CEO duality and asymmetric behavior of operating costs

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Dualidad del CEO y comportamiento asimétrico de costos de operación

Las decisiones gerenciales tienen un efecto en el comportamiento de los costos, y la dualidad del CEO facilita a los gerentes tomar decisiones según intereses personales. En Brasil, el *Código de las mejores prácticas de gobierno corporativo* (Instituto Brasileiro de Governança Corporativa [IBGC], 2023) recomienda que el CEO no debería asumir el cargo de presidente o miembro del directorio. En vista de ello, el objetivo del presente artículo es evaluar el efecto de la dualidad CEO en el comportamiento asimétrico de los costos de operación de las empresas de capital abierto de Brasil. Con este fin se llevó a cabo una investigación descriptiva, documental y cuantitativa sobre un muestreo equilibrado de 178 empresas en el periodo 2012-2021, y los datos fueron analizados usando estadística descriptiva y regresión lineal jerárquica. Este estudio adoptó la perspectiva de la Teoría de la Agencia de Jensen y Meckling (1976) en la que los gerentes toman decisiones en base a intereses personales. Los resultados mostraron que el grado de asimetría en los costos de operación durante periodos de menores ventas de empresas con dualidad de CEOs era mayor que el de empresas sin dicha dualidad. Por consiguiente, estos resultados podrían estar relacionados con prácticas más agresivas de reducción de costos de operación adoptadas por gerentes con dualidad durante períodos de menores ventas.

Palabras clave: gobierno corporativo, decisiones gerenciales, problemas de agencia, asimetría de costos

CEO duality and asymmetric behavior of operating costs

Management decisions have an effect on cost behavior, and the duality of the CEO makes it easier for managers to make decisions based on personal interests. In Brazil, the *Code of best corporate governance practices* (Instituto Brasileiro de Governança Corporativa [IBGC], 2023) recommends that the chief executive officer (CEO) should not hold the position of chairman or member of the board of directors. In view of this, this research aimed to evaluate the effect of CEO duality on the asymmetric behavior of the operating costs (OC) of Brazilian publicly traded companies. To this end, descriptive, documentary and quantitative research was carried out on a balanced sample of 178 companies in the period 2012-2021, and the data was analyzed using descriptive statistics and hierarchical linear regression. This study adopted the perspective of Jensen and Meckling's agency theory (1976), in which managers make decisions based on personal interests. The results showed that companies with dual CEOs had a higher degree of asymmetry in operating costs during periods of falling sales than companies without dual CEOs. Thus, these results may be related to more aggressive operating cost reduction practices carried out by managers with duality during periods of falling sales.

Keywords: corporate governance, management decisions, agency problems, cost asymmetry

Dualidade do CEO e comportamento assimétrico dos custos operacionais

As decisões gerenciais têm um efeito sobre o comportamento dos custos, e a dualidade do CEO torna mais fácil para os gerentes tomarem decisões segundo seus interesses pessoais. No Brasil, o *Código das melhores práticas de governança corporativa* (Instituto Brasileiro de Governança Corporativa [IBGC], 2023) recomenda que o CEO não assuma o cargo de presidente ou membro da diretoria. Diante disso, o objetivo deste artigo é avaliar o efeito da dualidade CEO no comportamento assimétrico dos custos operacionais das empresas de capital aberto no Brasil. É por isso que foi realizada uma pesquisa descritiva, documental e quantitativa sobre uma amostragem equilibrada de 178 empresas no período 2012-2021, e os dados foram analisados usando estatística descritiva e regressão linear hierárquica. Este estudo adotou a perspectiva da Teoria da Agência de Jensen e Meckling (1976), na qual os gerentes tomam decisões com base nos interesses pessoais. Os resultados mostraram que o grau de assimetria nos custos operacionais durante os períodos de menores vendas das empresas com dualidade de CEOs foi maior do que o das empresas sem essa dualidade. Portanto, esses resultados poderiam estar relacionados com práticas mais agressivas de redução de custos operacionais adotadas por gerentes com dualidade em períodos de vendas mais baixas.

