously increasing minimum wage of workers. Dilma's policy, especially, actively acted in favor of employment and had essential participation in confronting the banking-financial fraction of the capital (Chernavsky *et al.*, 2020).

In 2015, unemployment started rising after several years of decline. Its levels went from 6,9% in 2014 to 12,85% in 2017 during Temer's heavily austere government, reaching 13,78% in 2020 with Jair Bolsonaro during the pandemic. Once a progressive policy was back in the Executive Command with Lula, unemployment fell to 7,9%, being further improved in the following year.

In the first time series, the first two tests employed did not express statistical significance, with an '*r*' coefficient of 0.3655725, and a *p*-value of 0.1032 (*p* > 0,05). The Simple linear regression was insignificant to explain effect of the public debt on unemployment, with values of ' **β_1** ' being 4.595e-07, and the *p*-value was 0.1032 (*p* > 0,05). For multiple linear regression, investment was the only variable to reveal influence on unemployment, with values of ' **β_1** ' being -7.654e-01, and the *p*-value being 0.001274 (*p* < 0,05).

As for the second time series, there's an alteration. Unemployment becomes statistically relevant, showing a strong negative correlation between Public debt and Unemployment, with values of '*r*' coefficient being -0.9004271, and the *p*-value being 6.509e-05 (*p* < 0,05). Simple linear regression showcased an effect of public debt in reducing unemployment, with values of ' **β_1** ' being -4.777e-06 '***', and the *p*-value being 6.509e-05 (*p* < 0,05). As for multiple linear regression, no other variables were found to be influential on unemployment.

Brazil's Unnocation rate (2003 - 2023) in (%)



Source: IPEA data

Figure 4-8: Brazil's Unnocation rate (2003-2023) in (%)

f) Investment rate

From 2003 to 2013, Brazil demonstrated a good evolution of its Gross Fixed Capital Formation, having a slight change in the policy of public investment in 2011 ascertained as ineffective to what it proposed (incentivize private investment to substitute public investment).

During the first decade, investment was highly appreciated with good national and international scenarios for domestic policy. The commodities boom, the heated domestic activity, and international influxes, among others. The period represented a scenery of growth and optimism. In 2003, the investment percentage of GDP represented 16,3%, reaching 19,03% in 2008, and 20,28% in 2010. From 2013 on, the investment steadily declined, having rates reduced from 20,9% to 14,52% in 2017, increasing again from 2018 to 2022.

Echoing the claim that public expenditure leverages economic growth, Rocha *et al.*, (2005) conclude in a study that government expenditure in capital, roads, and water systems, for example, has a positive effect on investment (GFCF), something that, according to post-Keynesian/heterodox theorists, induces employment, a consequence of the multiplier effect of the investment (Keynes, 1937; Oliveira & Gennari, 2009: 264).

Interesting to observe that in 2010, after the subprime crisis in 2008 and with an investment percentage of more than 20%, Brazil's GDP growth rate rose to the level of 7,5%. In 2023, the rate still rose 3%. When the governmental policy was modified to reduce public investment, among other measures, the GDP growth rate drastically dropped to levels of negative 3,3%.

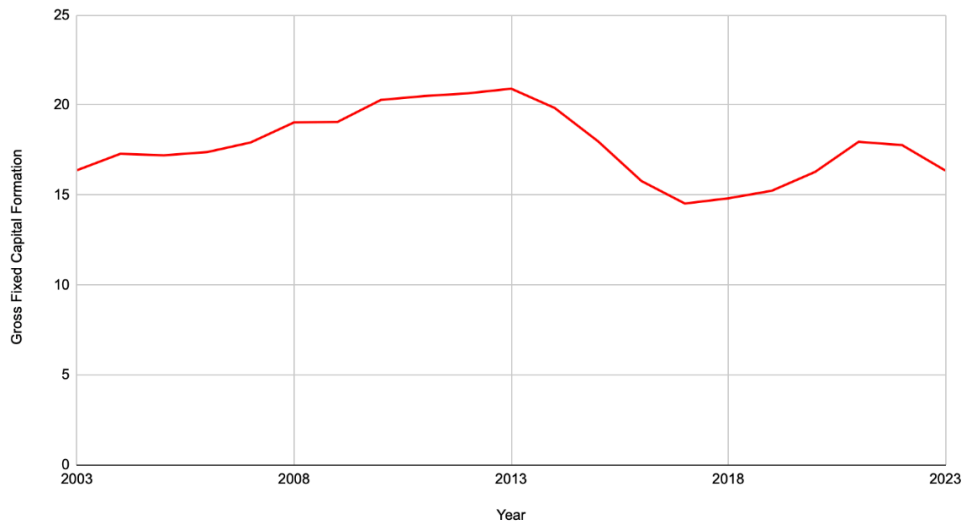
During the Worker's Party governments, the national policy strongly favored the industrialization plan and the strengthening of public companies like Petrobras. The political agenda was heavily inclined towards diversifying and reshaping the industrial capacity of the Brazilian economy, comprehending the role industry takes in developing a nation (Oliveira & Herscovici, 2021). With the impeachment, this scenario is reversed.

