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BUDGET CUTS, PANDEMIC, AND DIFFERENCES IN THE COMPOSITION OF EXPENDITURES OF BRAZILIAN FEDERAL UNIVERSITIES

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ABSTRACT

The objective of this study was to analyze the reconfiguration of expenditures at Brazilian federal universities between 2016 and 2023 from the perspective of budget cuts and the Covid-19 pandemic. The study sought to identify differences among the annual amounts of expenditures accrued by 63 federal universities using the nonparametric *Friedman* test for median comparisons. The results indicated that Personnel and Social Charges accounted for the largest share of expenditures, while Investments were the most affected by budget cuts. A significant reduction in current and capital expenditures was observed, accompanied by changes in the composition of institutional expenditures, particularly during the years coinciding with the pandemic. In light of Cutback Management Theory, the results suggest that federal universities reoriented the allocation of their expenditures in a context of resource scarcity, preserving mandatory expenditures and concentrating adjustments on budget categories with greater flexibility. Although investments and other current expenditures partially recovered by the end of the period analyzed, their levels remained below those observed in 2016, a scenario consistent with the budgetary restraint observed while Constitutional Amendment No. 95/2016 was in effect. The study contributes to the literature by demonstrating that Brazilian federal universities responded to fiscal constraints and

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the effects of the pandemic by adjusting their budgetary priorities, providing empirical evidence consistent with Cutback Management Theory and reinforcing its applicability to the context of Brazilian public higher education.

Keywords: public expenditures, fiscal austerity, higher education funding.

1 INTRODUCTION

Federal universities are public organizations that are essential to the provision of collective goods and services, operating in teaching, research, extension, and innovation, with impacts on the country's social, economic, and institutional development (Albino & Moreira, 2024). As public organizations, they provide society with services that generally have no direct monetary value or are difficult to measure (Levine, 1978), meaning that their operation requires a substantial allocation of public resources. In this context, Federal Higher Education Institutions (IFES) depend primarily on budgetary transfers from the Federal Government, funded by taxes collected from society and provided for in the Federal Government Budget (Santos, 2013), highlighting the role of the public budget as an instrument of planning, control, and accountability in higher education management.

From the perspective of Public Sector Accounting, recent studies have highlighted the budgetary constraints faced by federal universities and their effects on the implementation of educational policies. Rodrigues *et al*. (2023) point out that, despite the constitutional obligation to maintain and develop higher education, the last decade has been marked by successive budget cuts. Additionally, Reis and Macário (2020) demonstrated that, between 2003 and 2019, only 1.62% of the Federal Government's total budgetary expenditures were allocated to federal universities, including university hospitals, indicating structural limitations in the funding of public higher education. This dynamic highlights the low priority given by the government to allocating resources to public education, with negative effects on the financial sustainability of IFES (Silva & Guimarães, 2022).

Budgetary constraints intensified with the enactment of Constitutional Amendment No. 95/2016, which established the New Fiscal Regime by imposing a ceiling on the Federal Government's primary expenditures for twenty years, limiting their growth to the inflation rate measured by the IPCA (Constitutional Amendment No. 95, 2016). From an accounting and managerial perspective, this regulatory framework posed challenges to the budgetary and financial execution of public organizations, requiring greater rigor in expenditure planning and prioritization. In this context, the adoption of practices associated with Cutback Management becomes relevant. Understood as the process of managing budget cuts involving strategic decisions to move an organization toward lower levels of resource consumption and activity (Levine, 1979), this approach entails the reallocation and containment of expenditures, with direct impacts on the composition of public spending (Levine, 1978).

Alongside fiscal constraints, the Covid-19 pandemic, officially recognized in 2020 as an emergency and public calamity (Brasil, 2020), led to changes in the composition and allocation of expenditures within the budget execution of IFES. The need to adapt academic and administrative activities to a remote format altered the cost structure, reducing certain operating expenses, such as electricity consumption (Reis *et al*., 2022), while also reallocating resources to investments in technologies for remote teaching (Miranda *et al*., 2021). Empirical evidence also indicates an overall decrease in costs and expenditures at federal universities following the onset of the pandemic (Albino & Moreira, 2024), reinforcing the importance of analyzing these effects from the perspective of public expenditure composition.

Despite the existence of studies that separately address the impacts of fiscal adjustments or the Covid-19 pandemic on IFES (Albino & Moreira, 2024; Machado & D'Avila, 2020; Miranda *et al*., 2021; Reis *et al*., 2022; Rodrigues *et al*., 2023), the literature still provides limited

explanations of how these two phenomena, which occurred concurrently, altered the composition of public expenditure at federal universities. The prevailing approach focuses on aggregate effects on expenditure levels or budgetary indicators, without examining how the distribution of resources among different expenditure nature groups was modified in this context.

This gap restricts the understanding of the mechanisms through which IFES responded to the pressures imposed by fiscal austerity and the public health crisis and limits theoretical advances regarding public management behavior in contexts of resource constraints and high uncertainty. In this regard, analyzing expenditure composition by nature groups reveals allocation priorities, budgetary adaptation strategies, and patterns of resource reallocation adopted by the institutions, contributing to the advancement of discussions on efficiency, transparency, and public expenditure control.

Against this backdrop, the following research question emerges: what was the composition of expenditures at Brazilian federal universities in the context of the Covid-19 pandemic and the budgetary constraints arising from Constitutional Amendment No. 95/2016? Thus, the objective of this study is to investigate the reconfiguration of expenditures at Brazilian federal universities by analyzing their expenditure composition by nature group in the context of the pandemic and fiscal constraints from 2016 to 2023.

This research contributes to the field of Public Sector Accounting by broadening the understanding of the combined effects of budgetary constraints and the Covid-19 pandemic on the configuration of public expenditure at Brazilian federal universities. Unlike previous studies, which prioritized the analysis of aggregate levels of costs and expenditures or the isolated impacts of these events, this study demonstrates how expenditure composition by nature group was reconfigured over the 2016–2023 period, making it possible to identify changes in allocation priorities and in how public resources were distributed among different expenditure categories. By providing evidence on the dynamics of public expenditure composition, the study also provides insights for improving budget management, accountability, and decision-making within federal universities.

2 LITERATURE REVIEW

2.1 Cutback Management Theory

The literature on budget cutback management in public administration has its starting point in the study by Levine (1978), who drew attention to the need to understand how resource scarcity affects public institutions and their management systems. The author developed his analysis based on the political and economic context experienced in the United States in the 1970s, a period characterized by fiscal instability and pressures on public spending. According to Levine (1978), public organizations perform the function of providing services to society that generally have no direct monetary value or are difficult to measure, making their sustainability highly dependent on budgetary appropriations. In this context, institutional continuity requires more sophisticated management practices, grouped under the concept of *Cutback Management*, or budget cutback management (Levine, 1978).