Palavras-chave: governança corporativa, decisões gerenciais, problemas de agência, assimetria de custos

1. Introduction

Understanding cost behavior is an essential element of cost accounting (Banker et al., 2014). In the traditional model of cost behavior, costs are described as fixed or variable in response to changes in production volume, i.e. this model describes a linear relationship between cost change and activity change (Anderson et al., 2003; Ibrahim et al., 2022). Thus, if there is a change in the volume of activity, costs will change in the same proportion (Richartz & Borgert, 2021).

However, the literature on cost behavior provides evidence that the relationship between costs and volume of activity does not necessarily occur in a linear fashion, i.e. not only the magnitude but also the direction of the change in activity shapes the behavior of costs (Ibrahim et al., 2022; Malik, 2012; Reis & Borgert, 2018). The study by Anderson et al. (2003) was the first to provide robust statistical evidence of the asymmetric behavior of costs, which the authors called sticky costs. Since then, several authors have identified the asymmetric behavior of costs in different contexts (Banker & Byzalov, 2014; Chen et al., 2012; Ibrahim et al., 2022; Richartz & Borgert, 2021; Weiss, 2010).

The cost asymmetry approach considers that managerial decisions have an effect on the cost behavior of organizations, unlike the traditional approach to cost behavior (Anderson et al., 2003; Banker et al., 2018). In this sense, managers' decisions regarding the management of resources in companies can be motivated by personal interests, which can lead to asymmetric cost behavior for companies (Chen et al., 2012). According to Ibrahim et al. (2022), operating costs (OC) represent the main costs of companies' cost structure, therefore, they are more likely to be affected by managers' decisions to adjust the company's resources.

The agency theory is based on the premise that managers will act in their personal interests, which are not necessarily aligned with the interests of shareholders (Jensen & Meckling, 1976). The literature related to agency theory considers that chief executive officer (CEO) duality can facilitate opportunistic behavior by managers (Salehi et al., 2021). CEO duality is understood as the situation in which the same person holds the positions of CEO and chairman or member of the board of directors (Lin et al., 2014; Salehi et al., 2021). In this sense, CEO duality reduces the monitoring power of the board of directors (Jensen, 1993), which consequently hinders a fair and efficient assessment of the CEO's performance (Lin et al., 2014).

CEO duality is a variable typically used in studies on agency problems, as in the case of managerial entrenchment (Salehi et al., 2021). However, regarding the literature

on asymmetric cost behavior, CEO duality has been little analyzed. Among the studies that have analyzed the effect of CEO duality on asymmetric cost behavior are those by Bugeja et al. (2015) and Ibrahim (2018), which analyzed companies from Australia and Egypt, respectively. In Brazil, so that there is no concentration of power, damaging the board's supervisory independence in relation to management, the *Code of best corporate governance practices* recommends that the CEO does not accumulate the position of chairman of the board of directors, nor does he act as a member of the board (Instituto Brasileiro de Governança Corporativa [IBGC], 2023).

In this way, Brazil offers a favorable scenario for analyzing the effect of CEO duality on asymmetric cost behavior, since the IBGC (2023) recommends, but does not prohibit, that the same person accumulate the position of CEO and member of the board of directors. Furthermore, publicly traded companies also offer a suitable environment for this analysis, as these companies are required by Brazilian legislation to have a board of directors in their corporate structure.

Based on the above, this research aims to evaluate the effect of CEO duality on the asymmetric behavior of the OC of Brazilian publicly traded companies. To this end, descriptive, documentary and quantitative research was carried out on a balanced sample of 178 companies in the period 2012-2021, and the data was analyzed using descriptive statistics and hierarchical linear regression. The results show that CEO duality has an impact on the asymmetric behavior of OC costs in Brazilian public companies during periods of falling sales.

As a theoretical contribution, this study adds to the literature on CEO duality as a factor that can impact on the asymmetric cost behavior of Brazilian listed companies. In a practical sense, this study can be useful for shareholders, board members and audit committee members of organizations to be more aware that CEO duality can have an impact on asymmetric cost behavior. Thus, in companies where the CEO is a member of the board of directors, corporate governance practices can be adopted, such as separating the roles of CEO and board member, to better monitor the activities of managers. This study can also be useful for auditors and market analysts, since their work procedures can be improved by considering that the duality of the CEO has an impact on the cost behavior of organizations.