Despite the divergence between heterodox considerations, one remains a consensus: investment is majorly important and responsible for industrialization, which is not determinant by itself but highly crucial to the development process.

The association between investment and public in the first time series presented a negative association between the variables, with values of ' r ' coefficient being -0.4563062 '*', and the p -value being 0.0376 ($p < 0,05$). The multiple linear regression depicted unfavorable influence of public debt on investment, with values of ' β_1 ' being -5.136e-07 '*', and the p -value being 0.0376 ($p < 0,05$). And the multiple linear regression stated that the only influential variable on investment was unemployment, with values of ' β_1 ' being -6.977e-01 '***', and the p -value is 0.003096 ($p < 0,05$), illustrating that employment has a positive influence on investment, whereas unemployment has the contrary effect.

The second time series, however, showed an alteration. The association between public debt and investment is strongly positive, with values of ' r ' coefficient being 0.8740151 '***', and the p -value being 0.0002016 ($p < 0,05$). The simple linear regression depicted values of ' β_1 ' value being 4.728e-06 '***', and the p -value being 0.0002016 ($p < 0,05$), determining a strong positive effect of public debt on investment. As for multiple linear regression, the only influential variable on Investment was Primary results, with values of ' β_1 ' being 1.797e-05 '*', and the p -value being 0.000255 ($p < 0,05$).

Investment rate in Brazil (2003-2023) in %



Source: Brazilian Institute of Geography and Statistics

Figure 4-9: Brazil's Investment Rate (2003-2023) in (%)

g) Human Development Index

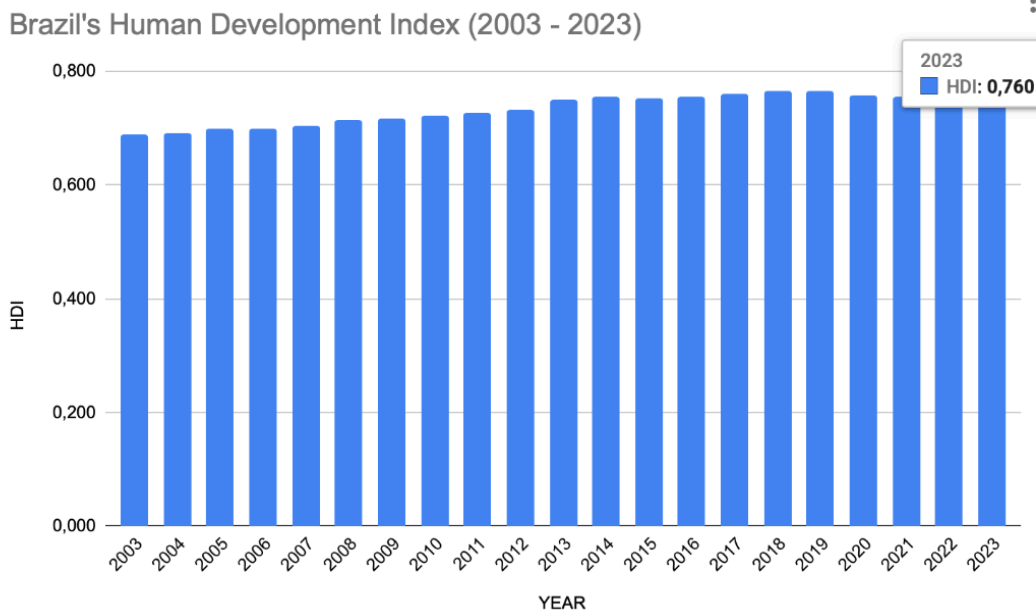
The Human Development Index exhibited a constant growing behavior, expressing that Brazil leveraged its social and economic indexes grounded on policies facilitated by economic expansion, social programs, and the enhancement of health care and education. With amplified life expectancy (Correio Braziliense, 2024), Brazil left the UN Hunger Map with food security elevation (Freitas & Pena, 2020), and income improved, the country had a visible improvement in the population's living conditions. After 2014, however, had a deceleration in its growth rate, due to policy shifts that affected the population's well-being.

