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# DETERMINING FACTORS OF THE BUDGET EXECUTION POLICY IN BRAZIL (1980-2018)

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## ABSTRACT

Budget studies in Brazil are eminently technical, with only a few utilizing theoretical models to examine and understand the decision behavior in the budget process. This purpose of this study is to analyze, among a set of factors, which ones were the determining for the budget execution policy in Brazil, in the period from 1980 to 2018. The study uses the Incremental Theory and the Punctuated Equilibrium Theory as support to develop the dependent variable (incremental and/or one-off variations in the decisions of implementation of the Federal Budget) and, thus, to test hypotheses of determining factors based on empirical studies (explanatory variables). The results showed that the variables "collected revenue" and per capital Gross Domestic Product showed a positive and significant effect with the execution of the budget expenditure (stability and punctuated variations), that is, larger revenues and per capita Gross Domestic Product result in an increment of public services at federal level. However, as resources are scarce, one must observe that the spending levels must be correlated with the economic growth. The variable "number of inhabitants (population)" has a negative and significant effect with the budget execution of the expenditure, showing the increase in the number of inhabitants causes a reduction in the provision of public services by the State/Public Administration, especially about the population's aging process. The variables related to the "political opposition" from the Presidents of Câmara dos

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Deputados and Senado Federal to the President of the Republic (political competition) did not show any statistical significance.

**Keywords:** Budget public policy. Determining factors. Brazil. Incremental theory. Punctuated equilibrium theory.

## FATORES DETERMINANTES DA POLÍTICA DE EXECUÇÃO ORÇAMENTÁRIA NO BRASIL (1980-2018)

### RESUMO

Os estudos orçamentários no Brasil são eminentemente técnicos, sendo que poucos se utilizam de modelos teóricos para examinar e compreender o comportamento das decisões no processo orçamentário. Este artigo tem o objetivo de analisar, dentre um conjunto de fatores, quais foram os determinantes da política de execução orçamentária no Brasil, no período de 1980 a 2018. A investigação utiliza a Teoria Incremental e a Teoria do Equilíbrio Pontuado como suporte para elaborar a variável dependente (variações incrementais e/ou pontuais nas decisões de implementação do Orçamento Federal) e assim testar hipóteses de fatores determinantes com base em estudos empíricos (variáveis explicativas). Os resultados demonstraram que as variáveis receita arrecadada e o Produto Interno Bruto *per capita* apresentaram efeito positivo e significativo com a execução da despesa orçamentária (variações de estabilidade e pontuadas), ou seja, maiores arrecadações e Produto Interno Bruto *per capita* acarretam no incremento dos serviços públicos a nível federal. Contudo, como os recursos são escassos, deve-se observar que os níveis de gastos devem ter correlação com o crescimento econômico. A variável número de habitantes (população) tem efeito negativo e significativo com a execução orçamentária da despesa, sinalizando que o aumento do número de habitantes provoca uma diminuição no atendimento por parte do Estado em serviços públicos, principalmente com o envelhecimento da população. As variáveis da oposição partidária dos Presidentes da Câmara dos Deputados e do Senado Federal ao Presidente da República (competição política) não apresentaram significância estatística.

**Palavras-chave:** Política pública orçamentária. Fatores determinantes. Brasil. Teoria incremental. Teoria do equilíbrio pontuado.

### 1 INTRODUCTION

In the process of formulating public policies, problems are conceptualized and taken to the government for solution; government institutions formulate alternatives and select policy solutions which are then implemented, evaluated and revised. In this line, budgetary policies can be analyzed by several theoretical frameworks: heuristic stages; institutional rational choice; multiple streams; punctuated equilibrium structure; advocacy coalition framework; policy diffusion structure, incremental and the causality funnel (Sabatier, 2007).

The Punctuated Balance Theory, for True, Jones and Baumgartner (2007), explains the stability and the change of in public policy. Incrementalism and rational theories of maximization of preference fail to analyze the limited attention in governments and people. In Incremental Theory, according to Davis, Dempster and Wildavsky (1966), the budget base is the amount authorized by Congress in the previous year and its use defends the *status quo* against demands for changes in the political and budgetary relation.

Incrementalism assumes that the request for a year's budget allocation consists of a fixed portion and another variable and stochastic one, considered incremental. The fixed portion is considered the budget base, meaning the result of a political consensus in which it establishes the degree of participation of each action in the general aggregate (Abreu, Neiva & Lima, 2012).

The budgetary process for the three spheres of government in Brazil, according to Alves (2016), suffers a strong incremental influence. Budget studies in Brazil are eminently technical, with few using theoretical models to examine and understand the behavior of decisions in the budget process, a scenario that does not occur in the international context (for example, Bezdek, Dybczak & Krejdl, 2003; Ferris, Park & Winer, 2008; Hobolt & Klemmensen, 2008; Rosenthal & Wolfson, 2013; Ukwueze, 2015; Lojanica, 2015; Zokalj, 2016; Thomson et al., 2017; Demera & Yemer, 2018).

In this perspective, Rosenthal and Wolfson (2013) examined the determinants of budget implementation in Israel. As a dependent variable, they used the budgets by the government (sum of budgets implemented by a ministry) and as independent variables they tested three conceptual groups: the political environment of the ministry (minister's party political positions, the minister's time, the power of bargaining by the minister's party, coalition fragmentation and stability); the bureaucratic function of the ministry and the effects of the budget execution process (macroeconomic shocks: Gross Domestic Product per capita, unemployment rate, the Gini Index as a factor of socioeconomic inequality and the inflation rate).

The main results of Rosenthal and Wolfson's research (2013) showed that having a higher negotiation around the government table is not enough to increase budget execution; last year's budget is a strong indicator of the current year's budget, with a positive effect on the use of interaction between political positions and party effectiveness. Finally, it was noted that having credible threat power over bureaucracy increases budget implementation.

Demera and Yemer (2018) investigated the determinants of budgetary control in public organizations in Benishangul Gumuz, in Ethiopia. As a dependent variable, they used the degree of budget control and as independent variables: the budget planning process; managerial support; the internal audit team; organizational commitment; budget monitoring and evaluation; information and communication and cost reduction. The results show that, with the exception of the budget planning process carried out by the public sector offices, the other independent variables contributed to the budget control of the public sector in a significant and positive way.