2. Theoretical framework and research hypothesis

The cost asymmetry approach, unlike the traditional view of cost accounting, considers that management decisions affect the behavior of companies' costs (Anderson et al., 2003; Ballas et al., 2022; Banker et al., 2018). Thus, when sales decrease, managers

must decide whether to maintain unused resources or reduce them to their optimum levels (Richartz & Borgert, 2021). According to Chen et al. (2012) and Lopatta et al. (2020), managers' decisions to maintain or reduce resources in periods of falling sales can be motivated by personal interests. In this context, the duality of the CEO is a factor that creates a favorable scenario for the manager to pursue personal interests that are not necessarily aligned with the interests of shareholders (Salehi et al., 2021).

CEO duality refers to the situation in which the same person holds the positions of chief executive officer (CEO) and chairman of the board of directors (Florackis & Okzan, 2009; Lee, 2023; Lin et al., 2014), but can also be extended to when the CEO is a member of the board (Salehi et al., 2021). Among the functions of the board of directors are decisions on the hiring, firing and remuneration of the CEO (Jensen, 1993).

An agency relationship is defined as a contractual relationship under which one or more people (shareholders) engage another person (managers) to perform some service on their behalf, which involves delegating some decision-making authority to the agent (Jensen & Meckling, 1976). Agency theory starts from the premise that both parties will seek to maximize utility, but that the agent will not always act in the best interests of the principal (Jensen & Meckling, 1976).

From the perspective of agency theory, the duality of the CEO weakens the monitoring power of the board of directors and is a deteriorating factor in agency conflict and information asymmetry (Jensen, 1993; Lee, 2023; Salehi et al., 2021). Thus, the likelihood of a fair and efficient evaluation of the CEO's performance will be lower, leading to greater difficulty for the board of directors to replace an unqualified CEO (Lin et al., 2014). When the CEO is a member of the board, even without holding the position of chairman, there is still the potential to influence decisions and steer the company in a way that benefits their own interests to the detriment of shareholders' interests (Salehi et al., 2021). In this context, Alves (2023) identified that the reduction in earnings quality is associated with CEO duality, but that this reduction is attenuated when the board of directors has independent members.

Chen et al. (2012) found that managers with power have a greater tendency to seek empire building, which refers to the expansion of the company beyond its optimal capacity. In this sense, managers with incentives for empire building increase resources rapidly when sales increase, but reduce idle resources very slowly when sales decrease, which leads to asymmetric cost behavior (Chen et al., 2012). Following this argument, Lopatta et al. (2020) found that managers with power increase the level of asymmetry in companies' costs, resulting in lower value for shareholders. On the other hand, Dierynck et al. (2012) and Kama and Weiss (2013) found that, to

meet or exceed profit targets, managers decrease resources more sharply when sales decrease, but increase resources to a lesser extent when sales increase, which also leads to asymmetric cost behavior.

Ibrahim (2018) found that CEO duality has an impact on the asymmetric cost behavior of publicly traded companies in Egypt. Thus, CEO duality, due to the greater concentration of power, allows managers to adjust resources in the way that is most favorable to them, regardless of its consequences on the company's cost behavior (Ibrahim, 2018). Given the above, it is expected that the duality of the CEO provides greater power for the manager to pursue personal interests, such as building empires (Chen et al., 2012; Lopatta et al., 2020), or to make more pronounced cuts in the company's costs, aiming for greater remuneration for achieving profit targets (Dierynck et al., 2012; Kama & Weiss, 2013), thus causing the asymmetric behavior of costs for companies. The following research hypothesis was therefore formulated:

- **H$_1$:** CEO duality has an effect on the asymmetric behavior of OC.

3. Methodological procedures

3.1. Population and sample

The population of this study comprises Brazilian companies listed on B3 (Brasil, Bolsa, Balcão). The selection of publicly traded companies is justified by the fact that these companies offer a favorable environment for analyzing the effect of CEO duality on the asymmetric behavior of costs. The period of analysis of this research covers the years 2012 to 2021. The year 2012 was chosen as the initial period because it is a year in which the rules of the International Financial Reporting Standards (IFRS) in financial statements in Brazil are already consolidated, which provides better comparability in the period analyzed. IFRSs comprise a set of accounting standards issued by the International Accounting Standard Board (IASB) designed to bring a common language so that financial statements can be understood consistently at an international level (Imhanzenobe, 2022).

Panel A of table 1 shows the composition of the companies in the sample. Panel B shows the composition of the companies in the sample by sector, according to the Global Industry Classification Standard (GICS) of the *Refinitiv Eikon Database*.