From 2013 to 2017, HDI growth was lower, advancing at a slow pace and having strong setbacks from 2017 to 2023. Several elements can be ascribed to such phenomena: economic struggle, the COVID-19 pandemic, educational complications due to the quarantine, and even environmental complications, as seen with the acute level of deforestation in the period. HDI metrics, once the pandemic's effects had been reduced, demonstrated a rebound in the years 2022 and 2023.

The association between Public Debt and the Human Development Index was proved to be strongly positive in both time series. The first series shows values of ' r ' coefficient being 0.7508349 '***', and the p -value being 8.789e-05 ($p < 0,05$). The simple linear regression depicted a strong cause and effect correlation, with values of ' β_1 ' being 1.150e-08 '***', and the p -value was 8.789e-05 ($p < 0,05$). As for the multiple linear regression, it was found that GDP is the only influential variable on HDI, with values of ' β_1 ' being 7.460e-09 '***', and

the p -value being $8.394e-05$ ($p < 0,05$).

The second time series, for instance, revealed the same conclusion. The association between Public debt and HDI was strongly positive, with values of ' r ' coefficient being 0.97103 '***', and the p -value being $1.531e-07$ ($p < 0,05$). The simple linear regression had the values ' β_1 ' of $7.161e-08$ '***', and a p -value of $1.531e-07$ ($p < 0,05$). As for multiple linear regression, GDP once again was the only influential variable to the one studied, with values of ' β_1 ' being $1.385e-08$ '*' and the p -value being $1.948e-05$ ($p < 0,05$).



Source: Brazilian Institute of Geography and Statistics

Figure 4-10: Brazil's Human Development Index (2003-2023) in (%)

6. CONCLUSION

Pursuing to contribute to the public administration theoretical basis and public management guidelines in policymaking, the present article sought to verify whether public debt is an automatic and inherently negative factor for development. To achieve that, the research was conducted to study how public debt was associated with development variables from the Brazilian experience from 2003 to 2023.

Based on established literature, descriptive analysis, and statistical tests, the research aimed at contributing to the debate regarding public debts worldwide, insights on how to induce development, and which measures to avoid. The study exposed concrete empirical observations with the Brazilian case, to verify whether the Modern Monetary Theory and other heterodox theoretical contributions find grounds pragmatically to explain that public debt is not automatically a hindrance to a nation's development.

The 2003 to 2023 series demonstrated positive associations between Public Debt, GDP, and HDI. Remarkable were also positive associations among Employment, Investment, and

Primary Results. Public Debt was found to have negative associations with Primary Results, Minimum Wage real increase, and Investment. Under the heterodox hypothesis that public debt is not a natural limitation to development, the 2003-2014 time series depicted that Public Debt is positively correlated to GDP, Employment, Investment, and HDI. Outstanding associations were perceived among Public Debt, Employment, and Investment. As for Primary Results, and Minimum Wage real increase, no statistical significance was found to determine association. Evaluating cause-effect correlation, Public Debt was demonstrated to improve GDP, Employment, Investment, and HDI.

The nature and composition of the debt, and the debt services payment tied to the Selic basic interest rate were three significant components to illustrate in which configuration public debt may harm the economic performance, as it did in Brazil during the military dictatorship from the 60's until the 80's. A debt acquired in an external currency undermines a country's monetary sovereignty. Brazil has historically demonstrated the capacity to issue its debt and manage it sustainably, following combined measures to leverage economic output. The prevailing risk to fiscal stability and to maintain trustworthiness from agents in society is the debt interest payment, which has elevated the cost of indebtedness in the country.

The conclusions taken from the tests reinforce heterodox diagnostics and solutions for economic development by denying austerity and upholding quality expenditure in important axes, such as investment. The results also endorse the affirmation that a contractionist policy is harmful to other development indicators. Results also elucidated that investment and employment are key variables to comprehending economic performance and inducing development.

With all considered, and based on the Brazilian experience case, this article points to two affirmations. The first is that public debt is not an automatic threshold to development, as economic development variables have improved despite the indebtedness elevation. And the second is that public debt did influence some variables positively. Other associations also revealed relevance, highlighting the important variables of development that deserve attention in the policymaking process.

