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INFLUENCE OF INCOME SMOOTHING AND RESPONSIBLE CORPORATE BEHAVIOR ON THE COST OF CAPITAL

INFLUÊNCIA DA SUAVIZAÇÃO DE RESULTADOS E DO COMPORTAMENTO CORPORATIVO RESPONSÁVEL NO CUSTO DE CAPITAL

ABSTRACT
The study analyzes the influence of income smoothing and responsible corporate behavior on the weighted average cost of capital (WACC) in publicly traded companies listed on B3. The study follows a quantitative approach, based on 906 observations from 151 companies listed on B3, covering the period from 2016 to 2021. Multivariate statistics were applied through balanced panel data with fixed effects for the analysis. The results indicate that companies with higher levels of income smoothing practices exhibited a significantly lower WACC. Responsible corporate behavior, represented by adherence to the SDG and inclusion in the CSI portfolio, did not show a relevant effect on WACC, contrary to expectations. However, higher ESG performance showed evidence of significantly reducing WACC. Based on an original empirical test, the findings reveal that the combined effect of income smoothing and responsible corporate behavior does not influence WACC. The managerial contribution of the study suggests that funders and investors perceive income smoothing more favorably compared to responsible corporate practices. The results may be due to a phase still of maturation in the process of implementing socio-environmental practices at the national level and/or the low perception of investors and funders regarding the long-term benefits of responsible corporate behavior.

Keywords: Income smoothing. Corporate responsible behavior. Cost of capital.

RESUMO
O estudo analisa a influência da suavização de resultados e do comportamento corporativo responsável no custo médio ponderado de capital (CMPC) em companhias abertas listadas na B3. A pesquisa segue uma abordagem quantitativa, baseada em 906 observações de 151 empresas listadas na B3, referentes ao período de 2016 a 2021. Para a análise, utilizou-se estatística multivariada por meio de painel de dados balanceados com efeitos fixos. Os resultados indicam que empresas com práticas mais elevadas de suavização de resultados apresentaram CMPC significativamente mais baixo. O comportamento corporativo responsável representado pela adesão aos ODS e a listagem na carteira ISE não apresentou efeito relevante sobre o CMPC, diferente do esperado. Contudo, o maior desempenho ESG apresentou indícios de redução significativa do CMPC. A partir de um teste empírico original, os achados revelam que o efeito conjunto da suavização de resultados e do comportamenteo corporativo responsável não exerce influência sobre o CMPC. A contribuição gerencial do estudo revela que a percepção de financiadores e investidores é mais favorável à suavização de resultados quando comparada com práticas corporativas responsáveis. Os resultados podem ser decorrentes de uma fase ainda de amadurecimento do processo de implantação das práticas socioambientais no cenário nacional e/ou da baixa percepção dos investidores e financiadores sobre os benefícios de longo prazo do comportamento corporativo responsável.

Palavras-chave: Suavização de resultados. Comportamento Corporativo Responsável. Custo de Capital.

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1 INTRODUCTION

Shareholders and investors are constantly attentive to the potential returns on their investments, in search of significant results. To meet these expectations and avoid disappointments, companies may adopt the practice of income smoothing, which consists of an intentional (and legal) intervention in operational processes and reports aimed at reducing the variation of reported earnings over time (Demerjian et al., 2020).

The practice of smoothing income can serve the opportunistic interests of managers and allow reserves to be built for periods of crisis, without undermining the ability to raise funds and keeping capital costs low even in difficult times (Skała, 2021). By acting this way, managers keep profits stable because they believe it improves the company's image and performance, making it more attractive to investors. As a result, income smoothing has become a common practice (Kartikawati et al., 2019; Kustono, 2021).

Another way to make a company attractive to investors is to pay attention to socio-environmental issues. Responsible corporate behavior has gained prominence in the contemporary context. Companies have been encouraged or compelled to pursue profit and economic growth in line with practices that consider environmental, social, and governance (ESG) impacts, which are fundamental for sustainable development and for building a more balanced and conscious society (Souza & Oliveira, 2023).