Thus, the following research question arises: What were the determining factors of the budget execution policy in Brazil, from 1980 to 2018? Thus, the general objective of this study is to analyze, among a set of factors, what the

determinants of the budget execution policy in Brazil, from 1980 to 2018, were. As specific objectives of this investigation, we highlight: to list factors that can determine the budget execution policy; identify the percentage changes in budget expenditures; estimate an empirical regressive model to test the explanatory factors.

The research will potentially expand the discussion of budgetary studies in Brazil, besides contributing to the literature on factors that can be considered determinants in budgetary decisions. The results of the survey may show, prospectively, to policy makers, factors that should be discussed in budget policy. Another consequence of the study is in the possible stimulus to carry out more related empirical research to encourage discussions about such a relevant topic to the society that owns public resources: the way in which public managers use these resources.

About the complexity of the public policy process, this study uses the Incremental and the Punctuated Equilibrium Theory as a support to elaborate the dependent variable (incremental and/or punctual variations in the implementation decisions of the Federal Budget, from 1980 to 2018) and thus test determining factor hypotheses based on empirical studies (explanatory variables). Thus, to fulfill the proposed objective, the investigation is divided into five topics. After this introduction, the next topic deals with the theoretical framework (theories on budgetary public policies; empirical studies on the Theories of Punctuated and Incremental Equilibrium and study hypotheses), followed by methodological procedures, results and discussions. The investigation ends with the topic of final considerations and references used.

## **2 LITERATURE REVIEW**

### **2.1 Theories on Budgetary Public Policies**

The most used theoretical models in budgetary studies are four: incremental, serial judgment, multiple flow and punctuated equilibrium. The incremental, better known in Brazil, assumes that each budget is based on the previous one. The serial judgment model explains budgetary behavior as a result of actions that follow sequential steps to establish objectives and solve problems, exploring alternative strategies to achieve those objectives. The multiple flow model analyzes how policies enter the government budget, focusing on three flows (problems, proposed solutions and the political one). The punctuated equilibrium model analyzes why political processes occasionally produce large variations (Ollaik et al., 2011).

The empirical theory of the incremental model was developed from the studies of Davis, Dempster and Wildavsky, presented in the article *A Theory of the Budgetary Process* in 1966. The authors presented a summary analysis of the federal budget process in the United States of America, explaining, through a relatively simple, linear and stochastic model, why the basic characteristic of this process is the stability over time (Fernandes & Alves, 2017).

For Davis, Dempster and Wildavsky (1966), the North American budget process can be represented by linear equations and a simple set of rules is responsible for decision making in the budget process. There is a strong interdependence between agents (what the Executive branch does depends on

what Congress has done and vice versa) and empirical sketches on the public budget are fundamental to understand this process.

Abreu, Neiva and Lima (2012) clarify that the incremental analysis or incrementalism, suggested by Lindblom, is a broad approach related to the theory of decision. Its logic has been extended to the budgetary context on the basis of Wildavsky's assumptions that if the budgeting process is based on incremental policies, then the budget is also incremental. The budget base existence implies sequential and repetitive budget processes, which suggests stability in the process.

According to Padgett (1980), the limited rationality theories of decision-making (Serial Judgment and Incrementalism Theories) about the federal budget in the United States were analyzed empirically with budget data by Eisenhower, Kennedy and Johnson and the main conclusion was that the Serial Judgment Theory surpasses the Incrementalism Theory proposed by Davis, Dempster and Wildavsky. The Serial Judgment Theory predicts not only that most programs will, in most cases, receive allocations only marginally different from the historical basis, but also that occasional, radical and even "catastrophic" changes are the normal result of routine decision making about federal budget.

The process of formulating public policies is usually complex, involving different actors and interest groups, such as governmental institutions, political parties, organized society, among others. Often, these actors act in an antagonistic way, making the process of efficient choices essential. The serial judgment model developed by Padgett falls within the paradigm of limited rationality, differing from incrementalism due to the sequential analysis of data and the lack of determinism in the final result of the analysis. In this model, the decision maker starts on a fixed basis, makes his decision on the direction he will take (increases or decreases in budget allocation, in a binary choice that guides the subsequent relevant alternatives for the decision maker), seeks for alternatives in the budget, and then apply the theory of serial judgment (Abreu, Neiva & Lima, 2012).

The multi-stream structure was developed by John Kingdon in 1984 based on the "garbage can" model of organizational behavior. He considers the political process to be composed of three streams of actors and processes: (i) a stream of problems consisting of data on various problems and the proponents of several problem definitions; (ii) a policy flow involving proponents of solutions to policy problems; (iii) a political flow composed by elections and elected officials. In Kingdon's view, the flows typically operate independently of one another, except when an "opportunity" happens, which allows policymakers to link the flows. If entrepreneurs are successful, the result is a major policy change (Sabatier, 2007).

The Punctuated Equilibrium Theory was formulated in evolutionary Biology in 1954, when Ernst Mayr theorized that biological evolution does not occur gradually, but through mutation, recombination and natural selection in populations. In 1972, paleontologists Stephen J. Gould and Niles Eldredge argued, in their essay *Models of Paleobiology*, that biological evolutionary change was not always "slow and steady" or gradual as it was maintained by Charles Darwin in 1859 (Givel, 2010).

The Punctuated Balance Theory research in public policy took place in 1993 and in 2009, when political scientists Frank Baumgartner and Bryan Jones, using the first scientific results of punctuated equilibrium from Gould and Eldredge, argued

that the change rate in public policy usually occurs slowly and gradually. However, occasionally, the change in public policy can also occur "sharply", "explosively" and in a "short period" due to an external disturbance (such as a triggering event), followed again by a slow gradual change in policy (Givel, 2010).

The Punctuated Equilibrium Theory, originally adapted by Baumgartner and Jones in 1993, argues that policymaking in the United States is characterized by long periods of incremental change, punctuated by brief periods of major policy change. The latter occurs when opponents are able to create new "policy images" and explore the multiple locations of politics characteristic of the United States. Originally developed to explain changes in legislation, this framework has been expanded to include very sophisticated analyzes of long-term changes in federal governmental budgets (Sabatier, 2007).

The Punctuated Equilibrium Theory, according to Jones and Baumgartner (2012), was created from dissatisfaction with the models of political processes that emphasized stability, rules, incremental adjustment and the "deadlock", while the policy change was often disjointed, episodic and not always predictable. In the first models of policy processes, developed mainly in the 1950s and 1960s, decision-making was considered to be incremental, subsystems seemed eternal and the political order was stable. For the authors, nothing is resolved in scientific research, nor should it be. In fact, the concept's success may lie in its future obsolescence, because new ways of thinking must be able to incorporate in the Punctuated Equilibrium Theory a little more transparent.

