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Article

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Budget institutions and fiscal performance of the Brazilian Federal Government

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Abstract

This article aims to assess the impact of federal budget institutions on the primary deficit of the Brazilian Federal Government from 1985 to 2009, a period marked by important changes in these institutions. Based on the methodology established in the literature on political economy that is linked to the macroeconomic mainstream, three sets of budget indices and their respective sub-indices are constructed, and their behaviour over the period of analysis indicate that the changes made have resulted in institutions that induce greater fiscal discipline. Regarding the effect of these institutions on the fiscal performance, the results allow us to conclude that the institutional changes have contributed to a lower government deficit.

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Keywords: Budget institutions; Government deficit; Budget

JEL classification: H61; H62

Resumo

O presente artigo tem por objetivo avaliar o impacto das instituições orçamentárias federais no déficit primário do Governo Federal, no período de 1985 a 2009, período este marcado por importantes mudanças nestas instituições. Com base na metodologia estabelecida na literatura de economia política ligada ao mainstream macroeconômico, três conjuntos de índices orçamentários e seus respectivos subíndices são construídos, e o seu comportamento ao longo do período analisado mostra que as mudanças realizadas resultaram em instituições que induzem a uma maior disciplina fiscal. No que tange ao impacto destas instituições sobre o resultado fiscal, os resultados permitem concluir que as mudanças institucionais contribuíram para um menor déficit público.

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Palavras-chave: Instituições orçamentárias; Déficit público; Orçamento

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1. Introduction

The persistent deficits and high government debt scenario experienced by many developed countries from 1975 to 1995 has motivated, since the 1990s, an extensive literature on political economy linked to the mainstream to search in the political–institutional factors for an explanation of these results. Such explanations were based on the behaviour of benevolent planners or the opportunistic behaviour of policymakers or voters' fiscal illusion, or even the restrictions and incentives imposed by political and budget institutions of each country on the behaviour of rulers. Empirical research also extended to developing countries revealed that budget institutions, defined as rules and regulations according to which budgets are prepared, approved and implemented, affect the budget result of the government and its fiscal policy, and more hierarchical/centralised and transparent institutions result in greater fiscal discipline.

In parallel, in Brazil, the important process of reform of its budget institutions can be observed, particularly at the federal level, which was initiated in the 1980s in the context of accelerating inflation, high government deficit and high debt and which changed the institutions of the Military Government. The budget process of the military period, established with the Plan of Economic Action of the Government (Plano de Ação Econômica do Governo – PAEG) and the other reforms undertaken between 1964 and 1967, was marked by three distinct budgets – the fiscal, monetary and state-owned companies budgets – by the centralisation of decision making within the Executive, by the lack of transparency in the decision-making process and by the lack of a comprehensive structure of external control. Moreover, this process was based on a financial arrangement that unified the National Treasury, the Central Bank and the Bank of Brazil: the *conta movimento*, a bank account that represented a simple and flexible tool for the execution of orders of the National Monetary Council (Conselho Monetário Nacional – CMN). The results were mechanisms that provided a lack of control of public expenditures. The reforms implemented since 1986 have sought to dismantle these mechanisms, with the separation of the three institutions and the unification process of the federal budgets,¹ and have initiated the changes that led to a new budget process, whose turning point was the 1988 Constitution. It is noteworthy that this new budget process was not established immediately. The changes performed by the Constitution, through introducing the Multiyear Plan (Plano Plurianual – PPA), the Budget Guidelines Laws (Leis de Diretrizes Orçamentárias – LDO), the Annual Budget Law (Lei do Orçamento Anual – LOA) and the other budget rules, form the main structure of the process. However, its current format is the result of both institutional changes made at the beginning of the New Republic, between 1986 and 1988, and the changes in the 1990s and 2000s, such as changes in the internal control system of the Federal Government and the Fiscal Responsibility Law (Lei de Responsabilidade Fiscal – LRF).

As empirical research revealed that budget institutions do affect the budget result of the government and its fiscal policy, it is essential to assess the impact of these institutions on the Brazilian budget performance, a topic, to our knowledge, underexplored in the Brazilian literature. Thereby, this article seeks to answer the following question: what impact do budget institutions exert on the Brazilian fiscal result? The analysis focuses on the impact of federal budget institutions on the primary deficit of the Federal Government between 1985 and 2009, a period for which there is data available for the primary deficit as a proportion of the GDP, within the concept 'below the line'², and the main hypothesis is that the changes in the Brazilian budgetary institutions contributed to a better fiscal performance.

One approach to assess the changes in the various rules that constitute the budget institutions, and thus to evaluate their impact on the fiscal result, is through the budget indices, which quantify and aggregate the various aspects that compose each institutional arrangement. Thus, based on the methodologies by Alesina et al. (1999) and Dabla-Norris et al. (2010), three sets of indices are constructed for this evaluation. The index proposed by Alesina et al. (1999) is the pioneer in this literature for developing countries and the basis for many subsequent studies. The methodology by Dabla-Norris et al. (2010) incorporates a wider range of institutional features and is designed to assess the budgetary institutions in low- and middle-income countries, allowing features typical of developing countries, such as Brazil,

¹ In January 1986 the *conta movimento* was extinct by the CMN and in March of that year the National Treasury Secretariat (Secretaria do Tesouro Nacional – STN) was created. The STN is subordinate to the Minister of Finance and it is in charge of planning, executing and controlling the financial administration.

² Due to data availability, the model presented in section four is estimated using annual data, which result in a sample with 24 observations. We recognise that the reduced number of observations can compromise the robustness of the econometric results, but since there is no data for a longer period, or at a higher frequency, and this is an important issue that should be evaluated we chose to proceed. A number of different models were estimated and the results were quite robust, giving confidence to the conclusions presented.

to also be considered. Both indices therefore capture different characteristics of the Brazilian budget process.³ Is it noteworthy that the majority of the empirical literature that evaluate the impact of budget institutions on the fiscal result through the budget indices compare different budget institutions across different countries in an given institutional framework. In contrast, this article also contributes to this literature by analysing the issue from a different perspective by assessing the effect of budgetary institutions on fiscal results in the context of institutional change, controlling for its possible endogeneity. The main results indicate that changes in the Brazilian budgetary institutions have contributed to a better primary result of the federal government.

This article is divided into four sections in addition to this introduction. The next section presents the economic literature on institutions and budget indices; section three explains the methodology of budget indices and the results obtained for the Brazilian federal level; section four examines the relationship between budget institutions and the primary fiscal result of the federal government; and the fifth and last section presents the conclusions of the study.

2. Budget institutions

The literature on political economy linked to the mainstream, as Gleich (2003, p. 7) summarises, starts from the idea that institutional structures have a systematic impact on the behaviour and strategic choices of politicians and may, therefore, influence the result of policies generated by a collective decision process.

Regarding the budgetary process, two theoretical and interrelated issues explain its nature and result: the problem of the common pool and the principal-agent model. Concerning the first issue, the decisions on public spending are determined in a decentralised manner by the agents involved in the process, and the cost is financed by a pool of resources. As demonstrated by Persson and Tabellini (2002) and Velasco (1997), each agent sets the amount of expenditure in the utility maximisation process without considering the volume of expenditure set by others, i.e., without internalising the cost of that decision. The result is a level of spending above the socially optimal, generating deficits and debt accumulation in the long term.

In the principal-agent model, in turn, the spending decisions are delegated by the principal to an agent, through explicit or implicit contracts. This relationship is present both among voters (principal) and the government (agent) as well as within government, between the Minister of Finance (principal) and the other ministers (agent). In a scenario of information asymmetry, distinct interest and different incentives, agents can select a volume and type of spending that is different from the preferences of the principal. As Dabla-Norris et al. (2010, p. 5) exemplify, this problem arises when politicians can extract economic rents and appropriate public resources at the expense of voter preferences.

Thus, budgetary institutions can broaden or restrict these incentives, which lead to different fiscal results with respect to the size of the budget, its composition and the form of funding.⁴ In particular, budgetary institutions that centralise the decision-making process tend to reduce the problem of the common pool and produce better fiscal results. Transparency and control tend to mitigate the principal-agent problem.