ESG issues are crucial for sustainable development as they consider economic development, environmental protection, and social justice. In the corporate context, ESG aspects allow for understanding the risks and opportunities companies face in their relationships with stakeholders and the environment, becoming a source of reputation and competitiveness for those that adopt good practices (Wan et al., 2023).

The participation of companies in the Corporate Sustainability Index (CSI) is considered an element of responsible behavior, as it demonstrates socio-environmental practices and improves relationships with stakeholders (Mazzioni et al., 2023; Peixoto et al., 2016). The aim of the CSI portfolio is to serve as an indicator of the average performance of the stock prices of companies with recognized commitment to corporate sustainability (B3, 2023). Participation in the CSI portfolio indicates that good socio-environmental performance may have positive effects on financial performance, as it can create a competitive advantage through concern for quality, sustainable development, transparency, and accountability, providing tangible and intangible benefits for the company (B3, 2023; Cruz et al., 2023).

Responsible behavior can be reflected in the adoption of the Sustainable Development Goals (SDG), launched in 2015 by the United Nations (UN), with the purpose of promoting sustainable development worldwide by 2030 (Agenda 2030). The adoption of the SDG by companies and their proper reporting in sustainability reports is growing (Salamanca, 2022), as companies more engaged with the SDG show better performance (Mazzioni et al., 2023) and greater engagement with Corporate Social Responsibility (CSR) (Schönherr et al., 2017). These practices are often associated with creating sustainable competitive advantage for companies (Fandella et al., 2023; Pfister et al., 2020).

The existence of numerous opportunities to improve the image and value of companies is not enough if there are no investments capable of turning them into a competitive advantage. To achieve this goal, companies need an appropriate capital structure, with resource management, and assertive and strategic decisions between investments and financing (Knivsflå, 2023).

The use of capital structure involves the transaction costs related to the provision of resources for the companies' cash flow (Fandella et al., 2023). In economic terms, the cost of capital represents the opportunity cost and is adopted as a method that evaluates investment proposals as a criterion for approving or rejecting financial decisions (Assaf Neto et al., 2008). The Weighted Average Cost of Capital (WACC) is used in the process of evaluating a particular company, considering financial leverage and capital structure (Cunha et al., 2013).

The calculation of WACC is different for each company, due to the accounting and economic information that is taken into consideration: assets, debts, equity, third-party capital, the return expected by shareholders, and the rates practiced in the capital market (Assaf Neto et al., 2013; Oro et al., 2013; Tomazoni & Menezes, 2002). The evidence from studies by Li and Richie (2016), Dewi et al. (2020), Hartlieb and Loy (2022), for example, indicates that income smoothing influences a company's cost of capital, suggesting that the greater the income smoothing, the lower the cost of capital. The explanatory argument presented is that smoothing reduces the risk perceived by investors, making them more inclined and willing to invest in the company.

Regarding responsible behavior, the literature (Chen et al., 2023; Fandella et al., 2023; Jesuka et al., 2022) notes the isolated use of corporate sustainability indicators, such as CSI, SDG, corporate social reputation, and ESG. The originality of the study lies in the analysis of WACC under the joint influence of income smoothing and corporate social responsibility (CSR), measured using three proxies: performance in environmental, social, and governance (ESG) practices, adherence to the Sustainable Development Goals (SDG), and participation in the Corporate Sustainability Index (CSI). To the best of our knowledge, this approach has not been used previously in the national literature, expanding the evidence on the determinants of the cost of capital.

There is considerable evidence that income smoothing (for example, Chen et al., 2023; Chen & Zhang, 2021; Carey et al., 2021; Fandella et al., 2023; Kuo et al., 2021) and responsible corporate behavior (for example, Castro & Martinez, 2009; Chen, 2019; Demerjian et al., 2020; Dewi et al., 2020; Moghadam et al., 2013) reduce the cost of capital. However, no studies were found that tested the possible influence of responsible corporate behavior and income smoothing,

simultaneously, on the cost of capital. Thus, it was not possible to determine whether responsible behavior prevents excesses or adds prudence in the relationship between smoothing and the cost of capital, allowing for the presentation of an original empirical test.