The process of formulating public policies is complex since it involves numerous institutional, ideological and economical political variables: problem; schedule; alternatives; proposals; decisions; interests; conflicts; data; estimates; cost-benefit analyzes; cost-efficiency and risk; sustaining economic growth; budget restrictions; degree of local investment; lobbying, etc. Considering that evaluating the universe of variables is not feasible, it is necessary to find a way to work with the best model, balancing parsimony (lesser number of explanatory variables) and explanatory power. The choice of a theory and the use of indicators (proxies) to assess public policies represent available alternatives. The Punctuated Balance Theory, when explaining the stability and change in the formulation of public policies with the contributions of political scientists, gathers the basic assumptions to analyze the budget policy of governments in Brazil (federal, state, district and municipal).

## **2.2 Empirical Studies on Punctuated and Incremental Equilibrium Theories**

There are empirical studies in the literature that address the Punctuated Equilibrium Theory and Incremental Theory in different areas of government. Below, some of these studies are presented, aiming to contribute to the present research.

Jordan (2003) studied the budgetary decisions of local levels of government (cities) from the 1965 to 1992 fiscal years of the United States annual report census. The results show that some budgetary functions (sanitation, public buildings, etc.) are likely to have scores and therefore have a less stable agenda. The practical significance of extending the Punctuated Balance Theory to the local government budget are: planning, forecasting and scheduling process.

Hegelich, Fraune and Knollmann (2014) used data from nuclear energy policy in the United States to analyze how decisive budget changes in a specific policy subsystem can be linked to Congress and the President. Data analysis was performed using cluster analysis techniques, main component analysis and the generalized linear model (GLM) regression. The results were able to predict budgetary changes in nuclear energy policy without violating the assumptions of the Punctuated Balance Theory.

Ibrahim (2016) tested the Incremental Theory in the budgets of the United Arab Emirates (UAE) from 1972 to 2010. The results confirmed the use of the incremental budget. Decision makers consider the budget revenue from the previous year as an important factor in determining the budget for the following year. Inflation, industrialization, increased demand for services and changes in priorities have significantly impacted the budget process. In the research, Ibrahim (2016) used three incremental models: the magnitude of change model showed that most changes are within the  $\pm 30\%$  incremental threshold; 11% of the changes were incremental and 7% as non-incremental.

Chan and Zhao (2016) analyzed the regional government expenditures (Chinese provinces) from the Statistical Yearbook of China published by the National Statistics Office of the Republic of China from 1996 to 2013 to check for situations of stability and sudden changes. For the authors, the punctuated balance appears in authoritarian states because employees have little exposure to information, which undermines their ability and incentive to make frequent adjustments to *status quo*. The results extended the punctuated balance to non-democratic contexts and show promising directions for future comparative studies.

Fittipaldi, Costa and Araújo (2017) analyzed whether the incremental approach can explain the behavior of social spending (government functions: Social Assistance; Culture; Education; Social Security; Sanitation and Health) from 1995 to 2014. The authors used inequality measures for the identification of the temporal dispersion of the variable of interest, as well as projections of social spending in the medium term from the use of an integrated self-regressive dynamic model and moving average (ARIMA). The results were that social spending showed an incremental pattern and that this characteristic will reproduce in the medium term.

Carvalho (2018) analyzed the behavior of stability and change in the budget execution of the Federal Government (Brazilian Federal Government), between 1980 and 2014, of expenses by government functions through the federal budget. The results showed that the greatest amplitude of variations happened in 1986, 1989 and 1990, periods of significant institutional changes. Likewise, the reduction in the amplitude of the variations observed since 1996 may indicate alignment with monetary stabilization as an institutional factor that contributes to the balance of budgetary execution. For the author, a pattern of equilibrium with interruptions was noticeable, corroborating the central hypothesis that the Punctuated Balance Theory is valid for analyzing the behavior of budgetary variations in Brazil.

The research presented in the literature review highlights Incremental Theories and Punctuated Theories as supporting ones for the analysis of variations in the implementation of budgetary policies in democratic countries (United

States), authoritarian countries (China) and Arab monarchies (United Arab Emirates - UAE). There are also, in Brazil (multiparty), some budgetary studies that used both theories. Empirically analyzing variations in budgetary implementations, normality tests ratify the Incremental Theory and the opposite (non-normality), the Punctuated Equilibrium Theory. However, the Punctuated Equilibrium Theory has as its central hypothesis the analyzes of stability and punctuated (atypical) variations in the execution of public budget policies, but as it was observed in the study by Ibrahim (2016), the Incremental Theory can be used as an isolated support in the analyzes. Public budgets in Brazil are, in general, prepared incrementally, so, data from the previous year's budget are used, add projections and estimates of revenues and expenses for the new budget. The Constitutional Amendment 95, of December 15th, 2016 (Brazil, 2016) validates this methodology for the Federal Government. The amendment instituted a new tax regime in which, in general, federal public spending for 20 years is updated by consumer price indexes. In this perspective, using Incremental Theory or just the Punctuated Balance Theory will facilitate the understanding of how, in fact, Brazilian budgetary policy is carried out.

## **2.3 Study Hypotheses**

Several studies address factors that can determine relations (associations) with the countries' budgetary policy. There are also studies that explain these factors. Below there are some of these studies to deduce the hypotheses that will be tested.

### **2.3.1 Collected Revenue**

The sources of financing for public expenditures in Brazil are classified by economic category: current revenues to defray current expenses (costs) and capital revenues to be applied to capital expenditures (investments). The economic categories represent the way resources are collected: current revenues are resources collected directly from the population (taxes, fees and contributions) and capital revenues, such as those from loans and financing and from public goods sale.

The balance between income and expenditure, in addition to the need for compatibility in the private and personal economy, is determined in the Brazilian public sector in Law no. 4.320, of March 17, 1964 (Brazil, 1964), which requires the balance between the revenue collected and the expenditure incurred to be maintained, as far as possible. The Fiscal Responsibility Law (Brazil, 2000) determines that there is a balance between income and expenses when determining the guidelines for preparing the public budget.