In contexts of fiscal constraint, Levine (1978) argues that public organizations face three fundamental decisions: first, whether to adopt strategies to resist or mitigate cuts; second, based on this choice, to select the most appropriate management strategies; and third, to determine where and how the cuts will be implemented within the organization. Among the most recurrent adjustment instruments identified by the author are salary reductions, hiring freezes, across-the-board cuts among units, reductions in resources allocated to sectors considered less productive, and the use of budgeting approaches aimed at efficiently reallocating resources during periods of fiscal stress. Subsequent studies reinforced these practices (Dougherty & Klase, 2009) and demonstrated that one of the central decisions in cutback management is determining whether adjustments will be implemented through generalized or targeted strategies, either distributing cuts

uniformly across organizational units or concentrating them in specific areas according to the intensity and persistence of fiscal stress (Raudla *et al*., 2015). These authors further emphasize that cuts rarely occur as isolated events and are generally implemented through successive rounds of adjustment, such that the longer and more severe the fiscal stress, the greater the tendency to adopt targeted cuts instead of generalized strategies (Raudla *et al*., 2015).

Budget cutback management is therefore understood as a complex process, as it involves not only defining adjustment strategies but also making choices that entail opportunity costs and long-lasting effects on institutional functioning (Levine, 1978). According to Levine (1979), managing cutbacks essentially means moving the organization toward lower levels of resource consumption and activity, which requires organizational adaptability and reconfiguration. Although Levine (1979) emphasizes the need for organizational adaptation in response to resource scarcity, more recent studies demonstrate that cutbacks do not always produce the intended changes because a significant proportion of public organizations' resources is already committed. Under these circumstances, the high proportion of predetermined expenditures reduces the flexibility to reallocate resources and implement organizational changes, limiting the effectiveness of adjustment strategies (Schmidt *et al*., 2017). Building on these contributions, the literature on cutback management has incorporated discussions concerning institutional constraints, decision-making processes, and organizational limitations imposed by budgetary rigidity, broadening the scope originally proposed by Levine (Hardy, 1984; Dougherty & Klase, 2009; Raudla *et al*., 2015; Schmidt *et al*., 2017).

From a theoretical perspective, Schmidt *et al*. (2017) identified three main strands in the literature on cutback management. The first, originating in classical public administration, focuses on the content of cutbacks, seeking to answer questions regarding what, when, and where to cut. The second emerged more prominently after the 2008 economic crisis and emphasizes strategies for managing authority in contexts of austerity. The third strand engages with the broader literature on organizational decline, adopting an institutional life-cycle perspective as a means of addressing crises. Although these strands share the assumption that resource scarcity requires organizational responses, they differ in their analytical focus and managerial implications. The tradition established by Levine (1978) focuses on identifying adjustment strategies and determining the targets of cutbacks, whereas more recent approaches emphasize decision-making processes, power relations, and the institutional effects of austerity. Thus, literature has evolved from a predominantly normative perspective toward approaches that recognize the political, organizational, and contextual nature of cutback decisions (Schmidt *et al*., 2017).

Within higher education institutions, Hardy (1984) analyzed cutback management at Canadian universities and identified four predominant approaches: i) the adoption of across-the-board cuts and salary freezes; ii) the recognition that cuts should be aligned with institutional goals and priorities, avoiding arbitrary decisions; iii) the implementation of planned budget adjustment processes; and iv) the involvement of the academic community in decision-making, with a view to enhancing transparency and institutional commitment. Nevertheless, the author emphasizes that formulating and implementing these decisions is particularly challenging because centralized strategies tend to generate political resistance, whereas decentralized approaches may compromise the university's quality and long-term sustainability.

In this regard, targeting budget cuts is a difficult and sensitive task from both managerial and political perspectives (Levine, 1979; Schmidt *et al*., 2017). Moreover, different types of universities may respond differently to fiscal constraints because, in contexts of scarcity, each level of the system tends to redefine its own interests, priorities, and institutional boundaries (Hardy, 1984; Levine & Posner, 1981). It should also be emphasized that, in Brazil, these organizations perform multiple functions involving teaching, research, extension, and student assistance, the outcomes of which are difficult to measure and depend heavily on public funding. Thus, determining which expenditures should be reduced involves choices among activities that are

equally strategic to fulfilling the institutional mission, making expenditure reconfiguration a particularly challenging process.

Although Cutback Management Theory was developed in administrative contexts characterized by greater managerial autonomy and budgetary flexibility, its contributions remain relevant to understanding organizational responses to fiscal constraints. In the Brazilian context, however, high institutional rigidity and the strong legal earmarking of a significant share of public expenditures limit managers' discretion, requiring the theory's assumptions to be interpreted in light of these specific characteristics. In this context, Cutback Management Theory is relevant for analyzing how federal higher education institutions reconfigure their expenditure structure in response to resource scarcity, providing a consistent framework for the analysis developed in this study.

2.2 Funding and Budget Execution of IFES

In light of Cutback Management Theory, budgetary constraints in public institutions are not limited to reductions in resources but involve decisions about how to redistribute expenditures, preserve activities considered priorities, and adapt organizational operations in response to scarcity (Levine, 1978; Schmidt *et al*., 2017). In the case of federal higher education institutions, these decisions take on particular characteristics due to the diversity of their institutional functions, the high proportion of mandatory expenditures, and the characteristics of Brazil's legal and budgetary environment.

Law No. 9,394/1996, the National Education Guidelines and Framework Law (LDB), defines federal universities as multidisciplinary institutions dedicated to professional education, the production of knowledge through research, extension activities, and the advancement of human knowledge. The same law assigns the Federal Government responsibility for ensuring the resources necessary for the maintenance and development of these institutions (Brasil, 1996). Despite this legal provision, studies have reported budget cuts and constraints over recent years (Rodrigues *et al*., 2023; Reis & Macário, 2020; Silva & Guimarães, 2022).

The literature converges in indicating that budgetary constraints at IFES intensified from 2015 onward, affecting institutional operations, infrastructure maintenance, and the provision of academic services (Machado & D'Ávila, 2020; Rodrigues *et al*., 2023; Santos & Pereira, 2019; Caetano & Campos, 2019), with more substantial budget constraints during the periods 2015-2016 and 2018-2022 (Rodrigues *et al*., 2023). From the perspective of Cutback Management Theory, this scenario represents a context of scarcity in which institutions are compelled to reorganize their expenditure structure to maintain their essential activities (Levine, 1978).

Santos and Pereira (2019) highlight that, following the budget constraint imposed in early 2019, the efficiency of IFES began to be questioned, as institutional operations were compromised, affecting essential areas. Similarly, Caetano and Campos (2019) emphasize that the cuts negatively affected the quality of education, resulting in the suspension of construction projects, interruption of building maintenance, and reductions in security and surveillance services.