In view of the above, the research presents the following research question: what is the influence of income smoothing and responsible corporate behavior on the weighted average cost of capital in publicly traded companies listed on B3? The aim of the study is to analyze the influence of income smoothing and responsible corporate behavior on the weighted average cost of capital (WACC) in publicly traded companies listed on B3.

Identifying the elements that affect the cost of capital is relevant for companies, as it clarifies the understanding of how the capital structure contributes to financial decision-making. Complementarily, it allows for analyzing and defining the ideal proportions of equity and third-party capital used for the company's investment and financing. An appropriate composition leads to a reduction in the cost of capital and an increase in market competitiveness, improves resource allocation efficiency, and maximizes the company's value (Brito et al., 2005).

From a managerial perspective, responsible corporate strategies did not lead to a reduction in capital costs, contrary to previous findings (such as Piechocka-Kałużna et al., 2021; Ramirez et al., 2022; Zahid et al., 2023).Conversely, it reinforces evidence on the relevance of using smoothing practices for less costly access to financial resources for companies (as noted by Castro & Martinez, 2009; Dewi et al., 2020; Li & Richie, 2016). The study presents consistent evidence that the simultaneous use of responsible practices and income smoothing does not significantly impact the cost of capital.

2 LITERATURE REVIEW

2.1 Cost of capital

The capital structure represents the combined use of net equity (own capital) and financial debt (third-party capital) (Knivsflå, 2023), affecting the financial, corporate, and social health of companies (Zahid et al., 2023). Excessive use of debt or an inadequate capital structure, for example, can lead to financial difficulties (Chadha & Sharma, 2015).

The cost of capital plays a strategic role in business management, influencing the acceptance or rejection of projects based on net present value (NPV) (Assaf Neto et al., 2008). The proper composition guides decisions aimed at creating shareholder value, with the weighted average cost of capital (WACC) constituting one of the main components of analysis (Minardi et al., 2007).

Conceptually, the cost of capital is the rate a company pays on all capital in use, divided into the cost of equity, the cost of debt, and the weighted average cost of capital (Fandella et al., 2023). From the creation of the capital structure concept by Modigliani and Miller (1958) to the consolidation of modern theories that analyze the effects of financing decisions and their impact on company value, the determinants for the optimal choice of capital structure balancing have been discussed.

The cost of equity (CoE) is represented by the rate of return for stock investors, considering three fundamental determinants: risk, information asymmetry, and liquidity (Thien & Hung, 2023). On the other hand, the cost of debt (CoD) is represented by the cost of long-term debt, representing the interest rate that would be paid if the debt sources were replaced by an equivalent one (Farhat, 2016).

The weighted average cost of capital (WACC) can be observed from both the company's and the investor's perspective. It can be defined as the total cost of capital that the company must pay, using resources from its owners and capital holders, from the company's perspective and being considered the minimum rate of return that a business must achieve to create value for investors. Additionally, it represents the opportunity cost of capital invested by the investor (Knivsflå, 2023; Singh et al., 2023).

2.2 Income smoothing

Earnings management can be characterized into different types: target earnings, where management is used to increase or decrease accounting profits; income smoothing, a management practice to minimize the variability of accounting results; and take a bath or big bath, earnings management to decrease current profits and maximize future profits (Martinez, 2001).

Income smoothing is a branch of earnings management that has received attention in finance and accounting literature. Castro and Martinez (2009) define it as a practice aimed at reducing profit fluctuations and stabilizing it over time, while Mulford and Comiskey (2005) describe it as the intentional dampening of fluctuations around a level of profit considered normal for the company.

The flexibility in preparing financial reports allows some room for maneuver for companies in implementing accounting regulations, which can lead to opportunistic situations. Thus, managers are allowed to shift profits between periods. The selection of accounting procedures is not used solely to inflate results but also, when convenient, to reduce current reported profits by deferring revenues with the aim of improving future bonuses (Healy, 1985).