The relationship between government revenue and spending has been an important topic in the public economy, given its relevance to politics, especially regarding the budget deficit (Mehrara & Rezaei, 2014). According to Rosoiu (2015), the relationship between government revenues and expenditures is bidirectional. The question that arises is how much the state must increase expenditure in relation to revenues so that social welfare is not affected.

The relationship between expenditure and income was addressed empirically by Ukwueze (2015) and Lojanica (2015). Ukwueze (2015) investigated the determinants of the public spending in Nigeria. The results showed that private investment, the growth rate of production and government revenue and population change are determinants of the public sector size. Changes in the population growth rate generate changes in the age distribution and this trend is reflected in spending on education, care for the elderly, defense, police protection, fire protection, etc. For the author, the study supports Wagner's Law that the growth of national income increases the public sector size.

Lojanica (2015) analyzed the links between government revenue and government spending in Serbia. Based on the obtained empirical results, the political implications should be oriented towards the reduction of government spending in the long term, because from the stability and growth of the Serbian economy, spending levels are unsustainable and the growing trends fiscal deficits are unacceptable, as is the upward trend in government debt and in the private sector. From these studies and in the questions imposed by Brazilian legislation, the following hypothesis is formulated:

*Hypothesis 1 (H1): The collected revenue has a positive effect (more resources may result in improvements in public services provision) and significant (relevant) with the execution of budget expenditure.*

### **2.3.2 Number of Inhabitants (population)**

The effects of the increase in the number of inhabitants (population) in relation to public finances have been studied by several authors. Bezdek, Dybczak and Krejdl (2003) made long-term projections to assess the sustainability of public finances related to population growth in Czech Republic compared to other countries of the Organization for Economic Cooperation and Development (OECD). The projection indicates that the cumulative effect of an aging population on the labor market and public finances will be deep. Given unfavorable demographic trends, policy makers will have to contemplate how to deal with the pressures on public spending resulting from population aging, especially on health.

Wong and Carvalho (2006), when studying the reasons for the transition in the age structure in Brazil (declining fertility, changes in survival patterns, migratory flows, different population growth, workforce qualification, etc.), concluded that if per capita government transfer is kept constant, the difference between income and expenditure will widen, causing an unbearable fiscal deficit. The crisis caused by the aging of the population and the irrational social security system must be a matter for discussion in Brazilian society.

Miller and Castanheira (2013), when estimating the influence of population aging on expenditures in Brazil, from 2005 to 2050, verified the probable increase in public spending in the coming decades, contrasting different trends in spending on education, health and social security. For the authors, public expenditure will start a fast and sustained increase that will last several decades. The growing needs for investment in education will compete with the growing and sustainable increase in demand in public health and social security stemming from the considerable growth in the proportion of elderly people in the Brazilian population.

Zokalj (2016) analyzed the impact of population aging on public finances in European Union. The study found out that an increase in the young population has a significant (relevant) impact only on health spending and an aging population has a greater positive (increase) impact on global public expenditure compared to total government revenue.

Connected with Bezdek, Dybczak and Krejdl (2003), Wong and Carvalho (2006), Miller and Castanheira (2013) and Zokalj (2016), the following hypothesis was formulated:

*Hypothesis 2 (H2): The number of inhabitants (population) has a negative effect (increase in expenditure imbalanced with revenue - decrease in the State's assistance in public services) and significant (relevant) with the budget execution of the expenditure (proxies punctual and / or incremental variations).*

### **2.3.3 Gross Domestic Product**

The sum of goods and services produced in a country over a certain period represents the Gross Domestic Product (GDP), thus, business investments and government spending drive GDP. GDP is one of the main indicators of the potential of a country's economy. While nominal GDP is calculated at current prices, in the year in which the product was produced and marketed, real GDP is calculated at constant prices, in which a base year is chosen for its calculation, thus eliminating the effect of inflation.

Bird (1971) clarifies that the dynamics of growth in public spending leads to the so-called Wagner Law, or Law of Increasing Public Expenditure, which states that the increase in national income induces government expenditure to grow more than proportionally, so, there is a long-term trend to increase the product share dedicated to public expenditure. This means there is an income elasticity of demand for goods and services provided by the State larger than the unit.

Sakurai (2009), when analyzing the political cycles in the budgetary functions of the municipalities, observed there is an influence of the national GDP on the behavior of the expenses of the Brazilian municipalities. For the author, some cases are expected, as in Agriculture, Transport, Assistance and Welfare, Legislative, Education and Culture, since the expenses of these functions are positively related to the economic cycle. Thus, in a counterintuitive manner, the expenses of the Health and Sanitation, Communications, Housing and Urbanism functions tend to decrease in years of expansion of aggregate production. Although it is complex to define a concrete reason for this phenomenon, these results seem to indicate that the behavior of the national income level itself tends to influence the way in which resources are allocated by Brazilian city halls, so, periods of economic expansion are not always associated greater public spending in general.

Rosenthal and Wolfson (2013) found no statistical significance of the Gross Domestic Product per capita in relation to the dependent variable (government use of budgets), when examining several determinants of budget implementation in Israel. The main variables analyzed for macroeconomic shocks were: unemployment rate, Gini Index as a factor of socioeconomic inequality and the inflation rate.

Silva and Triches (2014) analyzed the effects of government spending on the GDP of the Brazilian economy over the period from 1980 to 2005. The results showed that public expenditure on Communication, Transport, Health and Sanitation proved to be productive expenditures by stimulating the income growth. For the authors, government activities can raise the level of the total product directly or indirectly through interaction with the private sector and the financing of public spending through taxes can cause distortions and inefficiency in the allocation of resources.

Magazzino, Giolli and Mele (2015) argue that the relationship between public expenditure and GDP is debated in the economic literature by two sides. In the first, public expenditure is seen as an exogenous factor, which can be used as a political instrument to influence growth. On the other hand, public expenditure is seen as an endogenous instrument or as a result and not a cause of growth in national income. For the authors, in the long run, an increase of 1 percentage point in GDP tends to determine an increase in the public expenditure / GDP ratio between 0.01% and 0.62%.

Zaed (2017) clarifies that the short and long term results made it clear that there is a difference in the result of the applied studies, in which it is found that each one supports a relation of Wagner's Law and there is a causal trend of GDP government spending. Economic growth leads to greater aggregate demand, which, in turn, increases the need to increase government spending as well as the available resources to the government sector to finance increased spending, through additional resources resulting from economic growth.