According to Silva and Araújo (2022), the period between 2014 and 2020 was marked by economic and social crises, state counter-reforms, and fiscal adjustment policies, which contributed to a reduction in resources allocated to public universities. The authors note that this reduction compromised the day-to-day activities of IFES, considering that approximately 85% of the budget is allocated to personnel and social charges, while resources for operating expenses and investments declined.

In this context, Oliveira and Corrêa (2021) argue that Constitutional Amendment No. 95/2016 would compromise the operation of federal universities even in the short term. Santos *et al*. (2021) corroborate this analysis by demonstrating that the effects of Constitutional Amendment No. 95/2016 significantly affected higher education, particularly through the reduction of resources allocated to financial assistance for students in vulnerable situations. Additionally, Reis

and Chaves (2021) report that, between 2013 and 2020. resources allocated to current expenditures and investments decreased by 37% and 93.28%, respectively.

In the public budget, expenditures are classified as mandatory or discretionary. Mandatory expenditures arise from constitutional or legal requirements and include, among others, expenditures on personnel, social security benefits, debt service, and minimum spending requirements in areas such as health and education, thereby reducing the discretion available to public managers (Meira *et al*., 2022). In contrast, discretionary expenditures correspond to spending whose execution depends on government decisions, including administrative operating expenses, investments, and public programs not subject to legal earmarking (Meira *et al*., 2022). In contexts of fiscal constraint, the predominance of mandatory expenditures tends to restrict budgetary flexibility, making discretionary expenditures the primary area in which adjustments can be made. Under these circumstances, public managers' decisions involve choices regarding the allocation of available resources, reconciling legal constraints with the organization's priorities and needs.

This budgetary configuration is consistent with the discussions proposed by Levine (1978), according to which cutback management consists precisely of determining where adjustments can be made when a significant portion of the budget cannot be reduced. In Brazilian IFES, the high proportion of mandatory expenditures may restrict the range of alternatives available to managers, which tends to concentrate adjustments on discretionary expenditures related to operating expenses and investments.

The effects of the pandemic can also be understood from the perspective of Cutback Management Theory, since universities had to reorganize the composition of their expenditures to respond simultaneously to the reduction in in-person activities and the new demands imposed by remote teaching. In this context, reductions in certain operating expenses and the reallocation of resources to information technology were observed (Miranda *et al*., 2021; Reis *et al*., 2022), demonstrating that resource scarcity may be accompanied by a reconfiguration of institutional priorities.

On the other hand, Albino and Moreira (2024) found that, during the 2020-2022 period, median current expenditures, capital expenditures, and current cost per student were lower than those observed between 2017 and 2019. Despite expectations of increased investment in technology during the pandemic, the authors found that actual investments remained below expected levels.

In summary, the literature demonstrates that federal universities constitute a relevant context for the application of Cutback Management Theory, as they combine multiple institutional functions and operate under budgetary and legal constraints that limit managerial flexibility. In this context, successive cuts and budgetary constraints require continuous processes of redefining priorities and reconfiguring the expenditure structure, particularly because of the high proportion of mandatory expenditures and the complexity inherent in these institutions' decision-making processes. Thus, considering the relevance of IFES to the country's scientific, technological, and social development, understanding how these organizations respond to fiscal constraints contributes to broadening the empirical application of Cutback Management Theory and provides a foundation for analyzing the reconfiguration of expenditures at Brazilian federal universities between 2016 and 2023.

3 METHODOLOGICAL PROCEDURES

The research adopted a quantitative, descriptive approach with an *ex post facto* design. The analysis period covered the years from 2016 to 2023, encompassing the two most recent Multi-Year Plans at the federal level (PPA 2016-2019 and PPA 2020-2023), as well as the period marked by the public health crisis caused by Covid-19, between 2020 and 2022. The annual amounts of accrued expenditures were considered, based on data extracted from the Integrated Planning and

Budgeting System (SIOP). Accrued expenditures are understood as those for which the commitment has already been made and the corresponding good or service has effectively been provided (Brasil, 2024), with payment remaining as the subsequent stage.

University expenditures were analyzed over eight different periods, comparing them year by year from 2016 to 2023 in order to identify differences among the years analyzed. Regarding expenditure nature groups, three variables were considered in the analysis: Personnel and Social Charges, Other Current Expenditures, and Investments. Expenditures in the Interest and Debt Charges, Financial Investments, and Debt Amortization groups were excluded from the analysis because their execution was either nonexistent or not significant throughout the period investigated. Given their low materiality in the budgets of federal universities, their inclusion would not provide relevant additional evidence for the analysis of expenditure reconfiguration. Table 1 describes the variables considered in the study:

Table 1
Classification of variables

Economic category	Nature of expenditure	Description
Current Expenditures	Personnel and Social Charges	Budgetary expenditures on active and retired personnel and pensioners, encompassing all forms of remuneration, including additional payments, bonuses, overtime, and personal benefits of any nature, as well as social charges and contributions.
	Other Current Expenditures	Budgetary expenditures on the acquisition of consumable materials, payment of per diem allowances, contributions, subsidies, meal allowances, transportation allowances, and other expenditures within the economic category of Current Expenditures that cannot be classified under the other expenditure nature groups.
Capital Expenditures	Investments	Budgetary expenditures on software and on the planning and execution of construction works, including the acquisition of real estate deemed necessary for such works, as well as the acquisition of facilities, equipment, and permanent materials.

Source: Adapted from the Manual of Accounting Applied to the Public Sector (Brasil, 2024).

In 2023, Brazil had 69 federal universities; however, six institutions established after 2016 were excluded from the analysis because they did not have financial information available for part of the period studied. Thus, this study considered a data panel containing annual expenditure amounts for 63 universities. To improve the accuracy of the analysis, all data obtained were adjusted according to the Extended National Consumer Price Index (IPCA), with the values deflated over the period analyzed using 2023 as the reference year.

The collected data were organized in *Microsoft Excel* spreadsheets and subsequently analyzed using Jamovi *software*. Descriptive analysis of the variables was performed based on the mean, median, standard deviation, coefficient of variation, maximum, and minimum values. The data were subjected to the *Shapiro-Wilk* normality test, which indicated that none of the variables analyzed followed a normal distribution (Table 2).

Table 2
Normality test results (Shapiro-Wilk)

Variable	Statistic	2016	2017	2018	2019	2020	2021	2022	2023
Personnel and Social Charges	W	0.851	0.859	0.862	0.858	0.862	0.863	0.866	0.868
	P	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*
Other Current Expenditures	W	0.841	0.830	0.843	0.851	0.814	0.784	0.859	0.851
	P	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*
Investments	W	0.851	0.825	0.752	0.775	0.776	0.706	0.853	0.827
	P	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*

Note. * Significant at the 1% level
Source: Research results.