Budget institutions can be divided into two types: the procedural rules relating to the budget preparation, approval and execution and the numerical fiscal targets, such as the balanced-budget rule. Alesina and Perotti (1996) argue that the balanced-budget rule is a neither necessary nor sufficient condition to ensure fiscal discipline. For the authors, the procedural rules, in particular, the rules for voting and approval of the budget and the degree of transparency are the crucial points. Among the voting rules, the sequence of voting on the budget project and the type of amendments rules allowed in the legislative discussion stand out. Thus, the procedures that first determine the voting on budget size and then its composition, the rules that limit the ability of the Legislature to propose amendments and the rules that require disclosure of the information concerning the preparation and execution of the budget tend to promote fiscal discipline. These institutions, as well as the others that limit the democratic accountability in the budget process, are classified as hierarchical by the authors. On the opposite side are the collegial institutions.

³ The option of using different indices, instead of aggregating their characteristics into a single index, is intended to maintain comparability between the calculated value for the Brazilian institutions and the value displayed for the other countries analysed by these articles, although this comparison is not an object of analysis in this study.

⁴ It is noteworthy that models that focus on budgetary institutions represent a branch of research within the political economy literature that also studies the effects of political-electoral institutions on government spending and the fiscal deficit.

Von Hagen (1992) and Von Hagen and Harden (1994) consider that centralised institutions, i.e., institutions that concentrate on the Executive branch the power to decide on the budget, ensure a lower deficit and debt level for the government. Among these institutions, the following features are noteworthy: in the preparation phase of the budget, the highest prerogative of the Minister of Finance in relation to other ministers to set the amount of the budget expenditure; in the voting phase, the rules that restrict legislative amendments and the agenda-setting, which gives the Executive the power to influence the voting process; and in the execution phase, the degree of control of the Minister of Finance on the expenses performed.

Several empirical works on developed and developing countries present evidence that more hierarchical/centralised and more transparent budgetary institutions result in greater fiscal discipline. These works include those of Von Hagen (1992) and Von Hagen and Harden (1994), for EU countries, Alt and Lowry (1994) for the U.S. states, Alesina et al. (1999), File and Scartascini (2004) and Stein et al. (1988), for Latin America, Gleich (2003) for eastern European countries and Dabla-Norris et al. (2010) for low- and middle-income countries.

With the exception of Alt and Lowry (1994), in all the other studies mentioned, the evaluation of the effect of budget institutions on the fiscal result and government debt was based on the comparison of institutions of different countries through the construction of budget indices. In general, these indices are constructed from a questionnaire, which covers the different institutional features in the preparation, approval and execution phases of the budget, in which scores are assigned to each feature, with the highest value being related to the more hierarchical/centralised institution. These scores are then aggregated using a formula, which can be the simple sum of the assigned values or their average.

Regarding the national literature, there is no knowledge to date of studies for Brazil that seek to evaluate the effect of budgetary institutions on the federal fiscal result based on these indices and for the period considered here. Barroso (2003) uses the budget indices of Alesina et al. (1999), Campos and Pradhan (1996) and Esfahani (2000) for the post-1988 Constitution period of the Brazilian budget process but with a different proposal: the author's goal is to evaluate the resulting institutional framework if the institutional changes proposed by the author were to be adopted. Thus, the present study advances in an area little explored by the Brazilian literature.

3. Budget indices

The study of the impact of Brazilian budgetary institutions on the fiscal result of the Federal Government is based on three sets of indices constructed based on the methodologies of Alesina et al. (1999) and Dabla-Norris et al. (2010). The methodology used by Alesina et al. (1999) assesses the budgetary institutions based on three characteristics: the existence of fiscal rules that limit the ex-ante deficit, i.e., in the preparation and approval phases of the budget; the existence of top-down procedures at the voting phase, i.e., the existence of rules that assign strong prerogatives to the Executive vis-à-vis the Legislature; and transparency. The authors define as hierarchical the budgetary procedures that display these three characteristics and as collegial the procedures with opposite characteristics. The features are evaluated by a set of ten questions along the hierarchical–collegial axis, giving a score 10 to the most hierarchical institutions and zero for to the most collegial ones. Institutions with intermediate characteristics receive scores according to the number of possible answers. The aggregate index (I_{AP}) is calculated as the sum of the scores assigned to each question. In addition to the aggregate index, three sub-indices were developed, also according to the authors' methodology: the sub-index 1 (I_{APsub1}) is considered a measure of borrowing constraint; the sub-index 2 (I_{APsub2}) is related to the political agenda of the budget process, called agenda-setting; and the sub-index 3 (I_{APsub3}) is interpreted as an indirect measurement of transparency.

Dabla-Norris et al. (2010) start from the three characteristics analysed by Alesina et al. (1999) to construct their index and add two others: the sustainability and credibility of institutions and the comprehensiveness of the budget process, both relevant to poor countries, the object of their analysis, and developing countries. Thus, this methodology evaluates the characteristics present in each of the three phases of the budget process – budget planning and negotiation, approval and execution – from five categories: top-down procedures, rules and controls, sustainability and credibility of institutions, comprehensiveness of the budget process and transparency. Therefore, two budget indices are calculated: the stage index that assesses the phases of the budget process (I_S) and the category index that evaluates the categories listed above (I_C). These two indices, in turn, are composed of sub-indices related to each of the three stages – planning and negotiation (S_I), approval (S_{II}) and execution of the budget (S_{III}) – and to each of the five categories – top-down procedures (C_A), rules and controls (C_B), sustainability and credibility (C_C), comprehensiveness (C_D) and transparency (C_E). In total, the budgetary institutions are evaluated based on 33 questions whose scores range from 0 to 4, with

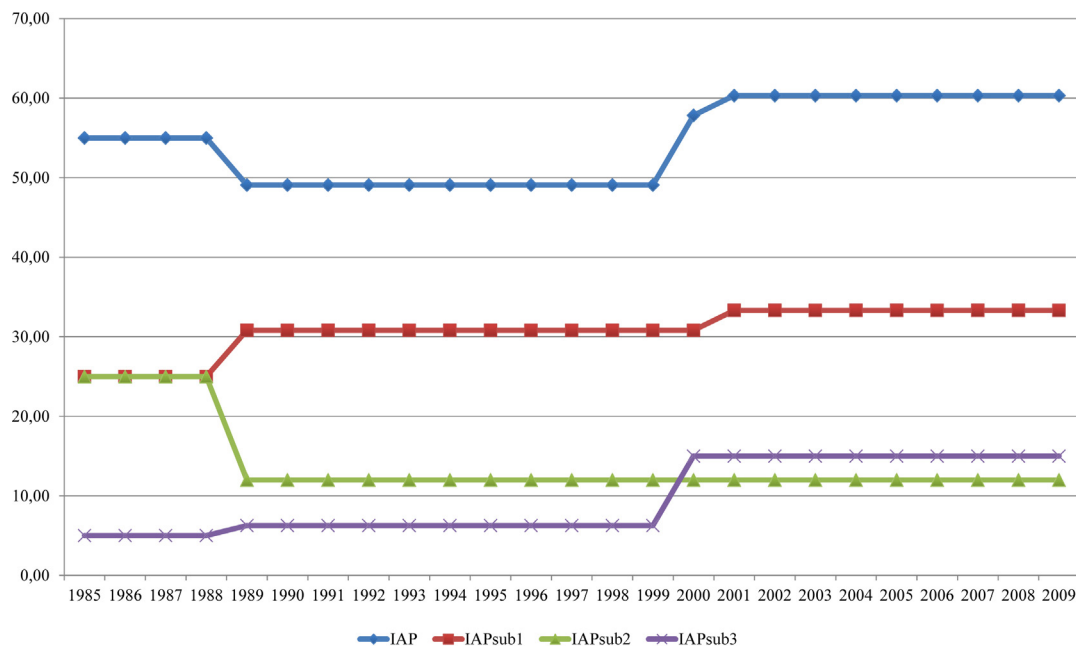
a value of 4 being assigned when the institution has better performance in terms of fiscal discipline. The aggregated indices correspond to the simple arithmetic average of the sub-indices that make up those indices, and the sub-indices are, in turn, calculated as the simple arithmetic average of the scores assigned to the questions that concern them.

It is noteworthy that, although the latter methodology encompasses more features, it does not include some of the aspects covered by Alesina et al. (1999). Thus, neither of the two methods individually captures all aspects of the Brazilian budget process; however, in parallel, they capture a relevant set of questions.