Jaén-García (2018), studying several theoretical and practical problems related to Wagner's Law on the growth of public spending, found that the law is rejected in Spain based on the belief that there are other variables, besides GDP, that influence the growth of public spending. For the author, a large part of the increase in public spending in Spain has been caused by the deficit, to the point that, in a six-year period, the public debt rose from 60% of GDP to 100.63%. This increase in deficit and debt was not incurred by the improvement in the welfare state, with the corresponding creation of jobs in Health and Education, but, in a deep contrast, public spending was restricted along with employment in these two sectors.

It is observed that there is no consensus in studies on GDP in relation to government spending (Bird, 1971; Zaed, 2017; Jaén-García, 2018). However, considering public expenditure as an exogenous or endogenous factor in the growth of national income (Magazzino, Giolli & Mele, 2015), thus outlines the third hypothesis to be tested:

*Hypothesis 3 (H3): The Gross Domestic Product has a positive (growth in economic activities may result in more investments) and significant (relevant) effect on the budgetary execution of Federal Government expenditure.*

### **2.3.4 Party Political Competition**

Political competition is interesting (in every sense), above all, to all agents at the top of the social hierarchy, or rather, to the different fractions of the upper classes. Political organizations can partially impede the dominant selective logic of political competition (Gaxie, 2012). Tarouco and Dantas Neto (2017) clarify that

political competition is a fundamental element of democracy, and can present itself - in different countries, or different moments in a country's political history - with varied degrees of institutionalization. It may be a central phenomenon of politics, but the degree to which it incorporates traces of polity also varies. Formats and patterns of political competition, to the extent that they stabilize, may have structural roles in politics and conditioning the strategies of political actors, while also constitute an institutional result of the interaction of strategies.

Ferris, Park and Winer (2008) analyzed the contributions of the economy and politics to the evolution of public expenditure by the Government of Canada over a period of more than 130 years. The results showed that political competition is central to the prediction that the balance of political choices is in line with the voters' interests. A reduction in the degree of political competitiveness can allow political and/or bureaucratic agents to divert public resources to private or party uses, increasing public expenditure above the level predicted based on economic fundamentals only.

Hobolt and Klemmensen (2008) verified the responsiveness of policy promises (speeches) and policy actions (public spending) in Great Britain, Denmark and the United States from 1970 to 2005. The results demonstrated the responsiveness effective in the United States and in the parliamentary systems of Denmark and Great Britain. High levels of uncertainty about the chances of re-election appear to have a favorable effect on the government's responsiveness. When the government's popularity is low, the capacity to respond to the preferences of public issues is greater. The more difficult the competition for votes and policies, the more likely the population is to benefit from public spending and the less opportunity for self-interest.

Adit and Eterovic (2011), when analyzing political competition, electoral participation and public finances in several Latin American countries in relation to government size, found that reforms that increase political competition tend to limit the government size, while reforms that increase political participation tend to increase it. For the authors, political competition is certainly an aspect of democracy, but most definitions also refer to some notion of electoral participation (e.g, universal suffrage) and civil liberties. The intensification of political competition experiences a drop in government spending and taxation in relation to the gross domestic product.

Silva (2017), when studying the cycles of coalition presidentialism (majority party composition and state representation) and its political-economic determinants in Brazil (inflation rate, GDP and presidential popularity), observed that the decrease in GDP causes decreased parliamentary support, as well as greater presidential popularity, causes greater coalition discipline. The relationship between parliamentary support and inflation has not been confirmed. In addition to it, the trends of variables oscillations and their coincidence with the occurrence of political crises are highlighted. The results point to the influence of political and economic factors on the coalition's parliamentary support.

Thomson et al. (2017) analyzed the fulfillment of election campaign promises in twelve countries. The results showed that the highest percentages of compliance happened in the United Kingdom, Sweden, Portugal, Spain and Canada with the majority of which governed themselves with a single party. In the countries of coalition governments (Germany, the Netherlands, Austria, Bulgaria,

Ireland and Italy) there were lower percentages. In the United States of America, the fulfillment of promises was at the top end of coalition governments.

Political competition affects a country's economic performance by blocking inefficient policies and can lead parties to select candidates. Party opposition from the heads of the legislative branch to that one of the executive branch can affect budget execution (execute more or less expenditure), regardless the differences in country policies. Considering the studies of Ferris, Park and Winer (2008), Hobolt and Klemmensen (2008), Adit and Eterovic (2011), Gaxie, 2012; Silva, 2017; Thomson et al., 2017 and Tarouco and Dantas Neto (2017), report the fourth research hypothesis investigated:

*Hypothesis 4 (H4): The party opposition of the Chamber of Deputies Presidents and the Federal Senate to the President of Federative Republic of Brazil (political competition) has a negative (obstruction to government programs) and significant (relevant) effect with the execution of the expenditure budgetary.*

### **3 METHODOLOGICAL PROCEDURES**

After developing the hypotheses from the literature, the following steps were followed: (i) definition of the variables and the database (item 3.1); (ii) choices of statistical tests for the analyzes (item 3.2); (iii) carrying out statistical tests; (iv) analysis of the results (item 4). It was also defined that the investigation uses the research strategy of result evaluation and the empirical-analytical method.

Results evaluation, according to Martins and Theóphilo (2009), is an empirical strategy applied to evaluate programs, projects, policies, etc. The empirical-analytical method (file / empiricist - database) corresponds to data collection use, treatment and analysis with quantitative metrics. Matias-Pereira (2012) clarifies that in this method, the process of validating the scientific evidence is done through testing the instruments, degrees of significance and systematizing the operational definitions.

#### **3.1 Variables and Database**

Table 1 defines the variables used in the study (dependent and explanatory).

**Table 1**  
Definition of variables

<b>Variables</b>	<b>Descriptions</b>	
Y = dependents: type of budget (reference variable: 0 - Pointed Budget).	Scored Budget (positive variations greater than or equal to 35% and / or negative variations greater than or equal to 25%); Incremental Budget (other variations): dummies variables: Scored (0); Incremental (1).	
<b>Explanatory (independent)</b>	<b>Descriptions</b>	<b>Hypotheses</b>
X1 = Revenue Raised (log) (REC)	Logarithm of collected budget revenue	H1 (+)
X2 = Population (log) (POP)	Logarithm of population estimate	H2 (-)
X3 = Real GDP per capita (GDP)	Real Gross Domestic Product per capita	H3 (+)
X4 and X5 = Party political competition (party opposition) - reference variable: 0 - Party of the President of the Republic.	Political Party of the President of the Republic, the President of the Federal Senate (SENADO) and the President of the Chamber of Federal Deputies (CAMARA); dummies variables: President's Party (0) and the opposite (1).	H4 (-)

Source: *research data*.