Table 1. *Companies from the study sample*

Panel A - Composition of companies in the sample		
Companies	**AF [b]**	**RF [c]**
(+) Companies listed on B3 [a]	480	100,0%
(-) Companies in the financial sector	79	16,5%
(=) Subtotal	401	83,5%
(-) Companies with periods without movement for NSR [d], COGS [e] or SG&A [f]	191	39,8%
(-) Companies with periods with negative values for NSR [d], COGS [e] or SG&A [f]	4	0,8%
(-) Companies with periods with a variation of more than 100% in the NSR [d]	28	5,8%
(=) Total	**178**	**37,1%**
Panel B - Composition of companies by sector		
Sector	**AF [b]**	**RF [c]**
Cyclical consumption	39	21,9%
Utilities	31	17,4%
Industry	29	16,3%
Basic materials	24	13,5%
Non-cyclical consumption	20	11,2%
Real estate	17	9,6%
Technology	6	3,4%
Healthcare	5	2,8%
Energy	4	2,2%
Educational and academic services	3	1,7%
(=) Total	**178**	**100,0%**

Note. From *Refinitiv Eikon Database*, by Refinitiv Eikon, 2024 (https://eikon.refinitiv.com).
[a] B3: Brasil, Bolsa, Balcão
[b] AF: absolute frequency
[c] RF: relative frequency
[d] NSR: net sales revenue
[e] COGS: cost of goods sold
[f] SG&A: selling, general and administrative expenses

480 companies listed on B3 were available on the *Refinitiv Eikon Database*. Companies belonging to the financial sector were excluded because they have a different operating structure to non-financial companies, which makes it difficult to compare results (Ibrahim et al., 2022). Next, all companies that did not show any movement in at least one year of the analysis period for the net sales revenue (NSR), cost of goods sold (COGS) or selling, general and administrative expenses (SG&A) accounts, as well as those that showed negative values for these accounts, were excluded.

Regarding the exclusion of outliers, this study used variations above 100% in NSR in relation to the previous year as the cut-off point, as adopted by Balakrishnan et al. (2014) and Pamplona et al. (2018). It is understood that companies with a variation of more than 100% in NSR had some eventual change, such as a merger or takeover, which affects the analysis in that period (Pamplona et al., 2018). This study used a balanced sample of 178 companies, totaling 1,780 observations for the period 2012 to 2021. It should be noted that the data collected refers to the companies' annual financial statements.

3.2. Data analysis procedures

The data analysis procedures in this study were carried out using SPSS® software. Initially, descriptive statistics were carried out on the variables in this study. To identify the asymmetric behavior of costs, an adaptation of the model by Anderson et al. (2003) was used, as shown in equation 1.

$$(1) \quad OC_i = \beta_0 + \beta_1 \, NSR_i + \varepsilon_i$$

Where:
log = Logarithm;
OC = Operating costs;
NSR = Net sales revenue;
ε = Regression error.

Equation 1 presents as an independent variable the logarithm of the variation in NSR in period t in relation to period t-1. Thus, in this model, NSR is used as an approximation of the companies' production volume. The dependent variable is the logarithm of the change in OC from period t to period t-1.

Operating costs refer to the sum of the COGS and SG&A. Financial Expenses were not considered because they are not directly related to production volume (Richartz & Borgert, 2021). The values of the NSR, COGS and SG&A accounts of the Brazilian public companies in this study's sample were obtained from the *Refinitiv Eikon Database*.

Following Banker et al. (2013), Li and Zheng (2017), Li and Luo (2021) and Li and Sun (2023), a hierarchical linear model was used in this study, in which the cost behavior derived from a level 1 model is defined as a function of level 2 explanatory variables. The two-level hierarchical model is shown in equation 2.

$$(2)\ OC_{ij} = \beta_{0j} + \beta_1 NSR_{ij} + \varepsilon_{ij}$$

Initially, the Basal model was run, as shown in equation 3. This model has no predictor, assuming that the fixed effects are only the ordinate at the origin (β_0).

$$(3)\ OC_{ij} = \beta_{0j} + \varepsilon_{ij}$$

The intercept β_{0j} is represented according to equation 4 below.

$$(4)\ \beta_{0j} = \gamma_{00} + \mu_{0j}$$

Where:

γ_{00} = Average intercept for all groups;

μ_{0j} = Random effects of groups j on the intercept.