The answers to each of the questions that compose the indices and sub-indices, as well as their respective scores, were based on the detailed analysis of the Brazilian budget process conducted in Giuberti (2012, ch. 4), using the budget legislation established in the Constitution, complementary laws, ordinary laws, decrees and ordinances, as well as the Brazilian empirical literature, which, as a whole, describes the budget practices of the country. Thus, it was possible to assess the budgetary institutions in terms of the budget practice. For the questions that concern the indices and sub-indices, the possible answers for each of them and the respective scores as well as the answers and scores attributed to the Brazilian federal budget process, including its justification, the reader is referred to Giuberti (2012, ch. 5).

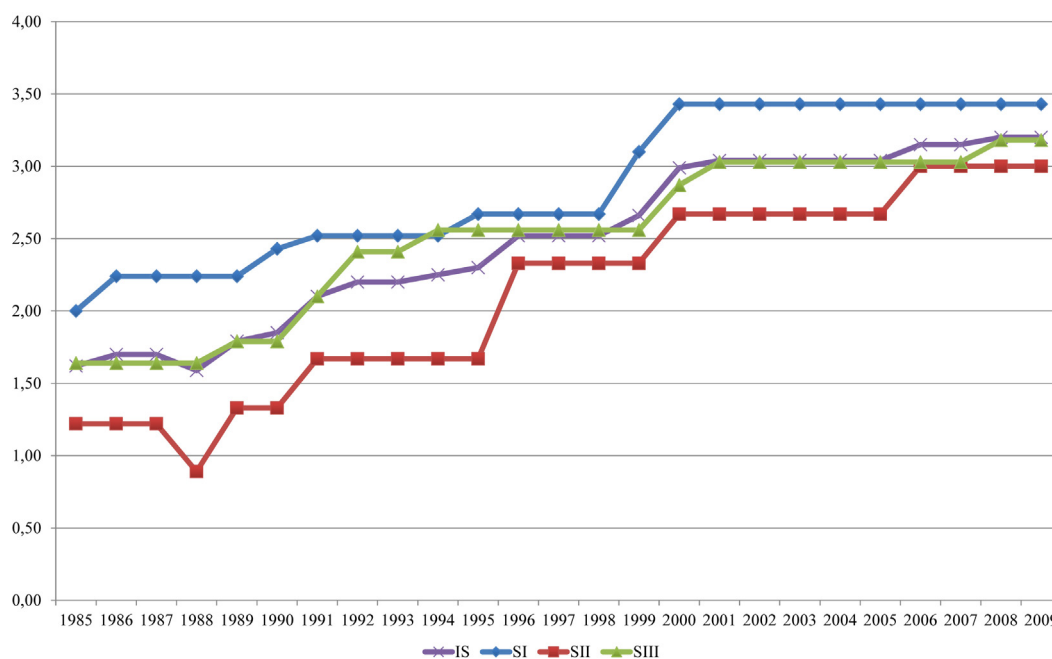
Graphs 1–3 present the results for I_{AP} and its sub-indices of Alesina et al. (1999), I_S and its sub-indices and I_C and its sub-indices of Dabla-Norris et al. (2010). The values of each index and sub-index are listed in Table A1 in the appendix.

Regarding the I_{AP} , a lower score for the federal budgetary institutions from 1989 to 2000 compared with 1985–1988, when the budgetary institutions of the military period were in force, is observed. This result suggests that the budget process established by the 1988 Constitution is less prone to fiscal discipline than the process of the military period, which contradicts the initial expectations, given that the institutional changes made in the mid-1980s were actually intended for a greater control of public accounts. The breakdown of the index reveals that only sub-index 2 has a higher score for 1985–1988 compared with 1989–2000 (Graph 1). The values for sub-index 1, which includes the institutions related to the control of spending and borrowing constraint, indicate that the successive institutional changes in the 1990s and 2000s made these institutions more hierarchical and therefore more conducive to fiscal discipline. Sub-index 3, which is related to the control of the debt of other public entities, also reveals a growing trend due to the changes in the late 1990s and early 2000s.



Graph 1. I_{AP} and Sub-Indices – 1985–2009.

Source: Prepared by the author based on Table A1.

Graph 2. I_S and Sub-Indices – 1985–2009.

Source: Prepared by the author based on Table A1.

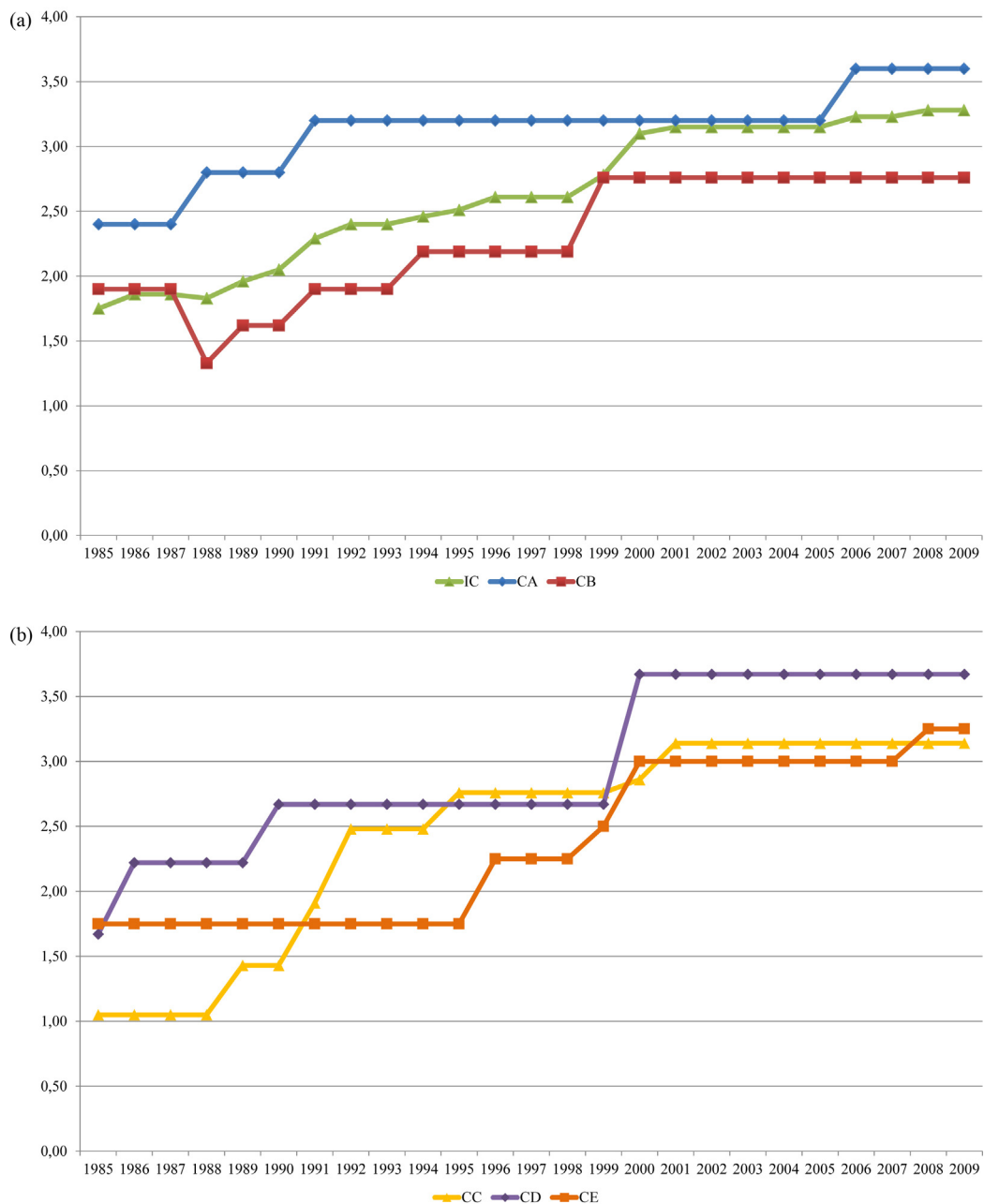
Sub-index 2 comprises the rules on legislative budget amendments and the rules related to delays in the voting or rejection of the budget process. Political negotiations between congressmen and the Executive open space for a minor control of government spending because the release of funds for parliamentary projects may be used as a bargaining chip to support projects of the Executive. This situation is typical of democracies and is also part of the current Brazilian budget process⁵. Thus, rules restricting the scope for this negotiation tend to promote fiscal discipline. According to Alesina et al. (1999, pp. 33–34), the rules prohibiting amendments that increase government spending and the budget deficit and those determining the execution of the proposed budget in case of delay or rejection of the proposal, thus making the relative position of Executive stronger in the negotiation process, are more hierarchical. In addition, these are precisely the rules that prevailed during the military period. Thus, the reforms of the 1988 Constitution rescued, on the one hand, the participation of the National Congress in evaluating and voting upon the budget project but, on the other hand, led to the political game between the Executive and Legislature, which turned budgetary institutions captured by sub-index 2 into less hierarchical institutions according to Alesina et al.'s (1999) classification.