Managers are more likely to make accounting choices that reduce earnings when the lower and upper limits of their bonus plan are linked to company results. Conversely, they use accruals that increase earnings when these limits are not

tied to the organization's performance. A higher incidence of voluntary switching in accounting procedures is observed in the years following the adoption or modification of a bonus plan (Healy, 1985).

The study adopts the smoothing model proposed by Leuz et al. (2003), which aims to capture the extent to which executives engage in income smoothing, identifying how they reduce profit variability, evidenced by changes in the accounting components of profit due to adjustments under the accrual basis. The model is based on the premise that cash flow is equal to net income minus accruals (OCF = Net Income – Accruals). Accordingly, the measure is an average ratio of the standard deviation of operating profit divided by the standard deviation of cash flow from operations, both at the firm level.

Previous evidence from the accounting literature (Dechow et al., 2010; Dewi et al., 2020; Hartlieb & Loy, 2022; Li & Richie, 2016) suggests that income smoothing is associated with compensation incentives, cost of capital, executive turnover, and the dissemination of private information that is useful to shareholders and investors. Income smoothing is closely related to the quality of company earnings, considered as the ability of revenue to reflect the company's current performance, in addition to pointing to the implicit need for investors to better understand the institutional factors that affect the accuracy of the data available to them (Tee, 2020). The temporary smoothing of cash flows can improve earnings persistence. However, managers' attempts to smooth permanent changes in cash flows will lead to less timely and less informative earnings (Dechow et al. 2010).

Castro and Martinez (2009) conducted a study in the Brazilian stock market to examine the effect of income smoothing and its association with capital structure and the cost of third-party capital. The results indicated that companies that engage in income smoothing tend to have a lower cost of third-party capital and a capital structure with a higher proportion of long-term debt. The analysis of different periods revealed that income smoothing affects future capital costs and influences the determination of the company's financing structure.

Income smoothing negatively impacts the cost of capital by adding stability to financial statement figures and reducing the risk perceived by the company's shareholders (Castro & Martinez, 2009; Dewi et al., 2020; Li & Richie, 2016). One of the consequences highlighted by the studies is the improvement of performance in the stock market (Hartlieb & Loy, 2022; Moghadam et al., 2013).

The study by Li and Richie (2016) analyzed publicly traded companies in China between 2002 and 2007. The findings indicated that income smoothing is a significant determinant of the cost of third-party capital, suggesting that companies with greater income smoothing exhibit a lower cost of third-party capital. In the research by Dewi et al. (2020), publicly traded companies on the Indonesian stock exchange were analyzed from 2014 to 2018. As a result, it was possible to identify that there is a negative relationship between income smoothing and the cost of capital for companies.

In the national context, Castro and Martinez (2009) analyzed 217 publicly traded Brazilian companies from 2003 to 2007. The study made it possible to identify that companies with income smoothing practices can reduce the cost of third-party capital. The argument is that companies with more stable profits tend to be perceived as less risky. Meli (2015) analyzed the effect of income smoothing on the cost of capital for publicly traded Brazilian companies. The tests indicated that the practice of income smoothing impacted on the reduction of the cost of capital, both before and after the adoption of IFRS.

Based on the evidence established in previous studies, the following hypothesis is presented:

H_1 – There is a negative relationship between income smoothing and the weighted average cost of capital.

2.3 Responsible Corporate Behavior

Responsible corporate behavior is an ethical and socially acceptable conduct aimed at promoting sustainability and environmental preservation, as well as contributing to the improvement of people's quality of life (Lopes & Silva, 2021). In addition to involving actions that promote general well-being, environmental preservation, social justice, and business ethics (Ribeiro & Freitas, 2019), responsible behavior can be applied in various areas, such as work, education, health, and politics, being essential for building a fairer and more balanced society (Lopes & Silva, 2021).

The sustainability of organizations requires responsible corporate behavior, which includes the implementation of ethical and sustainable practices aimed at contributing to environmental preservation and social well-being (Lopes & Silva, 2021). Promoting sustainable corporate behavior involves conscious attitudes toward consumption, production, and waste disposal, as well as ethical policies that respect human rights (Machado Filho & Zylbersztajn, 2004).