To analyze the reconfiguration of university expenditures over the period investigated, a procedure was adopted that allowed the values observed in different years to be compared while considering the same institutions. This analytical strategy is consistent with the research objective of examining the temporal evolution of expenditure composition and identifying whether statistically significant differences occurred among the years analyzed, while preserving the dependence among observations resulting from tracking the same universities throughout the period. In this context, the *Friedman* test was used because it is an appropriate procedure for comparing repeated measures when the assumption of normality is not met, allowing statistically significant differences among the years to be assessed without disregarding the longitudinal structure of the data. The test was employed to evaluate the following research hypotheses:

- Null hypothesis (H0): The median annual expenditures of Brazilian federal universities are statistically equal across the years from 2016 to 2023.
- Alternative hypothesis (H1): The median annual expenditures of Brazilian federal universities are not statistically equal across the years from 2016 to 2023.

Subsequently, in cases where the null hypothesis was rejected, the *Durbin-Conover* post hoc multiple comparisons test was applied to identify the periods that differed significantly from the others.

Although panel data models and time-series analyses can also be employed to examine the evolution of expenditures and explore longitudinal patterns across universities, the choice of analytical strategy was guided by the research question and the theoretical framework adopted. In light of Cutback Management Theory, the study seeks to determine whether the composition of federal university expenditures changed across the years analyzed, given that contexts of budgetary constraint may be associated with the reconfiguration of resource allocation among different expenditure groups. From this perspective, the research focuses on comparing expenditure distributions over the period rather than modeling their evolution or estimating the influence of explanatory variables, which is why the *Friedman* test was considered consistent with the proposed analytical purpose.

It should be emphasized that, although the study seeks to reflect on the composition of federal university expenditures in a context marked by fiscal adjustments and the Covid-19 pandemic, these events are considered as contextual factors for interpreting the results rather than as factors whose influence is empirically tested. Thus, the methodological strategy adopted makes it possible to identify differences among the periods analyzed and highlight potential changes in the distribution of expenditures, but it does not, in isolation, allow structural changes in the phenomenon under investigation to be inferred, causal relationships to be established, or the influence of institutional factors to be measured, such as differences in university size, academic profile, infrastructure composition, and the rigidity of mandatory expenditures. In this regard, studies employing explanatory longitudinal models or other analytical strategies may complement the findings of this study by examining the factors associated with the observed differences.

4 RESULTS

Initially, the study sought to identify the composition of total expenditures on Personnel and Social Charges, Other Current Expenditures, and Investments at Brazilian federal universities over the period analyzed. Table 3 presents the total amounts and percentage shares of public expenditures by expenditure nature group from 2016 to 2023.

Table 3
Total amounts and percentage shares of expenditures, by nature, 2016-2023 (in millions of reais)

Year	Personnel and Social Charges		Other Current Expenditures		Investments		Total	
2016	47,834.21	82.21%	9,592.74	16.49%	760.52	1.31%	58,187.47	100.00%
2017	52,355.27	84.75%	8,957.49	14.50%	461.93	0.75%	61,774.69	100.00%
2018	53,000.55	85.21%	8,874.23	14.27%	322.57	0.52%	62,197.35	100.00%
2019	53,819.87	86.41%	8,270.33	13.28%	194.98	0.31%	62,285.18	100.00%
2020	52,512.18	87.70%	7,127.06	11.90%	238.66	0.40%	59,877.91	100.00%
2021	48,918.77	89.61%	5,544.17	10.16%	129.74	0.24%	54,592.69	100.00%
2022	46,750.33	87.96%	6,207.27	11.68%	189.92	0.36%	53,147.51	100.00%
2023	47,763.26	85.85%	7,615.89	13.69%	254.45	0.46%	55,633.59	100.00%
Mean	50,369.30	86.21%	7,773.65	13.24%	319.10	0.54%	58,462.05	100.00%

Source: Research results.

Expenditures on Personnel and Social Charges predominated throughout the entire period, accounting on average for 86.21% of federal university expenditures, while Other Current Expenditures accounted for 13.24% and Investments for only 0.54%. This composition highlights the high degree of budgetary rigidity of these institutions, since most resources are committed to mandatory expenditures, leaving only a small share for discretionary expenditures. Consequently, adjustments resulting from fiscal constraints tend to be concentrated precisely on resources allocated to operating expenses and Investments, whose share remained below 20% and declined over the period. This result indicates that budget cuts were not distributed uniformly across expenditure groups but predominantly affected the budget categories that support the maintenance of activities and the universities' capacity for expansion.

To identify potential changes and provide a detailed assessment of the behavior of the observed values, the descriptive statistics of the variables were analyzed. Table 4 presents the descriptive statistics for the Personnel and Social Charges expenditure group.

Table 4
Personnel and Social Charges, 2016-2023 (in millions of reais)

Year	Mean	Median	Standard Deviation	Coefficient of Variation	Minimum	Maximum
2016	759.27	641.00	678.84	89.41%	64.42	3,508.12
2017	831.04	709.34	728.19	87.62%	75.00	3,674.27
2018	841.28	720.89	724.31	86.10%	92.21	3,628.86
2019	854.28	726.46	736.98	86.27%	101.36	3,622.10
2020	833.53	717.17	708.99	85.06%	100.42	3,517.90
2021	776.49	667.64	658.32	84.78%	96.48	3,200.31
2022	742.07	642.02	620.70	83.64%	95.22	3,027.35
2023	758.15	660.20	626.12	82.59%	101.27	3,050.17

Source: Research results.

Expenditures on Personnel and Social Charges showed continuous growth between 2016 and 2019, followed by a decline beginning in 2020, a pattern that continued through 2022. This result suggests that, although these expenditures are predominantly mandatory, their growth was constrained by the context of fiscal austerity, possibly due to the restrictions imposed by Constitutional Amendment No. 95/2016 on salary adjustments. This pattern is consistent with

Cutback Management Theory, according to which salary freezes constitute one of the main expenditure containment strategies in higher education institutions (Hardy, 1984). The results also corroborate Silva and Araújo (2022), who associate the expansion observed through 2019 with civil servants' position, career, and compensation plans, while the reduction in subsequent years reflects the accumulated erosion of salaries. The reduction in expenditure variability over the period further indicates that the effects of these constraints occurred relatively uniformly across universities, although differences in institutional size and structure continue to explain part of the observed heterogeneity.

Considering the analysis of the Other Current Expenditures nature group, Table 5 shows that the Means and Medians of this Variable decreased considerably from 2016 to 2021. In turn, 2022 and 2023 showed a slight increase in values; however, even with this growth, they remained below the levels observed in 2016.