However, the other institutional changes made in the late 1990s and early 2000s, such as the greater constraint on the contracting of loans by States, Municipalities and public companies, the end of the claim by the Federal Government of debts contracted by these entities and the introduction of targets for the primary result, captured by sub-indices 3 and 1, respectively, were institutional changes strong enough to counteract the current agenda-setting, resulting in an institutional arrangement more prone to fiscal discipline.

I_S and I_C , calculated using the methodology of Dabla-Norris et al. (2010), exhibit continuous growth over the analysed years, demonstrating that changes in Brazilian budgetary institutions as a whole have increasingly favoured fiscal discipline. It is observed that the higher growth rates for these indices occur in the period from 1989 to 2000, not because of specific changes in the budget process but because of institutional changes that affected all the stages of the process and all the categories, as can be observed in the behaviour of the sub-indices (Graphs 2, 3A and B).

The largest growth from 1989 to 2000 contrasts with the result determined by the methodology of Alesina et al. (1999), in which after the promulgation of the 1988 Constitution, there is a decrease in the value of the index for the same period. In that methodology, the rules on legislative budget amendments and the rules relating to delays in the

⁵ Mendes (2009) and Alston et al. (2005).



Graph 3. (A) I_C and Sub-Indices – 1985–2009. Source: Prepared by the author based on Table A1. (B) I_C and Sub-Indices – 1985–2009. Source: Prepared by the author based on Table A1.

voting or rejection of the budget proposal were those that led to a decline in the period after the 1988 Constitution. In this methodology, in addition to the weight of these issues being lower in the stage indices (I_S), category indices (I_C) and sub-indices, the treatment given to the issue of amendments is different: while in Alesina et al.'s (1999) methodology, the rules of the military regime corresponded to the more hierarchical procedure, for Dabla-Norris et al. (2010), in practice, the prohibition of introducing amendments to the budget does not contribute to fiscal discipline. When analysing a larger set of issues relating to the budget process, the behaviour of the index of Dabla-Norris et al. (2010) is not affected by a single budgetary institution.

The increase observed for the sub-indices related to the stages of planning and negotiation (S_I), approval (S_{II}) and execution of the budget (S_{III}) over the period of analysis did not change the relative position of these sub-indices with respect to fiscal discipline: the budgetary institutions that govern the preparation promote a greater control of government spending compared with institutions that manage the execution, and these, in turn, stand out compared with the institutions that define the approval of the budget ([Graph 2](#)).

Regarding the budget categories ([Graphs 3A and B](#)), institutional changes are observed to have strengthened the powers of the budgetary authority in terms of the definition of the main budgetary aggregates (C_A), expanded the existing rules and controls in the budgetary process (C_B), increased the sustainability and credibility of the budget (C_C), as well as its comprehensiveness (C_D), and made the current process more transparent (C_E). The sub-index C_C exhibited the highest growth rate between 1985 and 2009, which was a result of the higher relative integration between planning and budget established by the 1988 Constitution, particularly between the LDO and LOA; the inclusion of new information on the budget bill, such as the macroeconomic projections determined by the LRF; the expansion in the scope of analysis of the Legislature on fiscal policy and the budget; and the monitoring of public companies and sub-national governments. Regarding the C_E sub-index, this was the last index to start its growth trajectory. The institutional changes that promoted greater transparency of the current budget process were performed only recently, with the start of the public hearings held by the Legislature in 1996, the expansion of the access to the budget bill in 1999 and the dissemination of Fiscal Management Reports (*Relatórios de Gestão Fiscal – RGF*) and Summary Budget Execution Reports (*Relatórios Resumidos da Execução Orçamentária – RREO*) by the LRF in 2000.

Finally, according to the methodology proposed by [Dabla-Norris et al. \(2010\)](#), the changes that made the most progress towards greater fiscal discipline did not occur after the adoption of the inflation targeting system by the Brazilian government, which requires fiscal discipline, but throughout the 1990s in an environment of severe fiscal problems in the country. The LRF is therefore an important milestone for the management of public resources, but it should be seen as part of a process initiated in the 1980s and that remains ongoing.

4. Budget institutions and fiscal results

In the empirical literature that studies the budget institutions, the main question that budget indices seek to answer is: what impact do these institutions exert on the fiscal result? Various models, samples and estimation methods are used to evaluate the possible effects. The common point of these studies, as mentioned in section 2, is the use of samples from a group of countries, whether for a single period (cross-section) or for multiple periods (panel). The primary result of the public sector or the central government, usually as a percentage of GDP, is then regressed on the indexes, with the economic and demographic characteristics of these countries used as control variables, for example, the GDP growth rate, the degree of openness to trade, the initial level of government debt or its share in GDP, the percentage of the population above 65 years and below 15, among others. This was the path used by [Alesina et al. \(1999\)](#) and [Dabla-Norris et al. \(2010\)](#).

Another method to assess the impact of institutions on the fiscal behaviour of the government is to estimate a fiscal policy reaction function, as performed by [Debrun and Kumar \(2007\)](#), in which the primary result of the government in a period t is a function of the government debt in the $t - 1$ period, with both variables being a proportion of the GDP, and a set of control variables, including the budget indices.

Proposed by [Bohn \(1998\)](#), in the context of government debt sustainability, this function initially intends to investigate the fiscal policy reaction when encountering an increase in the debt/GDP ratio. According to the author, a positive response of the primary surplus (or a negative one of the deficit) to an increase in the debt/GDP ratio indicates that the government is taking measures to neutralise the increase in debt, which can be interpreted as evidence of its sustainability.

[Mello \(2008\)](#) uses this function in the context proposed by [Bohn \(1998\)](#) to study the sustainability of the Brazilian government debt from January 1995 to July 2004 and includes in the analysis the impact of two institutional changes that occurred during this period: the Senate Resolution no. 78 in 1998, which changed the rules for the indebtedness of states and municipalities, and the enactment of the LRF in 2000. The objective was to verify whether these two institutional changes altered the way fiscal policy reacts to an increase in the government debt. Therefore, an interaction term between debt and each dummy that captures these changes was included in the estimated model. For LRF, the results revealed a lower response of the federal government fiscal policy to the increase in debt, which contradicts the

expected effect. Conversely, the primary surplus of regional governments began to respond positively to an increase in debt following the Senate resolution.

The study developed here follows the same line of [Debrun and Kumar \(2007\)](#) and [Mello \(2008\)](#) and investigates the impact of budgetary institutions on the fiscal result based on the fiscal policy reaction function. Because the objective is to assess the direct effect of institutions in the government deficit and not its effect on the fiscal policy response to an increase in government debt, as in [Mello \(2008\)](#), budget indices were directly included in the estimated model, following [Debrun and Kumar's \(2007\)](#) article.

Thus, the following reaction function was estimated for the Brazilian fiscal policy:

$$b_t = \alpha_0 + \alpha_1 b_{t-1} + \alpha_2 d_{t-1} + \alpha_3 I_t + \alpha_4 h_{t-1} + u_t \quad (1)$$

where b_t represents the variable primary deficit/GDP, d_t represents the net debt/GDP, I_t represents the budget index, and h_t represents the output gap, as a control variable. A full description of the variables used, how it was constructed, as well as the source of data, is presented in [Box A1](#) of the Appendix. It is noteworthy that, in line with the object of study of this work, the primary deficit and the net debt refer to the federal government and the Central Bank.