In this study, responsible corporate behavior involves performance in Environmental, Social, and Governance (ESG) practices, participation in the Corporate Sustainability Index (CSI), and adherence to the Sustainable Development Goals (SDG). ESG practices are increasingly present in the corporate world, referring to a set of actions that companies can adopt to promote sustainability and social responsibility in their activities, implemented to meet stakeholders' demands, who require a more ethical and sustainable approach (Pedersen et al., 2021).

In turn, CSI is a B3 indicator that monitors the performance of companies that adopt sustainable management principles, offering investors a benchmark to evaluate organizations engaged in sustainability (Marcondes & Bacarji, 2010). The adoption of the SDG has been incorporated into responsible corporate behavior, recognizing that Brazilian companies listed on B3 have used the SDG to create value through positive impacts on society, such as poverty reduction, social

inclusion, and minimization of negative impacts. In this way, companies respond to society's expectations and contribute to the preservation of the planet, making sustainability part of their competitive business strategy (Penna et al., 2022).

Christensen et al. (2022) draw attention to the divergence in ESG ratings among various agencies. The study reveals that, among the consequences, greater divergence in ESG ratings is associated with a lower likelihood of obtaining external financing. Going further, they highlight that the disclosure of ESG information generally tends to exacerbate the divergence in ESG ratings rather than resolve it.

The study by Piechocka-Kałużna et al. (2021) found a negative relationship among the three ESG pillars and the weighted average cost of capital, equity capital, and third-party capital when analyzing companies in the United States. One justification for the results is that investors are being attracted by non-financial scope practices, such as environmental protection, social responsibility, and corporate governance. Thus, companies that care about their reputation have identified the need to use practices and reports related to ESG and CSR issues, achieving a reduction in the cost of capital.

The research by Zahid et al. (2023) analyzed the relationship between ESG performance and corporate capital financing decisions in listed companies in China between 2010 and 2019, identifying that companies with higher ESG performance have a lower cost of debt financing, suggesting that ESG information is crucial for financing decisions.

When analyzing Brazilian publicly traded companies, Balassiano et al. (2023) identified a negative relationship between environmental issues and the cost of third-party capital, suggesting that creditors are sensitive to companies' environmental practices. Similar evidence was found in the study by Ramirez et al. (2022), which pointed out that ESG practices reduce the cost of capital. In the study by Costa and Ferezin (2021), the findings indicated that good ESG performance reduces companies' financing constraints and helps to reduce the cost of third-party capital.

Based on this evidence, the following hypothesis is presented:

H_2 – There is a negative relationship between ESG practices and the weighted average cost of capital.

Chen and Zhang (2021) argue that actively engaging in CSR activities reduces operational risk and affects pricing in the capital markets, as the risk to investors decreases, leading to a reduction in the cost of equity. Ribeiro and Lima (2022) support the idea that companies, by adopting the SDG in their reports, demonstrate a clear commitment to sustainability and corporate responsibility. Transparency and accountability can contribute to investor confidence, reducing customer risk and the cost of capital.

The disclosure of socio-environmental information has been reported as being associated with lower capital costs (Ribeiro & Lima, 2022). Companies that invest in sustainability reports with external assurance are able to reduce credit constraints and lower the cost of third-party capital, as found by Carey et al. (2021).

Evidence has shown that the greater the concern with sustainable development, the lower the cost of third-party capital for companies (Sun et al., 2023). Thus, as companies demonstrate better performance in the pillars of sustainability, there is a lower perception of risk and a lower cost of capital (Yilmaz, 2022).

The research by Kuo et al. (2021) found that disclosing corporate social reputation information reduced the cost of third-party capital by decreasing investor uncertainty and information asymmetries. The evidence was even stronger when companies sought assurances from external sources in their reports.

Previous evidence allows us to present the following research hypothesis:

H_3 – There is a negative relationship between the adoption of the SDG in sustainability reports and the weighted average cost of capital.