The dependent binary variables (Table 1) refer to the temporal aspect of the execution of budget expenditures in Brazil (Executive Power) from 1980 to 2018. This period was chosen due to the availability of data on the budget execution of the Federal Government at the time of this investigation (April 2019). The purpose of these variables is to determine, by percentage changes in budget execution, the type of budget: punctuated or incremental (Table 2).

The data on the budgetary execution of the expenditure were updated to January 31, 2019 by the variation of the IGP-DI (Índice Geral de Preços/Disponibilidade Interna.) of Fundação Getúlio Vargas Foundation (FGV). The IGP-DI is used by Secretaria do Tesouro Nacional (STN) to update the values of historical series of income and expenses. The updates were carried out with the support of Cálculo Exato.com website (Cálculo Exato, 2019). The data were extracted from Secretaria do Tesouro Nacional (STN) website (STN, 2019) in April 2019. Secretaria do Tesouro Nacional (STN), linked to Ministério da Economia, is responsible for publishing the consolidation of public accounts in Brazil. Data on the number of inhabitants (population) and the real Gross Domestic Product per capita were extracted from the website of the Instituto Brasileiro de Geografia e Estatística (IBGE, 2019).

The Presidents of Brazil from 1980 to 2018 were from the Parties: Aliança Renovadora Nacional (ARENA), Partido do Movimento Democrático Brasileiro (PMDB), Partido da Reconstrução Nacional (PRN), Partido da Social Democracia Brasileira (PSDB) and Partido dos Trabalhadores (PT). The list of Political Parties of the ex-presidents of Brazil was extracted from the website of the Presidency of the Republic Library (2019), of the ex-presidents of the Chamber of Federal Deputies

on the website of the Chamber of Deputies (2019) and of the former presidents of the Federal Senate from the Federal Senate website (2019).

### 3.2 Data Analysis

The study adopts Jordan's percentages (2003) to demonstrate those considered extreme (atypical), which need further analysis to verify the possible reasons for changes in budget execution: positive equal to or greater than 35% and / or negative 25% or more as punctuated variation (Punctuated Equilibrium Theory). The other variations are considered incremental - stability (Incremental Theory). The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to test the normality or otherwise of variations in budget execution of expenditures in order to identify in the histogram whether the distribution is normal or leptocurtic (more tapered distribution with a higher peak than normal distribution - is heavy and flatter). The use of these tests follows the guidelines of Fávero *et al.* (2009).

The association or not of the explanatory variables with the binary dependent variables was performed with the regression modeling of Modelo Linear Generalizado (MLG or GLM in English: *Generalized Linear Models*) - exponential regressions. The components for any GLM are: the random component (probability distribution); the systematic component (specification of the explanatory variables) and the linkage function (( $\eta$  or  $g(\mu)$ ), which specifies the link between the random and systematic components.

A Generalized Linear Model (MLG or GLM) is defined as follows

$$\eta_1 = \alpha + \beta_1.X_{1i} + \beta_2.X_{2i} \dots + \beta_k.X_{ki} \quad (1)$$

where:  $\eta$  is known as a canonical link function;  $\alpha$  represents the constant;  $\beta_j$  ( $j = 1, 2, \dots, k$ ) are the coefficients of each explanatory variable and correspond to the parameters to be estimated;  $X_j$  are the explanatory variables (metrics or dummies) and the subscripts  $i$  represent each of the observations of the sample under analysis ( $i = 1, 2, \dots, n$ , where  $n$  is the sample size).

There are no restrictions (assumptions) for the use of GLM, except for the type of probability distribution used (random component), the specification of variables (systematic component) and the choice of the link function (McCullagh & Nelder, 1989; Breslow, 1996; Lindsey, 1997; Olsson, 2002; Liang, 2002; Swan, 2006; Agresti, 2007; Cordeiro & Demétrio, 2008; Myers *et al.*, 2010; Fávero, 2015; Abdulkabir *et al.*, 2015). The distribution used was Bernoulli's, in which the variables can assume two numerical values 0 or 1, where 1 corresponds to an event and 0 corresponds to a non-event. The Bernoulli distribution is a discrete distribution that is related to several distributions, such as the negative binomial, geometric and binomial distribution. It represents the result of an essay. Statistical calculations were performed with SPSS 21.

## 4 RESULTS AND DISCUSSIONS

Table 2 shows the percentage changes in budget expenditures from 1980 to 2018. The variations were calculated to define the variables dependent on budget execution based on Incremental and Punctuated Balance Theories.

**Table 2**

Percentage changes in budget expenditures (1980-2018)

Years	%	Years	%	Years	%	Years	%
1981*	-9,80	1991*	-58,69	2001*	-11,30	2011*	27,48
1982*	4,83	1992*	25,75	2002*	-1,46	2012*	24,84
1983*	-5,34	1993*	15,71	2003*	5,76	2013*	19,38
1984*	-4,95	1994*	8,18	2004*	-5,28	2014*	53,96
1985*	18,49	1995*	7,58	2005*	15,01	2015*	19,84
1986*	73,48	1996*	7,54	2006*	4,33	2016*	21,42
1987*	-9,29	1997*	25,59	2007*	-5,59	2017*	4,35
1988*	25,14	1998*	23,26	2008*	-37,89	2018*	6,68
1989*	135,34	1999*	5,68	2009*	11,67		
1990*	43,40	2000*	-7,94	2010*	21,89		

Subtitle: \* 1981/1980 variations and sequences.

Source: research data.

The initial year of 1980 does not appear in Table 2, since it represents the starting point (base) to demonstrate the variations. The calculations were performed by dividing the variable value for the following year by the previous one (1981/1980 and sequences), shown in decimal numbers multiplied by 100. Thus, the values represent the index numbers of percentage of positive or negative variation (formula in Excel =  $((x2 / x1) - 1) * 100$ ).