Since a time series data is being used, it is necessary to test for the presence of a unit root in the economic variables before estimating equation. The presence of a unit root was tested using the modified Dickey–Fuller (ADF-GLS) test proposed by [Elliot et al. \(1996\)](#) and the modified Phillips–Perron (MZ α -GLS) test proposed by [Ng and Perron \(2001\)](#). These tests have as a null hypothesis the presence of a unit root and are an improvement of the traditional Dickey–Fuller (ADF) and Phillips–Perron (PP) tests by overcoming the low power⁶ and size distortions problems that the original tests present.⁷

[Table 4](#) shows the results for the economic variables primary deficit/GDP, net debt/GDP and the output gap, and in all cases, the series were considered stationary.⁸ Therefore, Eq. (1) was estimated by ordinary least squares (OLS) for each of the indices and sub-indices calculated in the previous section for the years 1985–2009. As stated in the introduction, the analysis starts in 1985, as this is the first year in which the primary result data are available for the concept below the line.

Two initial conclusions can be drawn from the results listed in the OLS columns of [Tables 1–3](#). The first conclusion is that fiscal policy reacts to an increase in the net debt/GDP ratio to reduce the primary deficit – the estimated coefficients are negative and statistically significant. The second conclusion is that the Brazilian budgetary institutions affect the result of the federal government fiscal policy, and this impact corroborates the hypothesis that the more hierarchical/centralised institutions reduce the government deficit. In all but one of the regressions, the estimated coefficients for the indices and sub-indices were negative and statistically significant. The exception was sub-index I_{apsub2} , whose positive and statistically significant coefficient derives from changes in the rules for parliamentary amendments to the budget and norms for delayed voting or rejecting the budget bill. According to the methodology of [Alesina et al. \(1999\)](#), the new rules established by the 1988 Constitution made these institutions less hierarchical in a period in which a lower primary deficit is observed, which results in the positive relationship noted.

A potential problem with the data used can make the results obtained by OLS invalid: the possible endogeneity of budgetary institutions since these institutions can be changed due to unsatisfactory fiscal results. The analysis presented in [Giuberti \(2012\)](#) indicates that both the reforms undertaken between 1964 and 1967 and the reorganisation of the federal finance in the 1980s had as background a budget deficit context, which was particularly severe in the 1980s. However, if the unsatisfactory fiscal result raises the need for institutional change, the date on which the change actually occurs depends mainly on the result of the political process. As [Gomes \(1999, pp. 37–40\)](#) stresses, since the early 1980s, government officials had already identified problems in the institutional design of government spending that allowed the lack of control of government finances; however, the remedial measures were delayed because this arrangement suited the centralising character of the military regime. A commission to evaluate the necessary reforms was formed only in 1984 by the National Monetary Council, and the proposed changes, which should have been launched in 1985, were only performed starting in 1986, when the political and economic conjuncture permitted these changes.

⁶ The tendency to not reject the null hypothesis when it is false.

⁷ For a formal description of these tests, see [Enders \(2014\)](#).

⁸ It should be noticed that in the presence of structural break the above tests have low power and tend not to reject the null hypothesis of unit root. But, since those tests did reject the null hypothesis, it is argued that this is evidence that the mentioned problem is not an issue. Nevertheless, the [Perron \(1989\)](#) test was applied and the series were considered stationary. The results are available upon request.

Table 1
Fiscal reaction function– I_C and sub-indices.

Variable	OLS	TSLS			OLS	TSLS			OLS	TSLS		
		<i>D</i>	<i>F</i>	DF		<i>D</i>	<i>F</i>	DF		<i>D</i>	<i>F</i>	DF
Primary deficit _{<i>t</i>−1}	0.044 [0.150]	−0.085 [0.234]	−0.160 [0.213]	−0.138 [0.210]	0.177 [0.183]	0.173 [0.179]	0.108 [0.186]	0.140 [0.177]	0.007 [0.161]	−0.607 [0.560]	−0.415 [0.280]	−0.385 [0.259]
Net debt _{<i>t</i>−1}	−0.058* [0.008]	−0.053* [0.013]	−0.051* [0.014]	−0.052* [0.014]	−0.067* [0.006]	−0.067* [0.006]	−0.065* [0.006]	−0.066* [0.006]	−0.059* [0.010]	−0.042 [0.031]	−0.048** [0.021]	−0.049** [0.020]
Output gap _{<i>t</i>−1}	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]
I_C	−0.013* [0.003]	−0.018* [0.007]	−0.021* [0.007]	−0.020* [0.006]	–	–	–	–	–	–	–	–
C_A	–	–	–	–	−0.018* [0.004]	−0.019* [0.005]	−0.024* [0.008]	−0.021* [0.008]	–	–	–	–
C_B	–	–	–	–	–	–	–	–	−0.015* [0.004]	−0.039*** [0.021]	−0.032* [0.010]	−0.030* [0.009]
Constant	0.040* [0.010]	0.050* [0.014]	0.056* [0.015]	0.054* [0.014]	0.066* [0.013]	0.067* [0.015]	0.082* [0.024]	0.075* [0.024]	0.039* [0.011]	0.082 [0.037]	0.068* [0.019]	0.066* [0.019]
R^2	0.768	0.751	0.726	0.734	0.764	0.764	0.752	0.761	0.768	0.459	0.622	0.642
Cragg–Donald <i>F</i> -statistic	–	11.259	16.549	8.626	–	41.958	42.680	34.309	–	2.241	6.953	3.427
Durbin–Wu–Hausman χ^2 statistic	–	1.760 (0.185)	2.695 (0.101)	2.583 (0.108)	–	0.010 (0.922)	1.918 (0.166)	0.887 (0.346)	–	1.586 (0.208)	2.800*** (0.094)	2.464 (0.117)
<i>C</i> test	–	–	–	0.311 (0.577)	–	–	–	1.112 (0.292)	–	–	–	0.369 (0.544)
Primary deficit _{<i>t</i>−1}	0.122 [0.180]	0.077 [0.198]	0.032 [0.183]	0.044 [0.183]	0.102 [0.123]	−0.237 [0.342]	−0.459 [0.476]	−0.330 [0.369]	0.149 [0.135]	−0.298 [0.315]	−0.401 [0.408]	−0.327 [0.357]
Net debt _{<i>t</i>−1}	−0.064* [0.008]	−0.063* [0.010]	−0.063* [0.011]	−0.063* [0.011]	−0.053* [0.008]	−0.034 [0.021]	−0.021 [0.029]	−0.028 [0.029]	−0.060* [0.009]	−0.043*** [0.024]	−0.039 [0.026]	−0.040 [0.025]
Output gap _{<i>t</i>−1}	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]
C_C	−0.009* [0.002]	−0.010* [0.003]	−0.011* [0.003]	−0.011* [0.003]	–	–	–	–	–	–	–	–
C_D	–	–	–	–	−0.010* [0.003]	−0.020** [0.009]	−0.027** [0.013]	−0.023** [0.013]	–	–	–	–
C_E	–	–	–	–	–	–	–	–	−0.008** [0.003]	−0.023** [0.008]	−0.026** [0.009]	−0.025** [0.008]
Constant	0.028* [0.007]	0.031* [0.007]	0.034* [0.008]	0.033* [0.008]	0.032* [0.010]	0.055** [0.020]	0.070** [0.028]	0.061** [0.022]	0.026* [0.008]	0.049* [0.014]	0.055* [0.017]	0.053* [0.015]
R^2	0.766	0.763	0.753	0.756	0.715	0.620	0.455	0.561	0.720	0.470	0.341	0.380
Cragg–Donald <i>F</i> -statistic	–	20.249	37.679	20.337	–	6.696	5.971	3.632	–	3.179	4.207	2.111
Durbin–Wu–Hausman χ^2 statistic	–	0.486 (0.486)	1.490 (0.222)	1.041 (0.308)	–	2.217 (0.137)	3.464*** (0.063)	2.507 (0.113)	–	2.034 (0.154)	3.842** (0.050)	3.617*** (0.057)
<i>C</i> test	–	–	–	0.271 (0.603)	–	–	–	0.845 (0.358)	–	–	–	0.123 (0.726)

Source: Results of Eq. (1) estimated from the data presented in Table A1. Software Eviews 8.0.

Notes: Adjusted sample 1986–2009 (24 observations).

* Significant at 1%.

** Significant at 5%.

*** Significant at 10%.

Robust standard error in brackets and *p*-value in parentheses.

Table 2
Fiscal reaction function – I_S and sub-indices.