Table 5
Other Current Expenditures, 2016-2023 (in millions of reais)

Year	Mean	Median	Standard Deviation	Coefficient of Variation	Minimum	Maximum
2016	152.27	116.27	124.52	81.78%	19.12	706.90
2017	142.18	113.37	114.77	80.72%	19.25	675.15
2018	140.86	107.83	109.77	77.93%	22.56	631.85
2019	131.28	102.70	101.09	77.01%	18.24	561.32
2020	113.13	78.76	95.37	84.30%	18.82	516.51
2021	88.00	70.73	71.29	81.00%	15.75	449.53
2022	98.53	78.27	70.44	71.49%	18.12	402.12
2023	120.89	95.88	89.19	73.78%	26.54	500.22

Source: Research results.

The reduction in Other Current Expenditures between 2019 and 2020 indicates that adjustments arising from fiscal constraints and the pandemic were concentrated primarily on discretionary expenditures, which support the day-to-day operations of universities. This result can be explained, in part, by the reduction in expenditures on electricity, maintenance, and general services resulting from the partial suspension of in-person activities, as demonstrated by Reis *et al*. (2022). In addition, the intensification of budgetary constraints following Constitutional Amendment No. 95/2016 may have further contributed to this process by reducing resources allocated to operating expenses and student assistance programs (Santos *et al*., 2021). These findings reinforce that, given the limited flexibility of mandatory expenditures, fiscal adjustments tend to fall on discretionary expenditures, with potential impacts on universities' operational capacity and provision of services.

The high coefficients of variation indicate that these adjustments did not occur uniformly across institutions. The greater dispersion observed in 2020 suggests that the effects of the pandemic and budgetary constraints depended on the characteristics and priorities of each university, such as size, areas of activity, location, and level of institutional consolidation. This pattern corroborates the perspective that responses to budget cuts are conditioned by the organizational specificities and strategic priorities of each institution (Hardy, 1984).

Regarding Capital Expenditures, Table 6 presents the results of the descriptive analysis of expenditures on Investments.

Table 6
Investments, 2016-2023 (in millions of reais)

Year	Mean	Median	Standard Deviation	Coefficient of Variation	Minimum	Maximum
2016	12.07	7.81	10.66	88.33%	0.42	42.60
2017	7.33	5.16	6.62	90.31%	0.92	31.90
2018	5.12	3.56	4.99	97.38%	0.20	31.01
2019	3.09	1.76	3.45	111.42%	0.06	15.77
2020	3.79	1.97	4.24	111.79%	0.00	21.74
2021	2.06	0.82	2.78	134.89%	0.00	12.62
2022	3.01	2.40	2.71	89.77%	0.03	11.52
2023	4.04	2.52	4.05	100.27%	0.00	19.52

Source: Research results.

Expenditures on Investments showed a continuous decline between 2016 and 2019, indicating that this group was the primary target of adjustments resulting from budgetary constraints. As discretionary expenditures, Investments tend to absorb a substantial share of fiscal cuts, thereby preserving mandatory expenditures. This result is consistent with the findings of Rodrigues *et al*. (2023), who identified Investments as the expenditure group with the largest reduction between 2013 and 2022, and corroborates the literature indicating that reductions in Capital Expenditures are among the most recurrent strategies in contexts of budgetary constraint (Raudla *et al*., 2015).

Although there was a slight recovery in Investments beginning in 2020, the amounts remained significantly below those observed at the beginning of the period analyzed. This pattern indicates that, even in the face of demands imposed by the pandemic, such as the need to adapt infrastructure for the development of academic activities, resources allocated to Investments remained limited, consistent with the findings of Albino and Moreira (2023). This evidence suggests that universities prioritized maintaining essential operating expenditures at the expense of expanding their investment capacity.

The high variability in Investments throughout the entire period demonstrates that the effects of budgetary constraints were not uniform across universities, reflecting differences in size, institutional priorities, and resource availability. Furthermore, the occurrence of institutions with no investment expenditures in some of the years analyzed reinforces the role of this expenditure group as the primary margin for adjustment within university budgets, making the capacity for expansion, modernization, and infrastructure renewal particularly vulnerable in contexts of fiscal austerity.

Table 7 presents the results of the *Friedman* test, which rejects the null hypothesis of equality across years for all three variables analyzed. This indicates a statistically significant difference among the years considered in the study for the Personnel and Social Charges, Other Current Expenditures, and Investments variables.

Table 7
Friedman Test Results

Variable	χ^2	Gl	*p*-value
Personnel and Social Charges	301.529	7	0.001*
Other Current Expenditures	315.980	7	0.001*
Investments	191.270	7	0.001*

Note. *Significance at the 1% level.
Source: Research results.

To identify statistically significant differences among the years from 2016 to 2023 in

expenditures on Personnel and Social Charges, Other Current Expenditures, and Investments, Table 8 presents the multiple comparisons identified using the *Durbin-Conover* post hoc test.

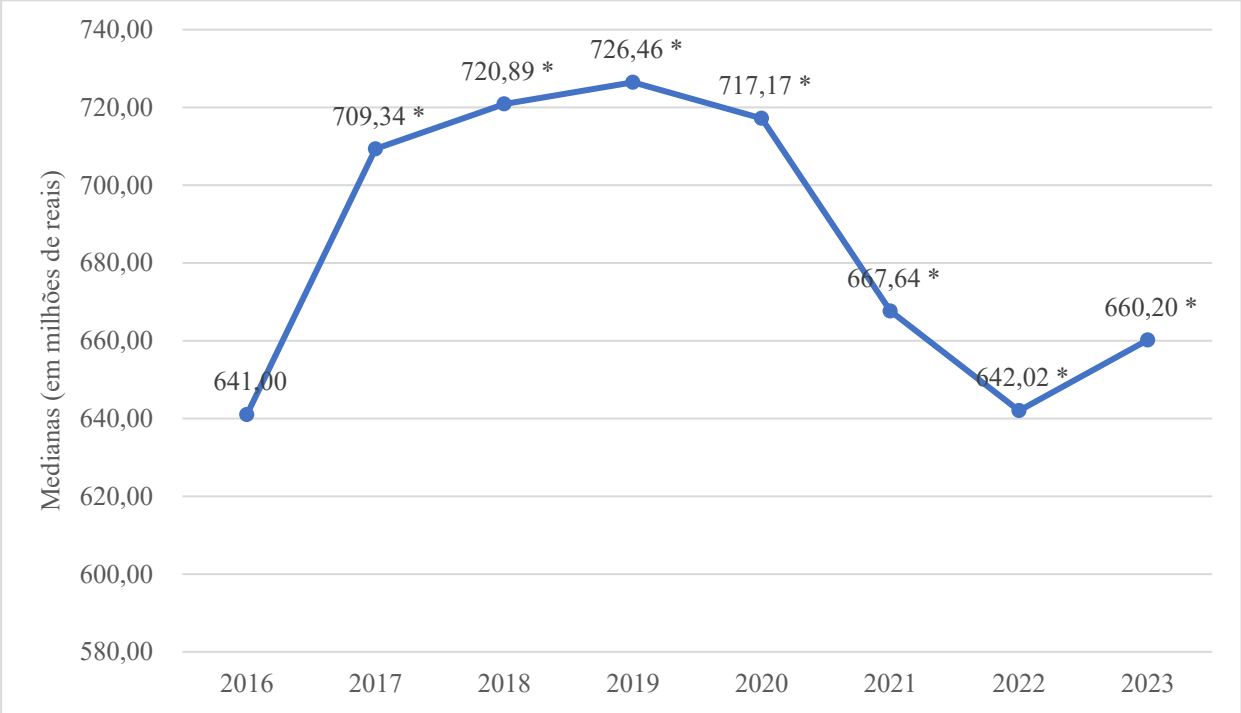
Table 8
Results of the Multiple Comparisons Tests, 2016-2023