Thus, equation 5 represents the Basal model, by combining equations 3 and 4 shown above.

$$(5)\ OC_{ij} = \gamma_{00} + \mu_{0j} + \varepsilon_{ij}$$

The coefficient β_{1j} is specified in the model according to equation 6.

$$(6)\ \beta_{1j} = \gamma_{10} + \mu_{1j}$$

Where:

γ_{10} = Average slope for all groups;

μ_{1j} = Random effects of groups j on the slope.

Specifically, the explanatory variable "group" (GR) was introduced into the level 2 model. This variable was organized into 4 different groups, comprising the variables "decrease in net sales revenue" (DNSR) and "CEO duality" (DUAL). Table 2 shows the detailed distribution, as well as the observations for each group.

The DNSR variable is a dichotomous variable, where it is considered to be 1 when the NSR of company i in period t is lower than the NSR of period t-1 and 0 (zero) otherwise. The DUAL variable is also a dichotomous variable, with 1 if the CEO is also a member of the company's board of directors, and 0 (zero) otherwise (Salehi et al., 2021). The data for this variable was obtained from item 12.5/6 (composition and professional experience of management and the board) of the reference forms of Brazilian listed companies.

Table 2. *Groups of dichotomous variables*

GROUP	DNSR [a]	DUAL [b]	OBSERVATIONS
1	0 = without reduction in the NSR	0 = without CEO duality	677
2	1 = with a reduction in the NSR	0 = without CEO duality	267
3	0 = without reduction in the NSR	1 = with CEO duality	587
4	1 = with a reduction in the NSR	1 = with CEO duality	249
	TOTAL		**1.780**

Note. From *Refinitiv Eikon Database*, by Refinitiv Eikon, 2024 (https://eikon.refinitiv.com).
[a] DNSR: dichotomous variable of decrease in NSR
[b] DUAL: dichotomous variable of CEO duality

Combining equations 2, 4 and 6, as well as including the GR variable, gives the following regression model, as shown below in equation 7.

$$(7) \quad OC_{ij} = \gamma_{00} + (\gamma_{10} + \mu_{1j})NSR_{ij} + \beta_2 GR_j + \beta_3 (NSR \times GR)_{ij} + \mu_{0j} + \varepsilon_{ij}$$

Equation 7 refers to the regression model to investigate the effect of CEO duality on the asymmetric behavior of operating costs. As outlined in the hypothesis of this study, CEO duality is expected to have an effect on the asymmetric behavior of the operating costs of the companies in this study's sample. Thus, for the hypothesis of this study to be accepted, the groups with CEO duality (groups 3 and 4) must have a higher coefficient for the ΔlogNSR variable than the groups without CEO duality (groups 1 and 2), and the results must be significant.

4. Presentation and discussion of results

4.1. Presentation of results

Table 3 shows the descriptive statistics for the ΔlogOC and ΔlogNSR variables, which comprise the continuous variables in this study and are shown separately for each of the four groups. The mean, standard deviation and coefficient of variation are shown.

Table 3 shows that group 1 has the largest number of observations, representing 38% of the sample. This group comprises the observations that did not have a drop in NSR compared to the previous year, nor did they have CEO duality, i.e. in this case the CEO did not hold the position of member of the company's board of directors. Group 4 had the lowest number of observations, 14% of the total. This group refers to the observations that showed a drop in NSR in relation to the previous year and that also had CEO duality.

Groups 1 and 3 had similar means and standard deviations. These two groups comprise observations where there was no drop in NSR compared to the previous year. However, groups 2 and 4 showed a large variation between the mean and standard deviation, which consequently had an impact on the total result of the sample. These two groups have in common the fact that they comprise observations where there was a drop in NSR compared to the previous year.