In Table 2, the atypical abrupt variations (Punctuated Balance Theory) highlight the execution of budgetary expenditures in 1986/1985 (73.48%) and 1989/1988 (135.34%), both under José Sarney's government; 1990/1989 (43.40%) and 1991/1990 (-54.69%), both under Fernando Collor's; 2008/2007 (-37.89%) under Luiz Inácio Lula da Silva's and 2014/2013 (53.96%) under Dilma Rousseff's government.

José Sarney's government was marked by a period of high inflation and several economic plans (Plano Cruzado, Bresser and Verão). The government tried to control public spending, contain high inflation and renegotiate foreign debt. Attempts to improve the economy can be seen as explanations for the unusual variations in José Sarney's government. Fernando Collor's government was also marked by the fight against hyperinflation and with economic plans that included actions of impact such as: reduction of the administrative machinery with the extinction or merger of ministries and public agencies, dismissal of public employees and the freezing of prices and salaries. The variations noted in Fernando Collor's government can also be clarified by the form of his government.

The year 2008 was one of the most intense in the world economy, with negative results in banks, bankruptcies, billionaire government plans, high dollar and economic crises. The negative variation of -37.89% in Lula's government can be explained by reflexes of the international economy in Brazil. In Dilma Rousseff's

government the punctuated variation (53.96%) can be explained by the electoral year and the Soccer World Cup in Brazil, in 2014.

Table 3 presents the results of the normality tests of budgetary expenditures, from the period 1980 to 2018.

**Table 3**  
Normality test of budget expenditures (1980-2018)

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Variations	0,213	38	0,000*	0,838	38	0,000*

Kurtose: 6,977

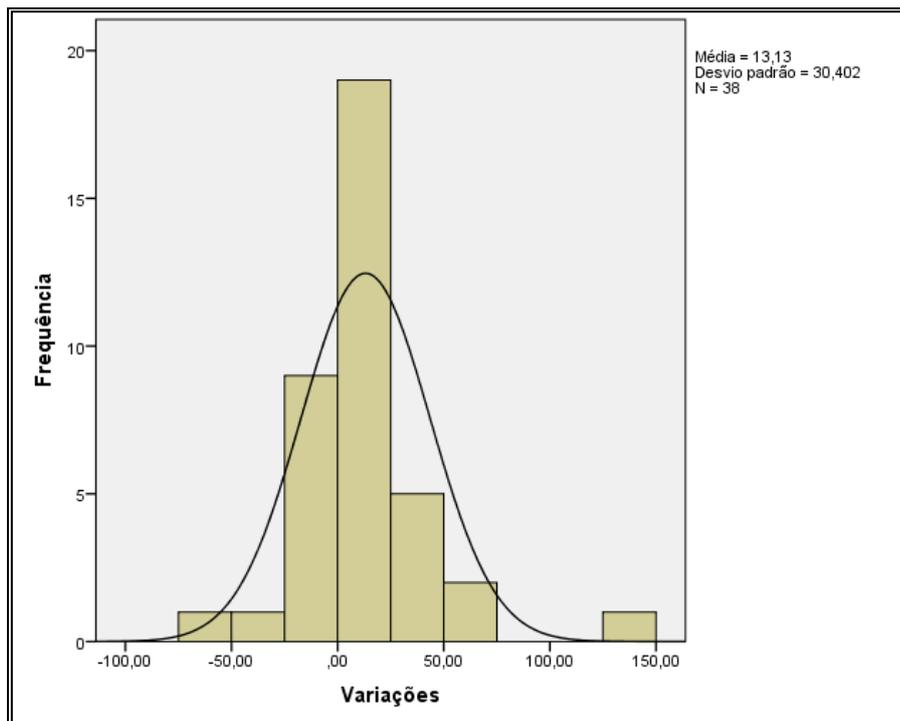
Subtitle: \* = leptocurtic distribution

Source: research data.

Table 3 shows that Kolmogorov-Smirnov and Shapiro-Wilk tests have a p-value  $<0.05$  (kurtosis statistics of 6,977), which indicates a leptocurtic distribution and proves the non-normality of the frequency curve. This means that Federal Government's budget execution policy for expenditures, from 1980 to 2010, presents behaviors of sudden changes (atypical) and stability, which is compatible with the Punctuated Balance Theory.

These results are corroborated with the research by Carvalho (2018), although the author has analyzed the Government's budget execution (1980-2014) by government functions (Legislative; Judiciary; Administration and Planning; Health and Sanitation, etc.)

Figure 1 shows the frequency histogram of the percentage changes in budget expenditures. It is observed that Figure 1 validates the analyzes presented in Table 3. The histogram has a leptocurtic distribution (the distribution function curve is more tapered with a higher peak than the normal distribution). This result confirms the hypothesis of True, Jones and Baumgartner (2007), according to which annual budgetary variations have a leptocurtic distribution, that is, a distribution with a small central peak demonstrating the logic of stability, relatively low occurrence of moderate changes and, in the bottom, the occurrence of budgetary scores (sudden changes - atypical).



**Figure 1** Histogram of frequency of changes in budget expenditures. Source: research data.

Table 4 presents the results of the regression of the generalized linear model (GLM). In the robust regression, Bernoulli distribution was used with the Logit link function, which is appropriate for the leptocurtic distribution (Table 3).

**Table 4**

Results of the regression of the generalized linear model (GLM)

Iteration 1	Deviance	26,90433
Iteration 2	Deviance	25,50264
Iteration 3	Deviance	25,38466
Iteration 4	Deviance	25,38323
Iteration 5	Deviance	25,38323
Generalized Linear Model	Number of observations	38
	Degrees of freedom (df)	32
Optimization: Fisher Punctuation	(1/df) Deviance	0,7932259
Deviance = 25,38322833	(1/df) Pearson	1,303874
Deviance (p-value)		
Pearson = 41,72397369		
Probability Distribution: $V(u) = u*(1-u)$	Bernoulli	
Link function: $g(u) = \ln(u/(1-u))$	Logit	
Robust		
	Coefficient	Chance Ratio
		Standard Error (RC)
		z
		P>z
		Confidence Interval of 95% (RC)
REC	9,574	0,00007
POP	-90,888	2,87e+39
PIB	0,003	0,9971996
SENADO	1,274	0,2795876
CAMARA	-1,336	3,806767
Constant	607,883	1,2e-264
		2,8e-262
		-2,60
		0,009
		0
		1,67e-65
		2,62e-08
		0,017 *
		0,010*
		0,041*
		0,111
		0,216
		0,9945153
		0,04576389
		31,66574
		3,05e+69
		0,9998912
		1,342307
		1,342307
		0,058235
		0,04576389
		31,66574
		1,67e-65
Subtitle: * = significance <0.05; RC = Chance Ratio Indicators.		