Year - Year	Personnel and Social Charges			Other Current Expenditures			Investments		
	Statistic	p-value	Variation	Statistic	p-value	Variation	Statistic	*p*-value	Variation
2016-2017	11.099	0.001*	↑	3.456	0.001*	↓	2.493	0.013**	↓
2016-2018	16.681	0.001*	↑	3.320	0.001*	↓	5.418	0.001*	↓
2016-2019	21.685	0.001*	↑	7.522	0.001*	↓	11.124	0.001*	↓
2016-2020	17.836	0.001*	↑	17.008	0.001*	↓	9.134	0.001*	↓
2016-2021	7.121	0.001*	↑	25.005	0.001*	↓	15.008	0.001*	↓
2016-2022	0.321	0.749	-	19.177	0.001*	↓	10.405	0.001*	↓
2016-2023	6.736	0.001*	↑	9.893	0.001*	↓	7.984	0.001*	↓
2017-2018	5.582	0.001*	↑	0.136	0.892	-	2.925	0.004*	↓
2017-2019	10.586	0.001*	↑	4.066	0.001*	↓	8.631	0.001*	↓
2017-2020	6.736	0.001*	↑	13.553	0.001*	↓	6.641	0.001*	↓
2017-2021	3.978	0.001*	↓	21.549	0.001*	↓	12.515	0.001*	↓
2017-2022	11.42	0.001*	↓	15.721	0.001*	↓	7.912	0.001*	↓
2017-2023	4.363	0.001*	↓	6.437	0.001*	↓	5.490	0.001*	↓
2018-2019	5.004	0.001*	↑	4.201	0.001*	↓	5.706	0.001*	↓
2018-2020	1.155	0.249	-	13.688	0.001*	↓	3.716	0.001*	↓
2018-2021	9.559	0.001*	↓	21.684	0.001*	↓	9.590	0.001*	↓
2018-2022	17.002	0.001*	↓	15.857	0.001*	↓	4.987	0.001*	↓
2018-2023	9.944	0.001*	↓	6.573	0.001*	↓	2.565	0.011**	↓
2019-2020	3.849	0.001*	↓	9.487	0.001*	↓	1.990	0.047**	↑
2019-2021	14.564	0.001*	↓	17.483	0.001*	↓	3.884	0.001*	↓
2019-2022	22.006	0.001*	↓	11.655	0.001*	↓	0.719	0.472	-
2019-2023	14.949	0.001*	↓	2.372	0.018**	↓	3.141	0.002*	↑
2020-2021	10.714	0.001*	↓	7.996	0.001*	↓	5.874	0.001*	↓
2020-2022	18.156	0.001*	↓	2.168	0.031**	↓	1.271	0.205	-
2020-2023	11.099	0.001*	↓	7.115	0.001*	↑	1.151	0.250	-
2021-2022	7.442	0.001*	↓	5.828	0.001*	↑	4.603	0.001*	↑
2021-2023	0.385	0.700	-	15.111	0.001*	↑	7.025	0.001*	↑
2022-2023	7.057	0.001*	↑	9.284	0.001*	↑	2.421	0.016**	↑

Note. *Significance at the 1% level; ** Significance at the 5%; variation (↑) indicates an increase and (↓) indicates a decrease in expenditure relative to the reference year.
Source: Research results.

The results reveal statistically significant differences in Personnel and Social Charges expenditures over the period analyzed. Figure 1 illustrates the evolution of these amounts:

Figure 1
Evolution of Personnel and Social Charges Expenditures, 2016-2023(in millions of reais)



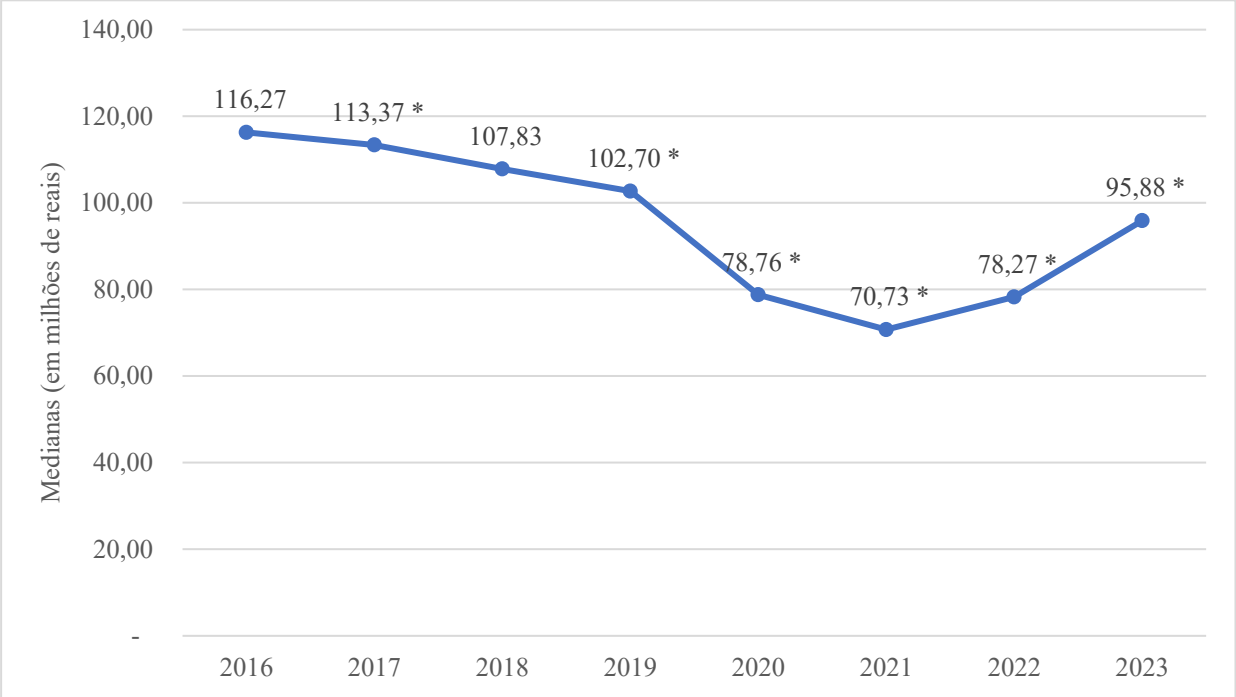
Note. *Significance at the 1% level.
Source: Research results.