Variable	OLS	TSLS			OLS	TSLS		
		<i>D</i>	<i>F</i>	DF		<i>D</i>	<i>F</i>	DF
Primary deficit _{<i>t</i>−1}	0.058 [0.148]	−0.103 [0.240]	−0.154 [0.208]	−0.143 [0.207]	0.072 [0.134]	−0.202 [0.291]	−0.336 [0.310]	−0.283 [0.285]
Net debt _{<i>t</i>−1}	−0.059* [0.008]	−0.054* [0.014]	−0.052* [0.014]	−0.052* [0.014]	−0.056* [0.009]	−0.044** [0.017]	−0.038*** [0.020]	−0.040** [0.019]
Output gap _{<i>t</i>−1}	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]
I_S	−0.012* [0.003]	−0.018** [0.006]	−0.019* [0.006]	−0.019* [0.006]	–	–	–	–
S_I	–	–	–	–	−0.013* [0.004]	−0.023** [0.009]	−0.028** [0.010]	−0.026** [0.009]
Constant	0.035* [0.009]	0.046* [0.012]	0.049 [0.013]	0.048 [0.012]	0.040 [0.012]	0.064 [0.021]	0.075* [0.024]	0.071* [0.021]
R^2	0.763	0.737	0.717	0.721	0.743	0.672	0.586	0.623
Cragg–Donald	–	9.453	15.874	7.914	–	6.459	7.505	4.033
<i>F</i> -statistic	–	–	–	–	–	–	–	–
Durbin–Wu–Hausman	–	1.948 (0.163)	2.901*** (0.089)	3.038*** (0.081)	–	2.213 (0.137)	4.026** (0.045)	3.482*** (0.062)
χ^2 statistic	–	–	–	–	–	–	–	–
<i>C</i> test	–	–	–	0.134 (0.714)	–	–	–	0.440 (0.507)
Primary deficit _{<i>t</i>−1}	0.101 [0.143]	−0.116 [0.254]	−0.103 [0.200]	−0.104 [0.200]	0.052 [0.156]	−0.020 [0.213]	−0.096 [0.201]	−0.071 [0.197]
Net debt _{<i>t</i>−1}	−0.062* [0.008]	−0.056* [0.014]	−0.057* [0.013]	−0.057* [0.013]	−0.060* [0.009]	−0.058* [0.012]	−0.056* [0.014]	−0.057* [0.013]
Output gap _{<i>t</i>−1}	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]
S_{II}	−0.009* [0.002]	−0.015* [0.005]	−0.015* [0.004]	−0.015* [0.004]	–	–	–	–
S_{III}	–	–	–	–	−0.013* [0.004]	−0.016** [0.006]	−0.019* [0.006]	−0.018* [0.006]
Constant	0.025* [0.007]	0.034* [0.008]	0.034* [0.009]	0.034* [0.009]	0.039* [0.010]	0.045* [0.012]	0.050* [0.014]	0.048* [0.012]
R^2	0.751	0.693	0.700	0.700	0.775	0.770	0.751	0.759
Cragg–Donald	–	6.914	16.458	7.804	–	15.392	21.811	11.923
<i>F</i> -statistic	–	–	–	–	–	–	–	–
Durbin–Wu–Hausman	–	2.019 (0.155)	3.279*** (0.070)	3.483*** (0.062)	–	0.644 (0.422)	1.511 (0.219)	0.853 (0.356)
χ^2 statistic	–	–	–	–	–	–	–	–
<i>C</i> test	–	–	–	0.006 (0.937)	–	–	–	0.469 (0.494)

Source: Results of Eq. (1) estimated from the data presented in Table A1. Software Eviews 8.0.

Notes: Adjusted sample 1986–2009 (24 observations).

* Significant at 1%.

** Significant at 5%.

*** Significant at 10%.

Robust standard error in brackets and *p*-value in parentheses.

Table 3
Fiscal reaction function – I_{AP} and sub-indices.

Variable	OLS	TSLS			OLS	TSLS		
		<i>D</i>	<i>F</i>	DF		<i>D</i>	<i>F</i>	DF
Primary deficit _{<i>t</i>−1}	0.355*** [0.181]	3.488 [4.584]	2.267 [1.714]	1.968 [1.968]	0.208 [0.223]	0.152 [0.226]	0.042 [0.212]	0.012 [0.215]
Net debt _{<i>t</i>−1}	−0.068* [0.009]	−0.208 [0.184]	−0.154 [0.121]	−0.140 [0.128]	−0.055* [0.010]	−0.051* [0.011]	−0.043* [0.013]	−0.049* [0.011]
Output gap _{<i>t</i>−1}	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]
I_{AP}	−0.0002 [0.0003]	0.012 [0.016]	0.007 [0.007]	0.006 [0.008]	—	—	—	—
I_{APsub1}	—	—	—	—	−0.002** [0.001]	−0.003* [0.001]	−0.004** [0.002]	−0.003** [0.001]
Constant	0.021 [0.021]	−0.585 [0.795]	−0.348 [0.321]	−0.291 [0.387]	0.065 [0.020]	0.081 [0.023]	0.111** [0.050]	0.089** [0.025]
R^2	0.643	−14.359	−4.940	−3.330	0.719	0.712	0.661	0.703
Cragg–Donald <i>F</i> -statistic	—	0.116	0.538	0.299	—	39.086	22.203	21.798
Durbin–Wu–Hausman χ^2 statistic	—	1.579 (0.209)	3.358*** (0.067)	3.261*** (0.071)	—	0.740 (0.390)	1.540 (0.215)	0.258 (0.612)
<i>C</i> test	—	—	—	0.115 (0.734)	—	—	—	1.854 (0.173)
Primary deficit _{<i>t</i>−1}	0.326 [0.216]	0.289 [0.230]	0.249 [0.226]	0.272 [0.228]	0.219 [0.167]	−0.411 [0.495]	−1.096 [1.395]	−0.366 [0.484]
Net debt _{<i>t</i>−1}	−0.062* [0.010]	−0.058* [0.011]	−0.053* [0.011]	−0.056* [0.011]	−0.060* [0.009]	−0.025 [0.038]	0.013 [0.079]	−0.027 [0.032]
Output gap _{<i>t</i>−1}	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]
I_{APsub2}	0.0008*** [0.0004]	0.001* [0.0004]	0.002** [0.001]	0.002** [0.0004]	—	—	—	—
I_{APsub3}	—	—	—	—	−0.0007*** [0.0004]	−0.003*** [0.002]	−0.006 [0.005]	−0.003 [0.002]
Constant	−0.003 [0.010]	−0.010 [0.010]	−0.018 [0.012]	−0.014 [0.009]	0.015** [0.006]	0.023** [0.009]	0.032 [0.022]	0.022 [0.009]
R^2	0.697	0.683	0.637	0.669	0.673	0.277	−1.055	0.332
Cragg–Donald <i>F</i> -statistic	—	42.146	31.446	27.900	—	2.918	1.325	1.389
Durbin–Wu–Hausman χ^2 statistic	—	0.953 (0.329)	1.755 (0.185)	0.799 (0.371)	—	1.885 (0.170)	3.337*** (0.068)	0.954 (0.329)
<i>C</i> test	—	—	—	1.174 (0.279)	—	—	—	1.930 (0.165)

Source: Results of Eq. (1) estimated from the data presented in Table A1. Software Eviews 8.0.

Notes: Adjusted sample 1986–2009 (24 observations).

* Significant at 1%.

** Significant at 5%.

*** Significant at 10%.

Robust standard error in brackets and *p*-value in parentheses.

Table 4
Unit root test.

Variable	ADF (GLS)		(MZ α -GLS)	
	Model	Statistic	Model	Statistic
Primary deficit/PIB	Intercept and trend	−4.067*	Intercept	−9.750**
Net debt/PIB	Intercept	−5.099*	Intercept	−11.500**
Output gap	Intercept	−2.532**	Intercept	−9.010**

* Significant at 1%.