Source: research data.

Table 4 shows that the probabilities of occurrence (association with the dependent variation) were significant (p-value <0.05) for the variables Revenue Raised (REC), Population (number of inhabitants - POP) and Gross Domestic Product per capita (GDP). The odds ratio or odds ratio were also significant for not having a value of 1, which would indicate the hypothesis of 50% of the event occurring or not. The Revenue Raised (REC) and the Gross Domestic Product for having the value less than 1, indicates a lesser chance of the event happening, which goes against the expected situation of Hypotheses H1 and H3. The Population variable (POP) with an odds ratio above 1 indicates that there is a greater chance that the event will happen. This result combined with the negative sign of the coefficient corroborates the expected situation of Hypothesis H2. The variables of Hypothesis H4 - Party Political Competition (SENADO and CÂMARA), for having a value above the significance level of 0.05 (0.111 for the Senate and 0.216 for the Chamber), are not analyzed (statistically it is not possible to make inferences).

Analyzing the hypotheses of the study, it is observed that it does not reject Hypothesis 1 (H1) tested in the variable Revenue Raised (REC) with the p-value of 0.017 and the coefficient of 9.574 (positive expected sign). Thus, with the confidence level in 95%, there is a positive and significant effect between the revenue collected from the execution of the budgetary expenditure, therefore, a

higher collection can increase public services. This result is corroborated with Ukwueze (2015) and Lojanica's research (2015). However, it should be noted that spending levels must correlate with the growth of the economy in order to avoid fiscal deficits (Lojanica, 2015).

Hypothesis 2 (H2) with the variable number of inhabitants (population - POP) with a p-value of 0.010 and a coefficient of -90.888 (negative expected sign) is not rejected with a confidence level of 95%. This result indicates that the number of inhabitants (population) has a negative and significant effect with the budgetary execution of the expenditure (proxies punctuated and / or incremental variations). The increase in the number of inhabitants causes a decrease in the State's assistance in public services, mainly with the aging of the population (Bezdek, Dyczak & Krejdl, 2003; Zokalj, 2016).

The explanatory variable Gross Domestic Product per capita had a p-value of 0.041 and a coefficient of 0.003, demonstrating the positive and significant effect on the execution of the Federal Government budget expenditure. This means that, with confidence level in 95%, Hypothesis 3 (H3) is not rejected. This result differs from the research by Rosenthal and Wolfson (2013), as they do not find statistical significance, but it is corroborated with Silva and Triches' studies (2014). Although Sakurai (2009) analyzed the ratio of expenditures by budgetary functions of municipalities, the result of his research found influence of the national GDP on the behavior of expenditures of Brazilian municipalities.

## 5 FINAL CONSIDERATIONS

The public policy formulation process is complex since it involves several party, institutional and economic ideological variables. Public budget policy deals, in summary, with obtaining public resources (revenues) to fund public services (expenses) for the well-being of the community. The solution of problems to serve the community includes several variables: agenda; alternatives; proposals; decisions; interests; conflicts; lobbying; cost benefit analysis, etc. Thus, finding factors for policy makers that can prospectively signal to solve these problems is relevant.

In this perspective, this study analyzes, among a set of factors, what the determinants of the budget execution policy in Brazil were, from 1980 to 2018. The variations of budget execution from one year to the next, with theoretical support from the Theory Incremental and Punctuated Equilibrium, were the basis for determining the determining factors (associated).

Among the theories used to analyze budgetary policy, the Punctuated Balance Theory highlights when explaining the stability and the change in the formulation of these policies as a central hypothesis. Formulated to make arguments about the formulation of public policies in the United States, it is observed that it is used by researchers from several countries (China, Ethiopia, Nigeria, Brazil, etc.). The Incremental Theory, although considered included in the Theory of Punctuated Equilibrium, remains valid to support analyzes of stability of budget execution.

This study theoretically contributes to the literature on factors that can be considered determinants in budgetary decisions. Empirically it contributes to the use of the regression modeling of the Generalized Linear Model by spreading the

use of exponential regressions (Bernoulli, Binominal, Gama, Poisson, Poisson-Gama, Tweedie etc.) distribution. These regressions, in addition to presenting flexibility in the restrictions (except for the type of distribution), when using robust regression, the assumption distortions are also corrected. The Generalized Linear Model also includes the normal distribution, but in this case it is mandatory to verify the assumptions of linearity, independence of errors, normality of the distribution of errors, homoscedasticity and multicollinearity.

It is expected to encourage more related research, considering that these discussions are relevant to society. This investigation cannot infer Hypothesis 4 (H4), which tested the party opposition of the Presidents of Câmara dos Deputados and Senado to the President of the Republic (political competition) with a negative and significant effect with the execution of the budgetary expenditure, considering that the level of significance exceeded the expected (p-value of 0.05). Other researches may replicate this approach in State and Municipal Governments, as well as expand the situation of party competition in other dimensions (Coalition Parties, Centrão, etc.).

It should be noted that statistical modeling is robust when using large data series (samples larger than 30). In the United States and Canada, researchers find data from more than 100 years ago. The larger data series and the evolution of statistical software allowed analysis for the development of the Incremental Theory and the Punctuated Equilibrium Theory in the United States. Secretaria do Tesouro Nacional (STN), in Brazil, is responsible for the disclosure of the data on the consolidation of public accounts, but only the data for the year 2000 are available on its website. In the case of Federal Government data, data are disclosed of budget revenues and expenses since 1980.

Finishing the study and answering the research problem, the results showed that the variables revenue collected (Hypothesis 1) and the Gross Domestic Product per capita (Hypothesis 3) had a positive and significant effect with the execution of budget expenditure (stability and punctuated variations), in other words, higher collections and Gross Domestic Product per capita, lead to an increase in public services at the federal level. However, as resources are scarce, it should be noted that spending levels must correlate with the growth of the economy. The variable number of inhabitants (population) has a negative and significant effect with the budgetary execution of the expenditure (Hypothesis 2), showing that the increase in the number of inhabitants causes a decrease in the State's assistance in public services, mainly with the aging of the population. The variables of the party opposition of the Presidents of Câmara dos Deputados and Senado Federal to the President of the Republic (political competition) were not statistically significant (Hypothesis 4).

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