By adopting sustainability indices, companies can improve their reputation, increase market credibility, and minimize risks. The research by Peixoto et al. (2016) examined the effects that inclusion in the CSI portfolio has on companies' cost of capital, based on an analysis of 200 non-financial Brazilian companies listed on the stock exchange between 2009 and 2013. The result indicated a negative relationship between adherence to the CSI portfolio and the cost of capital, which implies that companies included in the CSI portfolio have a lower cost of capital compared to those that do not participate, providing clear benefits.

In the study by Venturini et al. (2025), the effect of the Corporate Sustainability Index (CSI) on the cost of debt in non-financial Brazilian companies listed on the Brazil Stock Exchange and Over-the-Counter Market (B3, as per its Portuguese acronym) from 2011 to 2018 was analyzed. The study's results demonstrated that CSI is significantly associated with the cost of debt, supporting the literature that highlights ESG practices being used by companies to send a strong signal to credit institutions about the efficiency and integrity of their management.

Based on previous evidence, the following hypothesis is presented:

H_4 – There is a negative relationship between participation in the CSI portfolio and the weighted average cost of capital.

There are several evidence that income smoothing and responsible corporate behavior reduce the cost of capital. However, no studies have been found that have tested the possible influence of responsible corporate behavior and

income smoothing, simultaneously, on the cost of capital. Thus, it was not possible to determine whether responsible behavior prevents excesses or adds prudence in the relationship between smoothing and the cost of capital, allowing for the presentation of an original empirical test.

Thus, the study aims to test the interactive effect of responsible behavior and income smoothing, based on the following hypotheses:

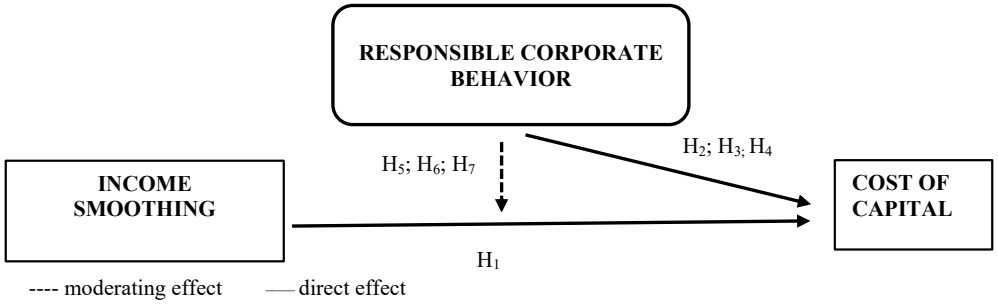
H_5 – ESG practices moderate the negative relationship between income smoothing and the weighted average cost of capital.

H_6 – The adoption of the SDG in the disclosure of the sustainability report moderates the negative relationship between income smoothing and the weighted average cost of capital.

H_7 - Participation in the CSI portfolio moderates the negative relationship between income smoothing and the weighted average cost of capital.

Based on the presented theoretical framework, the study tests the relationships of the addressed dimensions and their hypotheses, as displayed in Figure 1.

Figure 1 - Theoretical model of the research



3 METHODOLOGICAL PROCEDURES

The research can be characterized as quantitative, descriptive, archival, and documental. Regarding the approach to the problem, the study presents quantitative aspects by measuring phenomena, conducting cause-and-effect analysis, testing hypotheses, exploring data, evaluating reliability, and performing descriptive and inferential statistical analyses (Sampieri et al., 2013).

Regarding the aims, the research is characterized as descriptive, as it systematically analyzes the relationships existing among the elements of the sample, using standardized procedures for data collection and analysis (Walliman, 2015). With respect to the procedures, the study is documental and archival, being based on information extracted from financial statements and accounting reports, as well as secondary data from structured databases (Martins & Theóphilo, 2016).

In this research, the population consists of publicly traded companies listed on B3 – tBrazil Stock Exchange and Over-the-Counter Market. To compose the sample, the companies had to meet the following criteria (Matias-Pereira, 2019): (i) not belong to the financial sector or similar; (ii) have positive shareholders'equity; (iii) make available the necessary information to operationalize all the variables selected for the study.