** Significant at 5%.

The rules for the granting of loans by the Federal Government to States and Municipalities are another example of this lag between the fiscal problem observed and institutional change. As exposed in [Giuberti \(2012, ch. 5\)](#), in the length of ten years between the late 1980s and the end of the 1990s, the Federal Government promoted on five different occasions the refinancing of domestic and external debt of these entities; however, only with the LRF in 2000 were the credit operations between members of the Federation banned. A considerable time lag is thus observed, at least in Brazil, between unsatisfactory fiscal results and institutional change, which could mitigate a possible endogeneity of budget indices. However, as this issue is important and may invalidate the OLS results, Eq. (1) was re-estimated for each index and sub-index using the two-stage least squares method (TSLS), with instrumental variables for the constructed indices.⁹

The main issue in the use of instrumental variables is to find an instrument that is correlated with the endogenous variable, in this case the budget indices, but not with the error term of the regression. In addition to the requirement of exogeneity, another necessary condition for the instrument to be valid is its relevance: when the instrument is considered weak, the TSLS estimators are biased and hypothesis tests exhibit large distortions ([Stock and Yogo, 2002](#)).

For budget indices, [Debrun and Kumar \(2007\)](#) suggest the use of political variables as instruments. However, as mentioned in a note at the beginning of section 2, the literature on political economy also studies the effects of political-electoral institutions on government spending and fiscal deficit and presents evidence that these institutions affect the fiscal result. Based on data for the U.S., [Abrams and Dougan \(1986\)](#), [Alt and Lowry \(1994\)](#) and [Poterba \(1994\)](#) conclude that divided governments, i.e., with no party majority, generate larger fiscal deficits. [Roubini and Sachs \(1989\)](#) present similar evidence for industrialised countries. In relation to the ideology of the party in government, [Kontopoulos and Perotti \(1999\)](#) find evidence for OECD countries that left-wing governments tend to spend more than right-wing governments. For Latin America, [Amorin Neto and Borsani \(2002\)](#) report evidence that the ideology of the party of the president affects the primary result.

However, the political aspects of a country should not be discarded as tools for budgetary institutions because these institutions are indeed defined within the political process. The evidence presented reveals that the fiscal result is affected by political variables determined by the rules for the election of parliamentary representatives as well as the results of the elections. Another set of political aspects that would be related to the budgetary institutions but not necessarily to the government deficit would comprise variables that structure the political framework, such as the regime in force and the number of parties. Two instruments with these characteristics were used in the two-stage estimations. The first one, called institutionalised democracy, is calculated by [Marshall et al. \(2010\)](#) and describes the pattern of democracy associated with competition for the position of Chief Executive and the restrictions on the exercise of power, i.e., it goes beyond the formal existence of a democratic or authoritarian regime. The second variable is the maximum fractionalisation of the Chamber of Deputies, which depends on the number of legislative seats in this

⁹ Another option would be to re-estimate Eq. (1) using the generalised method of moments (GMM). As [Johnston and Dinardo \(1997, p. 337\)](#) note, in cases where the hypothesis of homoscedasticity of the error term is valid, the model estimation by GMM and TSLS yields the same result. In the case of heteroscedasticity, the GMM estimators are asymptotically more efficient. Thus, Eq. (1) was also estimated using GMM for each index and sub-index using the instruments described below. The coefficients obtained by this estimation were very similar in terms of magnitude and significance to the coefficients obtained by TSLS and corroborates the analysis presented below. The results obtained using GMM are available upon request.

Table 5
Correlation coefficient – instruments, indices and sub-indices.

	Maximum fractionalisation	Institutionalised democracy
Primary deficit/PIB	–0.222 (0.287)	–0.319 (0.120)
I_C	0.600* (0.002)	0.572* (0.003)
C_A	0.692* (0.000)	0.783* (0.000)
C_B	0.417** (0.038)	0.314 (0.126)
C_C	0.643* (0.001)	0.665* (0.000)
C_D	0.631* (0.001)	0.545* (0.005)
C_E	0.410** (0.042)	0.375*** (0.065)
I_S	0.575* (0.003)	0.544* (0.005)
S_I	0.573* (0.003)	0.514* (0.009)
S_{II}	0.529* (0.007)	0.491* (0.013)
S_{III}	0.600* (0.002)	0.604* (0.001)
IAP	0.053 (0.802)	–0.042 (0.843)
I_{APsub1}	0.682* (0.000)	0.772* (0.000)
I_{APsub2}	–0.711* (0.000)	–0.846* (0.000)
I_{APsub3}	0.395** (0.050)	0.376*** (0.064)
Period	1985–2009	

p-Value in parentheses.

* Significant at 1%.

** Significant at 5%.

*** Significant at 10%.

house and the number of nominally existing parliamentary parties in the country. A full description of the variables and the source of data are provided in [Box A1](#) of the Appendix.

Evidence that these variables can be used as instruments is provided in [Table 5](#), which demonstrates a correlation between the instruments and budget indices but not between the instruments and the primary deficit for the sample period. Thus, for each index and sub-index, equation (1) was re-estimated through TSLS, using the variable institutionalised democracy (D) as a primary instrument, then the variable maximum fractionalisation (F) and finally both variables together (DF). The next step was to test the validity of these instruments. The results are presented in columns D, F and DF of [Tables 1–3](#).

The relevance of the instruments was tested using the method proposed by [Stock and Yogo \(2002\)](#), in which the instruments are considered weak if the bias of the TSLS estimator and the maximum Wald test size distortion are above a certain threshold, for example, 5%, 10% or 15%. The test is based on the Cragg–Donald *F*-statistic for the null hypothesis that the instruments are weak. According to the authors, when there is only one endogenous regressor, the null hypothesis can be rejected at the 5% level if the calculated *F*-statistic is greater than ten. In this case, the bias and the distortion size are lower than 10%.

When two or more instruments are used in the estimation, their exogeneity can be tested using the orthogonality test, also known as the *C* test described in [Eichenbaum et al. \(1988\)](#), in which the null hypothesis assumes that the tested instruments are orthogonal to the error term, i.e., the tested instruments are exogenous. This test was conducted in the regressions in which the variables fractionalisation and democracy were used together.

Finally, the endogeneity of the budget indices was tested using the Hausman test, also called the Durbin–Wu–Hausman test, in which the estimations through OLS and TSLS are compared under the null hypothesis that both estimations are consistent, i.e., the tested variable is exogenous, against the alternative hypothesis that only the estimation through TSLS is consistent.¹⁰ It is worth noting, however, that in the presence of weak instruments, the coefficients estimated by TSLS are biased and therefore, the test loses its ability to provide conclusive results.

The results presented in [Tables 1–3](#) provide mixed evidence regarding the endogeneity of budgetary institutions. In models where the two instruments were considered relevant (Cragg–Donald greater than ten) and exogenous (*C*-test with *p*-values higher than 10%), the Durbin–Wu–Hausman test indicates that the budget indices are exogenous. They

¹⁰ See [Wooldridge \(2002\)](#) for a formal description of this test.

are I_C , C_A , C_C , S_{III} and I_{APsub1} . In these cases, the coefficients estimated by OLS and the initial conclusion that the more hierarchical/centralised institutions reduce the government deficit are valid. The same is valid for the sub-index I_{APsub2} , whose estimated impact is positive.

In two cases, for the sub-index S_{II} and its corresponding index I_S , only the variable maximum fractionalisation was considered as a relevant instrument. For these two indices, the result of the endogeneity test depends on the significance level adopted: at 5%, both S_{III} and I_S are considered exogenous; however, at 10%, these indices can be considered endogenous (Table 2). If these indices are considered endogenous, the TSLS results should be considered, which in turn confirms the results observed through OLS. Thus, changes in budgetary institutions measured by these indices favour fiscal discipline.

There is also a third group consisting of the sub-indices C_B , C_D , C_E , S_I and I_{APsub3} and the index I_{AP} for which it is not possible to reach a conclusion about the endogeneity of these variables. For this group, the two instruments used are considered weak, which invalidates the endogeneity test. In these cases, although the estimations both through OLS and through TSLS indicate a negative impact of budget indices on the federal government deficit,¹¹ it is impossible to reach a formal conclusion on the effect of the budgetary institutions measured by these indices. Notably, with the exception of the sub-index C_B , which evaluates the budget process rules and controls, the other sub-indices – C_D , C_E , S_I and I_{APsub3} – are the only sub-indices for which the evaluated institutions exhibited stronger changes in terms of fiscal discipline at the end of the studied period, from the second half of the 1990s, which may have contributed to the inconclusive result of these models.