The differences identified between 2016 and the subsequent years through 2019 reflect the increase in Personnel and Social Charges expenditures, while the absence of differences in comparisons such as 2016-2022 and 2021-2023 demonstrates that, following the decline observed from 2020 onward, these expenditures returned to levels similar to those at the beginning of the series. This result is relevant because it indicates that the cumulative growth between 2016 and 2019 was largely reversed in subsequent years, demonstrating that fiscal constraints significantly altered the trajectory of personnel expenditures. This pattern is consistent with the findings of Rodrigues *et al*. (2023) and Silva and Araújo (2022), suggesting that the combination of the expansion resulting from career plans and, subsequently, restrictions on salary adjustments modified the dynamics of these expenditures over the period.

The analysis of the Medians reinforces this interpretation by showing continuous growth between 2016 and 2019, followed by a decline between 2020 and 2022 and a slight recovery in 2023. Nevertheless, the levels observed in the final year remained below those recorded before the pandemic, indicating that the containment of personnel expenditures produced persistent effects even after the gradual resumption of in-person activities.

In turn, comparisons among the values of Other Current Expenditures reveal statistically significant differences throughout most of the period analyzed, indicating a downward trend in these expenditures, interrupted only between 2017 and 2018, when expenditures remained relatively stable. This pattern suggests that operating expenditures were progressively adjusted in response to budgetary constraints, intensified by the fiscal measures adopted following Constitutional Amendment No. 95/2016 and, subsequently, by the effects of the Covid-19 pandemic. The evolution of these expenditures is illustrated in Figure 2:

Figure 2
Evolution of Other Current Expenditures, 2016-2023 (in millions of reais)



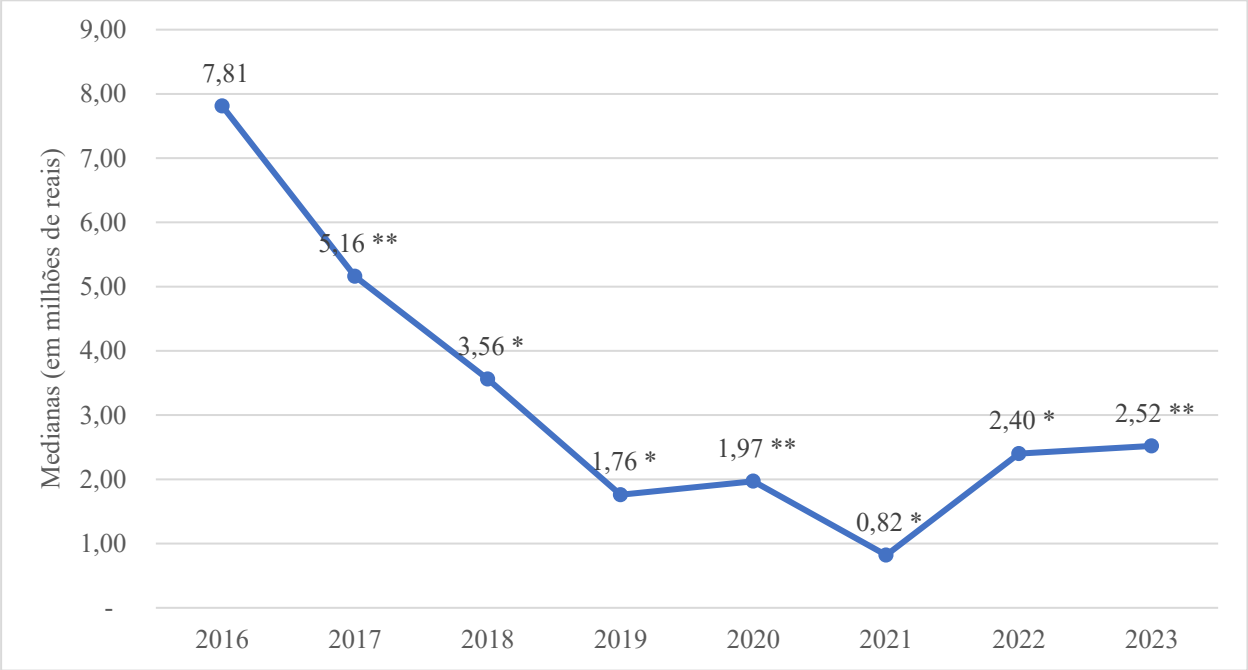
Note. *Significance at the 1% level.
Source: Research results.

The analysis of the Medians shows an almost continuous decline between 2016 and 2021, with a sharp decrease between 2019 and 2021. This result indicates that fiscal adjustments and the changes imposed by the pandemic were concentrated on expenditures related to university operations, such as electricity, maintenance, and other services, facilitated by the adoption of remote teaching. This finding corroborates the study by Reis and Chaves (2021), which identified a reduction in the Current Expenditures of public universities between 2013 and 2020. The studies by Albino and Moreira (2024) and Reis *et al*. (2022) also documented a reduction in these expenditures during the pandemic.

Although Other Current Expenditures recovered in 2022 and 2023, accompanying the resumption of in-person activities, the levels observed remained significantly below those recorded between 2016 and 2019. This result demonstrates that the resumption of activities was insufficient to restore operating expenditure levels to those observed before the pandemic, indicating that the effects of budgetary constraints on discretionary expenditures persisted even after university operations returned to normal.

Comparisons among Investment amounts reveal statistically significant differences throughout most of the period analyzed, reflecting a trajectory marked by a substantial contraction in resources allocated to the expansion and modernization of universities (Figure 3). The successive reductions observed between 2016 and 2019 indicate that Investments constituted the expenditure group most affected by budgetary constraints, a result consistent with their discretionary nature. This pattern corroborates the findings of Reis and Chaves (2021), who identified a substantial reduction in Investments at federal universities between 2013 and 2020, as well as the results of Rodrigues *et al*. (2023), who demonstrated the impact of budget cuts on this expenditure category.

Figure 3
Evolution of Investment Expenditures, 2016-2023 (in millions of reais)



Note. *Significance at the 1% level; ** Significance at the 5%.
Source: Research results.