The present work clarifies that, based on the Brazilian experience, an austerity framework is not legitimate, as administrative and political choices determine economic outcomes, not debt levels alone. The results challenge the idea of debt as a liability, giving attention to the governance factor as a crucial and determining element for economic development. Administrative adaptability is highly important for public managers, as holding a rigid adherence to fiscal limitations destabilizes the State's capacity to address inequality or economic shock.

Limitations to be outlined are the potential endogeneity of the causality between public debt and GDP and HDI, as these variables may be dependently determined, and also be affected by omitted variables. As the objective of this research was to analyze empirical associations and historical patterns, pursue consistent relationships, and identify possible causal nexus, the results obtained are not undermined. The methods used in the present work are commonly addressed to attest whether there is space for further investigation in the topic, relegating to further research more specific aspects of the research problem regarding structural-specific causality. Furthermore, to mitigate such methodological risks, for instance, concerning the omitted influences, other variables are evaluated in the descriptive analysis and in the statistical tests. To the risk of endogeneity, it's advisable that once the topic has shown concrete paths for further investigation, other statistical methods be used, for instance, the Granger causality test, to attest structural causal conclusions going beyond historical contexts.

With the abovementioned, this work contributes to Public Administration's theoretical grounds and practical challenges with considerations for the policy-making process, recentring the debt debate on governance rather than economics, when societal needs are more important than numeric targets.

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APPENDIXES

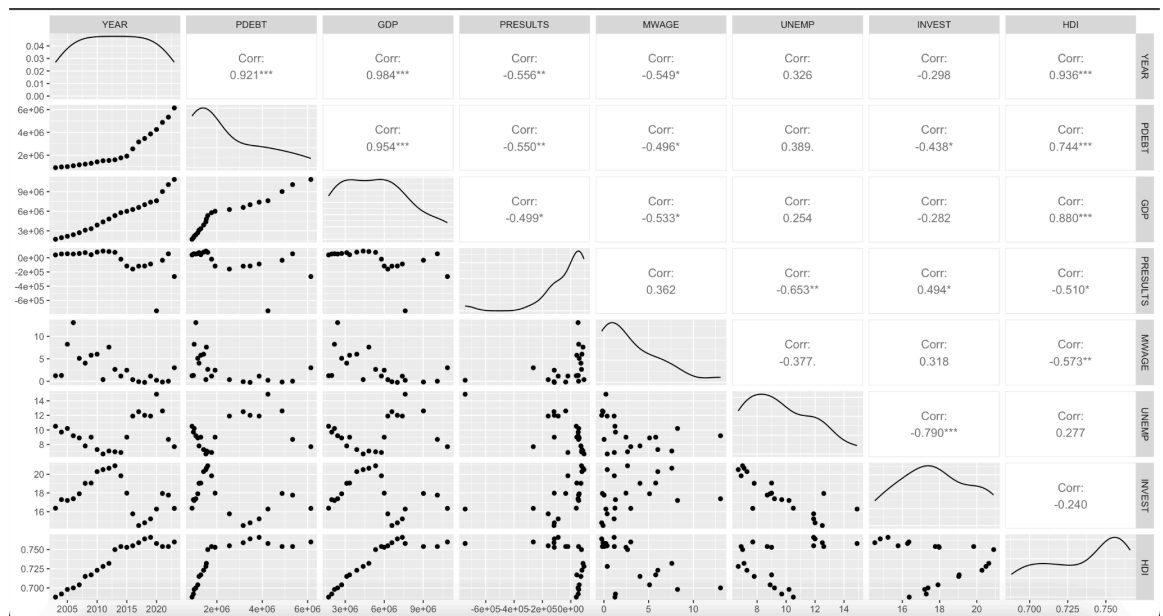
Appendix A: Series of values found in the respective sources from 2003 to 2023.