Table 3. *Descriptive statistics for continuous variables*

Group			Variable	Observations	Mean	Standard deviation	Coefficient of variation
Number	DNSR [a]	DUAL [b]					
1	0	0	ΔlogOC [c]	677	0,066	0,082	124,5%
			ΔlogNSR [c]		0,076	0,061	80,9%
2	1	0	ΔlogOC [c]	267	407,935	6.666,595	1634,2%
			ΔlogNSR		-442,166	7.223,742	-1633,7%
3	0	1	ΔlogOC [c]	587	0,055	0,054	98,5%
			ΔlogNSR [c]		0,064	0,056	87,3%
4	1	1	ΔlogOC [c]	249	-964,441	10.777,697	-1117,5%
			ΔlogNSR [c]		-452,522	7.139,342	-1577,7%
TOTAL			**ΔlogOC [c]**	**1.780**	**-73,680**	**4.794,584**	**-6507,3%**
			ΔlogNSR [c]		**-129,577**	**3.866,406**	**-2983,9%**

Note. From *Refinitiv Eikon Database*, by Refinitiv Eikon, 2024 (https://eikon.refinitiv.com).
[a] DNSR: dichotomous variable for decreasing NSR
[b] DUAL: CEO duality
[c] ΔlogOC and ΔlogNSR: log of the variation (t/t-1) in OC and NSR, respectively

Table 4 shows the descriptive statistics for the dichotomous variables of the GR variable.

Table 4. *Descriptive statistics for dichotomous variables*

Variables	Category	Absolute frequency	Relative frequency
DNSR [a]	0	1.264	71,0%
	1	516	29,0%
Total		**1.780**	**100,0%**

Variables	Category	Absolute frequency	Relative frequency
DUAL [b]	0	944	53,0%
	1	836	47,0%
Total		**1.780**	**100,0%**

Note. From *Refinitiv Eikon Database*, by Refinitiv Eikon, 2024 (https://eikon.refinitiv.com).
[a] DNSR: dichotomous variable for decreasing NSR
[b] DUAL: CEO duality.

Table 4 shows that 29% of the observations in this study's sample showed a drop in NSR in relation to the previous year, while 71% of the observations showed an increase in NSR in relation to the immediately preceding year. About CEO duality, 47% of the observations showed that the company's CEO was also a member of the board of directors. As a result, almost half of the companies in the sample did not comply with the recommendation in the *Code of best corporate governance practices* that the CEO should not work simultaneously as a member of the board of directors of the same company (IBGC, 2023). Table 5 shows the results of the Basal model. This model does not have any independent variables, thus assuming that the fixed effects are only the ordinate at the origin.

Table 5. *Basal model results*

Variable	Dependent variable = $\Delta logOC$ [a]				
	Estimate	Standard error	Observations	t [b]	Sig. [c]
Intercept	-73,680	113,611	1780	-0,649	0,52

Note. From *Refinitiv Eikon Database*, by Refinitiv Eikon, 2024 (https://eikon.refinitiv.com).
[a] $\Delta logOC$: log of the variation (t/t-1) in OC
[b] t: t-test
[c] Sig.: significance

The intercept represents the mean of the dependent variable $\Delta logCO$. Therefore, the coefficient presented in table 5 indicates that the average variation in operating costs in the sample is -73.68, which suggests that companies reduced their costs. However, the significance level presented at 0.52 indicates that, although the Basal model showed a reduction in average operating costs, this estimate is not statistically significant. Therefore, the reduction in operating costs may have been influenced by other factors, such as CEO duality. Table 6 shows the results of the fixed effects estimates of the hierarchical linear model, to meet the research objective of analyzing the effect of CEO duality on the asymmetric behavior of operating costs.

Table 6. *Fixed effects estimation results*

Variables	Dependent variable = ΔlogOC [a]				
	Estimate	Standard error	Observations	t [b]	Sig. [c]
Intercept	**-443,019**	**232,421**	**1780**	**-1,906**	**0,06**
Group 1	443,015	322,647	1780	1,373	0,17
Group 2	852,492	323,084	1780	2,639	0,01
Group 3	443,028	326,841	1780	1,355	0,18
Group 4	0*	0*	0*	0*	0*
ΔlogNSR	**1,152**	**0,033**	**1780**	**35,394**	**0,00**
Group 1 x ΔlogNSR	-0,225	2300,715	1780	0,000	1,00
Group 2 x ΔlogNSR	-1,149	0,045	1780	-25,529	0,00
Group 3 x ΔlogNSR	-0,429	2691,352	1780	0,000	1,00
Group 4 x ΔlogNSR	0*	0*	0*	0*	0*