5. Conclusions

The relationship between budgetary institutions and fiscal results is the object of analysis of relevant literature in economics, which has documented the positive impact of hierarchical/centralised institutions in fiscal discipline. Overall, these findings are obtained from studies comparing groups of countries at a given date or during a specific but short period, in which institutional changes typically do not occur. This methodology seeks to circumvent the possible endogeneity of budget indices, as institutions can be changed due to unsatisfactory fiscal results. In this sense, this article aimed to contribute to this literature by analysing the issue from a different perspective by assessing the effect of budgetary institutions on fiscal results in the context of institutional change, controlling for its possible endogeneity. The object of this study was the Brazilian Federal Government from 1985 to 2009.

The results indicate that, in general, changes in the Brazilian budgetary institutions have contributed to a better primary result of the federal government, particularly those changes captured by the indices that evaluate the budget categories and stages I_C and I_S and the sub-indices top-down procedures (C_A), sustainability and credibility (C_C), approval (S_{II}) and budget execution (S_{III}). Moreover, the results also indicate that in most cases, the institutional changes that occurred from 1985 to 2009 can be considered exogenous to the primary result. This fact does not eliminate the possibility that future changes in budgetary institutions will be motivated by unsatisfactory fiscal results. This issue must be constantly evaluated. The fiscal policy reaction is also noteworthy; according to the estimated models, this reaction reduces the government deficit before an increase in the debt/GDP ratio, which provides evidence that the debt is sustainable.

Lastly, these findings pave the way for future studies aiming to analyse the interaction between the political and budgetary variables in the fiscal result of the federal government and to expand the scope of analysis for the Brazilian public sector as a whole.

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¹¹ With the exception of I_{AP} , whose impact estimated through TSLS is positive.

Appendix A.

Box A1: Description of variables and sources.

Variable	Description	Sources
Federal Government and Central Bank Primary Deficit	In % of the current GDP. Need for funding by the public sector, evaluated by the primary concept, with currency devaluation. Scope: Federal Government and Central Bank. Series ended in 2009.	Central Bank
Net debt	In % of the current GDP. Total net debt of the Federal Government and Central Bank.	Central Bank
Output gap	Difference between the GDP at current prices deflated by the implicit GDP deflator (2009 = 100) and the trend of GDP estimated by the Hodrick-Prescott filter.	IBGE [Brazilian Institute of Geography and Statistics] for the GDP and GDP deflator series
Democracy	Institutionalised democracy. Index constructed from the presence of competition in the electoral process and the existence of limits to the power exercised by the Executive. A full description of the variable can be obtained in Marshall et al. (2010) .	Policy IV Project of the Centre for Systemic Peace http://www.systemicpeace.org/polity/polity4.htm
Maximum fractionalisation (FRACMAX)	Maximum party dispersion of a parliament. Variable constructed as $FRACMAX = N(n-1)/n(N-1)$, where N = number of seats and n = number of parliamentary parties.	Laboratory of Experimental Studies (Laboratório de Estudos Experimentais – LEEX) http://www3.ucam.edu.br/leex/

Table A1
Budgetary, Economic and Political Variables.

Year	I_{AP}	I_{APsub1}	I_{APsub2}	I_{APsub3}	I_S	S_I	S_{II}	S_{III}	I_C	C_A	C_B	C_C	C_D	C_E	Primary deficit/GDP	Net debt/GDP	Output gap	Democracy	FRACMAX
1985	54.99	24.99	25.00	5.00	1.62	2.00	1.22	1.64	1.75	2.40	1.90	1.05	1.67	1.75	-0.02	0.27	-11,358.66	7	0.802
1986	54.99	24.99	25.00	5.00	1.70	2.24	1.22	1.64	1.86	2.40	1.90	1.05	2.22	1.75	0.00	0.16	72,506.44	7	0.919
1987	54.99	24.99	25.00	5.00	1.70	2.24	1.22	1.64	1.86	2.40	1.90	1.05	2.22	1.75	0.02	0.14	95,691.35	7	0.919
1988	54.99	24.99	25.00	5.00	1.59	2.24	0.89	1.64	1.83	2.80	1.33	1.05	2.22	1.75	0.01	0.25	55,679.30	8	0.919
1989	49.07	30.82	12.00	6.25	1.79	2.24	1.33	1.79	1.96	2.80	1.62	1.43	2.22	1.75	0.02	0.73	79,615.04	8	0.919
1990	49.07	30.82	12.00	6.25	1.85	2.43	1.33	1.79	2.05	2.80	1.62	1.43	2.67	1.75	-0.03	0.10	-41,198.98	8	0.949
1991	49.07	30.82	12.00	6.25	2.10	2.52	1.67	2.10	2.29	3.20	1.90	1.91	2.67	1.75	-0.01	0.31	-57,602.19	8	0.949
1992	49.07	30.82	12.00	6.25	2.20	2.52	1.67	2.41	2.40	3.20	1.90	2.48	2.67	1.75	-0.01	0.35	-104,608.97	8	0.949
1993	49.07	30.82	12.00	6.25	2.20	2.52	1.67	2.41	2.40	3.20	1.90	2.48	2.67	1.75	-0.01	0.37	-57,617.03	8	0.949
1994	49.07	30.82	12.00	6.25	2.25	2.52	1.67	2.56	2.46	3.20	2.19	2.48	2.67	1.75	-0.04	0.19	3,541.50	8	0.946
1995	49.07	30.82	12.00	6.25	2.30	2.67	1.67	2.56	2.51	3.20	2.19	2.76	2.67	1.75	0.00	0.13	48,575.97	8	0.946
1996	49.07	30.82	12.00	6.25	2.52	2.67	2.33	2.56	2.61	3.20	2.19	2.76	2.67	2.25	0.00	0.15	46,244.20	8	0.946
1997	49.07	30.82	12.00	6.25	2.52	2.67	2.33	2.56	2.61	3.20	2.19	2.76	2.67	2.25	0.00	0.18	70,303.83	8	0.946
1998	49.07	30.82	12.00	6.25	2.52	2.67	2.33	2.56	2.61	3.20	2.19	2.76	2.67	2.25	-0.01	0.24	17,713.31	8	0.952
1999	49.07	30.82	12.00	6.25	2.66	3.10	2.33	2.56	2.78	3.20	2.76	2.76	2.67	2.50	-0.02	0.30	-33,160.89	8	0.952
2000	57.82	30.82	12.00	15.00	2.99	3.43	2.67	2.87	3.10	3.20	2.76	2.86	3.67	3.00	-0.02	0.30	5,016.43	8	0.952
2001	60.32	33.32	12.00	15.00	3.04	3.43	2.67	3.03	3.15	3.20	2.76	3.14	3.67	3.00	-0.02	0.32	-30,102.88	8	0.952
2002	60.32	33.32	12.00	15.00	3.04	3.43	2.67	3.03	3.15	3.20	2.76	3.14	3.67	3.00	-0.02	0.38	-38,399.85	8	0.949
2003	60.32	33.32	12.00	15.00	3.04	3.43	2.67	3.03	3.15	3.20	2.76	3.14	3.67	3.00	-0.02	0.34	-89,925.85	8	0.949
2004	60.32	33.32	12.00	15.00	3.04	3.43	2.67	3.03	3.15	3.20	2.76	3.14	3.67	3.00	-0.03	0.31	-32,751.72	8	0.949
2005	60.32	33.32	12.00	15.00	3.04	3.43	2.67	3.03	3.15	3.20	2.76	3.14	3.67	3.00	-0.03	0.31	-42,422.55	8	0.949
2006	60.32	33.32	12.00	15.00	3.15	3.43	3.00	3.03	3.23	3.60	2.76	3.14	3.67	3.00	-0.02	0.31	-33,145.19	8	0.954
2007	60.32	33.32	12.00	15.00	3.15	3.43	3.00	3.03	3.23	3.60	2.76	3.14	3.67	3.00	-0.02	0.31	37,402.90	8	0.954
2008	60.32	33.32	12.00	15.00	3.20	3.43	3.00	3.18	3.28	3.60	2.76	3.14	3.67	3.25	-0.02	0.24	87,621.02	8	0.954
2009	60.32	33.32	12.00	15.00	3.20	3.43	3.00	3.18	3.28	3.60	2.76	3.14	3.67	3.25	-0.01	0.29	-41,540.92	8	0.954

Appendix B. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.econ.2015.06.003](https://doi.org/10.1016/j.econ.2015.06.003).

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