The period under analysis covers the years 2016 to 2021, selected due to the entry into force of the 2030 Agenda in 2016, which made it possible to include the variable related to adherence to the SDG. The research population consisted of 206 companies, totaling 1,236 observations.

As for the composition of the research sample, 210 observations of companies in the financial sector were excluded due to their accounting and regulatory particularities; 84 observations of companies with negative equity; and 36 observations of companies with missing data necessary for the operation of the study variables. After these filtering steps, the final sample consisted of 906 observations, corresponding to 151 companies.

Table 1 displays the variables used in the study, their respective metrics, authors who have already used the variables in similar studies, and the sources for data collection.

Table 1 - Research construct with the study variables

Dependent variable	Metric	Authors	Source
Weighted Average Cost of Capital (WACC)	$WACC = \sum_{j=1}^{N} Wj \,.\, Kj$ WACC: weighted average cost of capital; Kj: specific cost of each source of financing (equity and debt); Wj: relative share of each source of capital in total financing.	Majid et al. (2024); Tawfiq et al. (2024)	Economatics
Independent variables	**Métrica**	**Authors**	**Source**
Income smoothing (SMOO)	$SMOO_{i,t} = \sigma(\mathrm{OPTA}_{i,t}) / \sigma(\mathrm{OCF}_{i,t})$ OPTA = Operating profit divided by total assets of the previous year; OCF = Operating cash flow divided by total assets of the previous year.	Leuz et al. (2003); Gaio (2010);	Economática
ESG Ratings	Index from 0 to 100, composed of the company's performance in aspects related to the community, employees, environment, and governance.	Mazzioni e Klann (2018)	Economatics
(ESG)	Dichotomous variable, with 1 for companies that adopted the SDG in their sustainability report and 0 for the others.	Balassiano et al. (2023); Majid et al. (2024);	Relatórios de sustentabilidade
Adoption of the SDG (SDG)	Dichotomous variable, 1 for a company participating in B3's CSI and 0 for the others.	Mazzioni et al. (2023); Mazzioni et al. (2024)	CSRHub
Corporate Sustainability Index (CSI)	Dichotomous variable, 1 for companies that have at least two responsible characteristics (ESG, CSI and SDG) and 0 for the others.	Mazzioni et al. (2023); Mazzioni et al. (2024)	CSRHub, B³, empresas
Responsible Corporate Behavior (RCB)	Dichotomous variable, 1 for companies that have at least two responsible characteristics (ESG, CSI and SDG) and 0 for the others.	Authors' proposal	CSRHub, B³, companies
Control variables	**Metric**	**Authors**	**Source**
Size (SIZE)	The natural logarithm of the book value of total assets at the end of each period.	Balassiano et al. (2023); Majid et al. (2024).	Economatics
Intangibility Index (INTANG)	$\frac{Intangible\ asset_{i.t}}{Total\ assets_{i.t}}$	Einsweiller et al. (2020)	Economatics

Control variables	Metric	Authors	Source
Indebtedness (IND)	$\frac{CL+NCL_{i.t}}{PL_{i.t}}$ CL: current liabilities; NCL: non-current liabilities; NE: net equity.	Balassiano et al. (2023);	Economatics
Sales Growth (SALESG)	$\frac{NSR_{i.t} - NSR_{i.t-1}}{NSR_{i.t-1}}$ NSR: net sales revenue.	Eliwa et al. (2021)	Economatics
Audit (AUDIT)	Variável dicotômica, sendo 1 para empresa auditada por *big four* e 0 para as demais.	Silva et al. (2019)	Reference form [B]3

The variables included in the construct were selected to meet the central goal of the research, having been previously tested in earlier studies, ensuring theoretical validity and empirical comparability of the results. WACC consists of the weighted average of the respective sources of financing and is formalized in the finance literature (Minardi et al., 2007; Oliveira et al., 2019; Sampaio; Losso, 2020) based on the formulas described below:

$$WACC = \frac{MVTC}{TOTCAP} X\ CTC\ x\ (1 - \%IT) + \frac{MVEC}{TOTCAP} X\ CEC$$

Where:
MVTC = market value of third-party capital;
MVEC = market value of equity capital;
TOTCAP = market value of total invested capital;
CTC = cost of third-party capital;
%IT = corporate income tax rate.
CEC = cost of equity capital.