Note. From *Refinitiv Eikon Database*, by Refinitiv Eikon, 2024 (https://eikon.refinitiv.com).
[a] ΔlogOC and ΔlogNSR: log of the variation (t/t-1) in OC and NSR, respectively
[b] t: t-test;
[c] Sig.: significance
*Values shown as zero because they are redundant

Breaking down table 6 into equations, we have:

Group 1: Δ*logOC* = −0,004 + 0,927Δ*logNSR*

Group 2: Δ*logOC* = 409,473 + 0,003Δ*logNSR*
Group 3: Δ*logOC* = 0,009 + 0,723Δ*logNSR*

Group 4: Δ*logOC* = 443,019 + 1,152Δ*logNSR*

It should be noted that group 4 is the reference group for the other groups in terms of the value of the intercept and the independent variable ΔlogNSR. Therefore, the values for this group in table 6 are presented as 0 (zero) because they are redundant. Groups 1 and 3 showed no significance for the intercept and the independent variable ΔlogNSR. These groups refer to observations related to the increase in sales compared to the previous year. Therefore, it was not possible to state that CEO duality had an influence on the asymmetric behavior of operating costs in relation to observations that include increases in sales in relation to the previous year.

On the other hand, groups 2 and 4 were significant for both the intercept and the independent variable ΔlogNSR. It can also be seen that the coefficient for group 4 (with CEO duality) is higher than the coefficient for group 2 (without CEO duality). Both groups comprise observations related to declines in sales compared to the previous year. Thus, it is understood that the degree of asymmetry in operating costs was greater in companies that had CEO duality, considering the observations where there was a drop in sales compared to the previous year.

4.2. Discussion of results

Table 7 shows the sum of the reference values and the values for each group, both for the intercept and for the independent variable ΔlogNSR.

Table 7. *Summary of fixed effects estimation results*

Group	Intercept			ΔlogNSR [a]		
	Reference	Group	Total	Reference	Group	Total
1	-443,019	443,015	-0,004	1,152	-0,225	0,927
2	-443,019	852,492	**409,473**	1,152	-1,149	**0,003**
3	-443,019	443,028	0,009	1,152	-0,429	0,723
4	-443,019	0*	**-443,019**	1,152	0*	**1,152**

Note. From *Refinitiv Eikon Database*, by Refinitiv Eikon, 2024 (https://eikon.refinitiv.com).

[a] ΔlogNSR: log of the variation (t/t-1) in NSR.

*Values shown as zero because they are redundant

As outlined in the hypothesis of this research, the duality of the CEO weakens the monitoring power of the board of directors over the activities of managers, being a factor that helps to create a more favorable scenario for managers to pursue personal interests to the detriment of the interests of shareholders (Jensen, 1993; Salehi et al., 2021). According to Chen et al. (2012) and Lopatta et al. (2020), managers with power have a greater tendency to seek empire building, i.e. to expand the company beyond its optimal capacity in order to take advantage of the company's size, such as demanding greater remuneration as a result of increased responsibility, which can lead to asymmetric cost behavior.

Other studies have identified that managers reduce the company's resources more aggressively in periods of falling sales, in order to meet or exceed profit targets, which also leads to asymmetric cost behavior (Dierynck et al., 2012; Kama & Weiss, 2013). Thus, the CEO's duality allows managers to adjust resources in the way that is most favorable

to them (Ibrahim, 2018). In this sense, the hypothesis of this research assumes that CEO duality has an effect on the asymmetric behavior of companies' costs.

Analyzing the results of the groups that showed significance for the intercept and the independent variable (groups 2 and 4), it can be seen that group 2 showed a coefficient close to 0 (zero) for the ΔlogNSR variable, indicating a low degree of asymmetry in operating costs. This group refers to observations where there were falls in NSR compared to the previous year and which did not show CEO duality.

On the other hand, group 4 had a coefficient for the ΔlogNSR variable of 1.152. This group comprises the observations in which there was a drop in NSR in relation to the previous year and which also had CEO duality, i.e. the CEO also held the position of member of the board of directors. From the results presented, it can be stated that CEO duality influenced the asymmetric behavior of operating costs, as group 4 had a higher coefficient than group 2 for the independent variable ΔlogNSR.

Based on the results presented, the hypothesis of this research is partially accepted. Thus, these results show that companies managed by CEOs who also hold the position of member of the board of directors, in the face of periods of falling NSR, have a greater degree of asymmetry in operating costs than companies where there is no CEO duality.