Despite the slight recovery in Investments in 2020, this increase proved insufficient in light of the demands imposed by the adoption of remote teaching, which required adaptations to university infrastructure. The absence of statistically significant differences when comparing 2019-2022, 2020-2022, and 2020-2023 reveals that, despite the recovery observed in the final years of the series, Investments remained close to the low levels recorded during the most critical period of budgetary constraints. This pattern is consistent with Albino and Moreira (2024), who emphasize that, even after the onset of the pandemic, Investments remained below previous levels.

Finally, the growth observed between 2022 and 2023 suggests a partial recovery in Investments following the resumption of in-person activities. However, the amounts remained significantly below those recorded in 2016, indicating that resources allocated to the expansion, modernization, and renewal of university infrastructure did not keep pace with the resumption of academic activities. These results highlight that, in contexts of fiscal austerity, Investments tend to constitute the primary margin for adjustment in university budgets, prolonging the effects of budgetary constraints even after the public health crisis had subsided.

5 DISCUSSION

The results show that budgetary constraints did not produce uniform reductions across the different expenditure groups of federal universities but instead led to a reconfiguration of their budgetary composition. From the perspective of Cutback Management Theory, this pattern reveals that, given the limited flexibility of mandatory expenditures, the ability of public organizations to reallocate resources and implement changes becomes constrained (Schmidt *et al*., 2017), causing adjustments to be concentrated on discretionary expenditures, while preserving Personnel and Social Charges expenditures and shifting the greatest burden of adjustment to operating expenditures and, particularly, Investments. In this context, the reduction observed in personnel expenditures from 2020 onward does not alter the predominance of this group within the budget but indicates that restrictions on salary adjustments constituted an additional expenditure containment strategy without changing the high degree of rigidity in the budgetary structure.

Other Current Expenditures and Investments exhibited different patterns. While the reduction in operating expenditures reflected both the decline in in-person activities during the pandemic and budgetary constraints, Investments remained at levels significantly below those observed at the beginning of the series, even after the resumption of in-person activities. This pattern is consistent with the literature, which identifies reductions in Investments as a recurrent strategy in contexts of budgetary constraint at universities (Raudla *et al*., 2015; Rodrigues *et al*., 2023).

These results suggest that the effects of budget cuts extend beyond the immediate reduction in expenditures and begin to influence institutions' capacity for adaptation and development over the medium and long term. This finding corroborates the proposition that, in contexts of prolonged fiscal constraint, adjustments tend to evolve from generalized strategies toward more targeted cuts, concentrating their effects on specific expenditure categories (Raudla *et al*., 2015). In this context, limitations on Investments compromise the maintenance and modernization of university infrastructure, restrict the incorporation of technologies, and reduce the capacity to expand teaching, research, and extension activities. Thus, although the adjustments contributed to meeting fiscal constraints, they may produce persistent effects on the quality and sustainability of the activities carried out by universities.

From this perspective, the effects of the Covid-19 pandemic should be understood within the context of an ongoing fiscal adjustment process. Rather than representing an isolated event, the pandemic intensified the budgetary constraints faced by federal universities. Even in the face of increased demand for technological infrastructure and the substantial role played by universities in responding to Covid-19, particularly through scientific research, continued budgetary constraints limited these institutions' capacity to respond (Reis & Macário, 2020; Santos *et al*., 2021; Rodrigues *et al*., 2023; Albino & Moreira, 2024). The partial recovery observed in the final years of the series was insufficient to restore previous levels of operating expenditures and Investments, indicating that the effects of the cuts persisted even after the normalization of in-person activities.

Overall, the main finding of this study is the identification of changes in the composition of expenditures at Brazilian federal universities between 2016 and 2023, during a period marked by fiscal constraints and the Covid-19 pandemic. The results reveal a greater concentration of adjustments on discretionary expenditures, particularly Investments, a pattern consistent with selective cutback management strategies. These findings suggest that the observed changes may have implications for the institutions' operational capacity, infrastructure, and future development, reinforcing the importance of considering the medium- and long-term effects of budgetary constraints on the functioning of federal universities.

6 FINAL CONSIDERATIONS

The present study analyzed the composition of expenditures at Brazilian federal universities by expenditure nature group in the context of the Covid-19 pandemic and the fiscal constraints in effect from 2016 to 2023. The results revealed changes in expenditure composition over the period, characterized by the predominance of Personnel and Social Charges, the reduction in Other Current Expenditures during the pandemic, and, above all, the greater variability observed in Investments. These findings indicate that, in the context of budgetary constraint, the reallocation of expenditures did not occur uniformly across the different expenditure nature groups.

In light of Cutback Management Theory, the results suggest that federal universities reconfigured the composition of their expenditures in response to a context of resource scarcity, preserving mandatory expenditures to a greater extent while adjusting those with greater budgetary flexibility, such as Investments. This evidence broadens the understanding of how public organizations respond to prolonged periods of fiscal constraint, demonstrating that cutback

management involves not only reducing the volume of expenditures but also redistributing them among budget categories with different degrees of rigidity and discretion.

The main contribution of this study lies in demonstrating, based on empirical data from Brazilian federal universities and a historical series encompassing both the pre- and post-pandemic periods, how expenditure composition changed in the simultaneous context of a public health crisis and fiscal constraints. By focusing on the structure of expenditures, the study complements the literature, which has traditionally focused on changes in the overall volume of resources, by providing empirical evidence on the dynamics of budgetary reconfiguration in public higher education institutions.

From a managerial and public policy perspective, the results reinforce the importance of resource planning and allocation mechanisms that consider the different degrees of flexibility across expenditure categories, thereby supporting more consistent budgetary decisions in contexts of fiscal constraint. In this regard, understanding how different expenditure nature groups respond to budgetary limitations can contribute to improving the financial management of federal universities and the planning of higher education funding policies.

As a limitation, the study focused on the aggregate analysis of expenditures by nature group and did not account for the heterogeneity of individual expenditure items or the institutional specificities of the universities. Future research may further explore this issue through disaggregated analyses of expenditure items, investigations of differences across institutional profiles, and examinations of the association between the observed budgetary reconfiguration and indicators of academic performance, quality of services provided, and institutional outcomes, thereby broadening the understanding of the effects of fiscal constraints on Brazilian federal universities.

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CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest.

DATA AVAILABILITY

The complete dataset supporting the findings of this study is available from the authors upon reasonable request.

AUTHOR CONTRIBUTIONS

Roles	1º author	2º author	3º author	4º author	5º author
Conceptualization	♦	♦			
Data Curation	♦	♦			
Formal Analysis	♦	♦	♦	♦	
Funding Acquisition					
Investigation	♦	♦	♦	♦	
Methodology	♦	♦	♦	♦	
Project Administration		♦			
Resources					

Software	♦	♦	♦	♦	
Supervision		♦			
Validation	♦	♦	♦	♦	♦
Visualization	♦	♦	♦	♦	♦
Writing – Original Draft Preparation	♦				
Writing – Review & Editing		♦	♦	♦	♦

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