YEAR	PDEBT	GDP	RESULTS	MWAGE	UNEMP	INVEST	HDI
2003	932.137,5	1.717.950,4	38.743,9	1,23	11,7	16,37	0,688
2004	982.508,8	1.957.751,2	52.385,2	1,29	10,07	17,285	0,692
2005	1.040.046,1	2.170.584,5	55.741,4	8,23	10,55	17,2	0,698
2006	1.120.052,6	2.409.449,9	51.351,6	13,04	9,69	17,38	0,700
2007	1.211.762,3	2.720.262,9	59.438,7	5,1	9,28	17,915	0,704
2008	1.168.238,3	3.109.803,1	71.307,9	4,03	8,27	19,03	0,715
2009	1.362.710,7	3.333.039,4	42.443,2	5,79	9,42	19,055	0,717
2010	1.475.820,2	3.885.847,0	78.723,3	6,02	8,03	20,28	0,723
2011	1.508.546,9	4.376.382,0	93.035,5	0,37	7,58	20,495	0,728
2012	1.550.083,1	4.814.760,0	86.086,0	7,59	6,9	20,645	0,732
2013	1.626.334,9	5.331.619,0	75.290,7	2,64	7,23	20,905	0,750
2014	1.883.147,0	5.778.953,0	-20.471,7	1,16	6,9	19,835	0,754
2015	2.136.888,0	5.995.787,0	-116.655,6	2,46	8,63	17,98	0,753
2016	2.892.913,5	6.269.328,0	-159.473,4	0,36	11,65	15,77	0,755
2017	3.382.942,2	6.585.479,0	-118.442,2	-0,1	12,85	14,52	0,759
2018	3.695.837,3	7.004.141,0	-116.167,4	-0,25	12,38	14,81	0,764
2019	4.041.768,8	7.389.131,0	-88.898,9	1,14	11,98	15,23	0,766
2020	4.670.004,3	7.609.597,0	-745.265,9	0,22	13,78	16,28	0,758
2021	4.966.921,4	9.012.142,0	-35.872,2	-0,17	13,2	17,95	0,754
2022	5.658.016,9	10.079.676,7	54.946,7	0,02	9,25	17,77	0,754
2023	6.612.829,7	10.866.112,3	-264.532,8	3	7,98	16,35	0,760

* in million Reals (R\$) * in million Reals (R\$) *in million Reals (R\$) *real increase in % *in % of GDP *in % of GDP *in index values

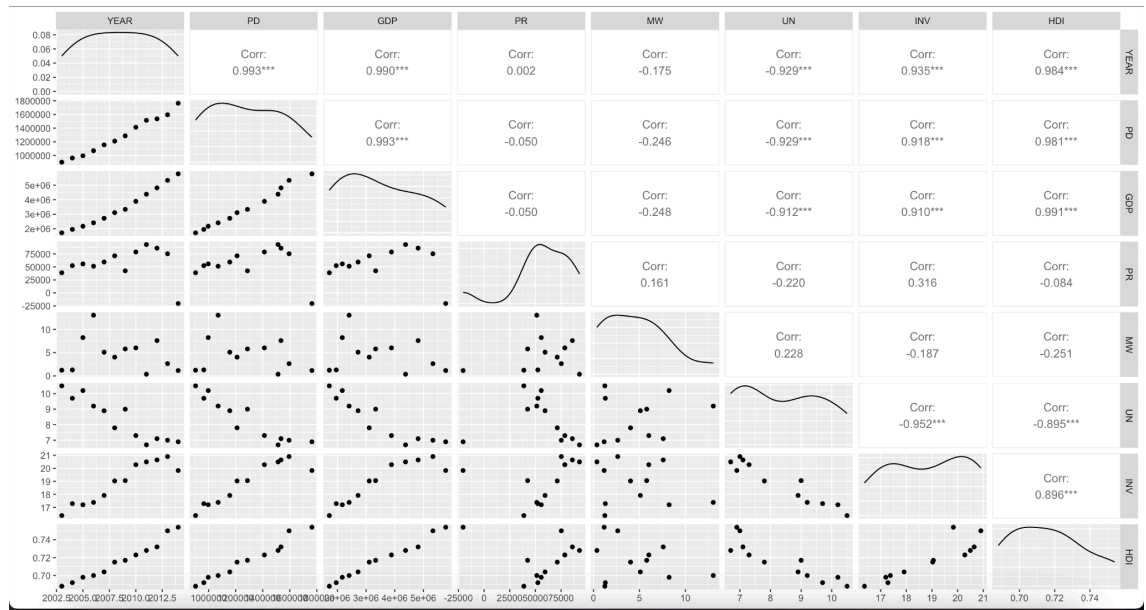
Source: Elaborated by the author with data from IBGE, DIEESE, IPEA data, the Central Bank, and the UN.

Appendix B: Pearson Correlation demonstrative (2003-2023)



Source: Elaborated by the author on R software/R Studio based on data from IBGE, DIEESE, IPEA data, The Central Bank, and UN.

Appendix C: Pearson Correlation demonstrative (2003-2014)



Source: Elaborated by the author on R software/R Studio based on data from IBGE, DIEESE, IPEA data, The Central Bank, and UN.