However, it was not possible to state that the duality of the CEO influences the asymmetric behavior of operating costs for periods of increase in NSR in relation to the previous year, since groups 1 and 3 did not show significance for the independent variable ΔlogNSR. Thus, there was no evidence of empire building, which refers to the situation in which managers seek to expand the company beyond its ideal capacity (Chen et al., 2012; Jensen, 1986; Lopatta et al., 2020). Analyzing the results of this research from the perspective of agency theory, a possible explanation for the results presented for groups 1 and 3 may be that it is more difficult for CEOs to argue to the board of directors about an expansion of the company that is not beneficial to the interests of shareholders.

In this way, CEOs may have used other means to pursue personal interests, such as a more accentuated reduction in operating costs in periods of falling NSR, in order to obtain greater remuneration as a result of achieving profit targets. Despite increasing the company's profits, cuts in operating costs can prove detrimental when NSR rises again, since increases in NSR require reinvestment.

It should be noted that the results of this research differ from those found by Bugeja et al. (2015), who also analyzed the effect of CEO duality on the asymmetric behavior of operating costs. The authors analyzed public companies in Australia and did not identify any significance for the asymmetry of operating costs in this case. Ibrahim (2018) also investigated the effect of CEO duality on the asymmetric cost behavior; however, the asymmetry was analyzed based on COGS. The authors investigated publicly traded companies in Egypt, where they identified that CEO duality has an impact on the asymmetric behavior of COGS.

5. Final considerations

The aim of this study was to assess the effect of CEO duality on the asymmetric behavior of the operating costs of Brazilian publicly traded companies. For this, 178 companies were analyzed in the period 2012-2021 using descriptive statistics and hierarchical linear regression. The results showed that companies managed by CEOs who also hold the position of member of the board of directors, in the face of periods of falling NSR, had a higher degree of asymmetry in operating costs than companies without CEO duality. However, it was not possible to affirm that CEO duality influences the asymmetric behavior of operating costs for periods of increase in NSR in relation to the previous year.

The results presented in this study may be related to more aggressive reductions in operating costs made by managers during periods of falling NSR. Analyzing the results from the perspective of the agency theory, these reductions may have been carried out by managers in order to obtain greater remuneration for achieving profit targets. Reductions in operating costs, despite increasing the company's profit, may not end up being beneficial for the company if these cuts in spending are carried out without fully considering the long-term implications, as further increases in NSR generally require new investments.

In theoretical terms, this study contributes by providing evidence of the effect of CEO duality on the asymmetric behavior of the operating costs of Brazilian public companies. In practical terms, this study helps shareholders, board members and audit committee members to be more aware that CEO duality can have an impact on companies' cost behavior, and thus create mechanisms to mitigate opportunistic managerial behavior. It also contributes to auditors and market analysts, since their work procedures can be improved by considering the impact of CEO duality on companies' cost behavior.

This study has some limitations. This study adopted the perspective of agency theory, where the duality of the CEO increases the power of managers to pursue personal interests, which can be detrimental to companies. However, there may be situations in which CEO duality is beneficial for companies, such as in cases where efficiency and speed in decision-making are crucial, since operational and strategic leadership is in the hands of the same individual. As such, the view that CEO duality is always detrimental to companies is considered a limitation of the research. Another limitation of this research refers to the use of NSR as an approximation of volume, since in this case price variation is not considered.

As a recommendation for future studies, we suggest carrying out studies on the effect of CEO duality on asymmetric cost behavior considering companies from other countries. We also suggest analyzing the relationship investigated in this study, separating the samples between family and non-family companies, with the aim of verifying whether the effect of CEO duality on asymmetric cost behavior occurs differently between these companies. Furthermore, future research could separately analyze the depreciation that is included as an operating cost (estimated according to accounting regulations), due to its characteristic of not being directly managed by the CEO.

Author contributions:

Bubeck, S.K.: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft, Writing, review, and editing, Visualization. **Hein, N.:** Conceptualization, Methodology, Validation, Supervision, Project administration.

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Conflict of interest statement

Authors declare that, throughout the research process, there has not been any sort of personal, professional, or economic interest that may have influenced the researchers' judgement and/or actions during the elaboration and publication of this article.

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