As for the cost of equity, the following procedure was adopted:

$$CEC = Rlr + \beta\ x\ (Rm)$$

Where:
CEC = required rate of return for an investment with funds from equity;
Rlr = rate of return of a risk-free asset (Selic, as per its Portuguese acronym);
β beta coefficient (provided by Economatics®);
Rm = rate of return of the market portfolio (Ibovespa, as per its Portuguese acronym).

The cost of third-party capital is expressed as follows:

$$CTC = \left(\frac{Financial\ expense}{total\ liabilities}\right) x\ (1 - IT)$$

Where:
CTC = required rate of return for investment with funds from third parties;
IT = current income tax rate (34%).

Moving windows of the standard deviation of OPTA and OCF from the previous five years were considered for the smoothing calculation. Accordingly, for 2016, the deviations from 2012 to 2016 were considered; for 2017, the deviations from 2013 to 2017, and so on.

Regarding the ESG variable, data from CSRHub® was used, which is among the five largest sustainability rating agencies in the world, providing ratings for more than 18,500 companies in 132 countries (Prudêncio et al., 2020), adheres to the Global Reporting Initiative - GRI guidelines (Mohamed & Salah, 2016), and considers four main dimensions: community, employees, environment, and governance.

The research adopts a quantitative approach, with statistical analysis of secondary data carried out using Microsoft Excel® and Stata® programs. Initially, univariate and bivariate statistical techniques were applied to characterize the companies and identify patterns of association among the variables.

In the inferential stage, regression models for panel data with fixed effects were estimated, incorporating year and industry controls to capture temporal and sectoral variations. The models were estimated with robust standard errors, a procedure that not only provides greater consistency to the estimates but also addresses the assumption of heteroscedasticity, as verified by the White test applied through the robust regression method.

Multicollinearity was analyzed using the Variance Inflation Factor (VIF), and the results indicated no severe correlation among the explanatory variables. Residual autocorrelation was evaluated using the Durbin-Watson test, which yielded values within acceptable limits, confirming the independence of the errors.

The measurement of income smoothing followed the indicator proposed by Gaio (2010), where values below 1 indicate greater variability of operational cash flow relative to accounting profit, reflecting higher use of accruals for income smoothing. Higher values represent less smoothed profits. To facilitate econometric interpretation, the results of the equation were multiplied by -1, so that higher coefficients correspond to a greater level of income smoothing (Gaio, 2010; Mazzioni, 2015).

4 ANALYSIS AND INTERPRETATION OF THE RESULTS

Table 2 displays the descriptive statistics of the quantitative variables.

Table 2 - Descriptive statistics of the quantitative variables

Variables	Minimum	Maximum	Average	Median	Standard Deviation
WACC	0.00	0.71	0.12	0.09	0.09
CEC	0.00	0.96	0.20	0.14	0.18
CTC	0.00	0.48	0.06	0.05	0.05
SMOOT	0.08	33.70	1.33	0.93	2.04
SIZE	9.63	20.71	15.46	15.43	1.79
INTANG	0.00	3.05	0.14	0.06	0.21
IND	0.00	304.22	2.71	1.28	13.24
SALESG	-0.94	5.39	0.14	0.09	0.41
PCT	0.00	1.00	0.55	0.56	0.19

Regarding the variables of interest, Table 2 indicates that the weighted average cost of capital is 12%, with the average cost of equity capital being 20% and the cost of third-party capital being 6%. After the adopted methodological procedure, the smoothing index is greater than 1, indicating the presence of income smoothing. The average ESG practices score is 21.84 (from 0 to 100), influenced by companies that are not evaluated and received a score of 0.

Table 3 displays the frequency of the categorical variables represented by the factors determining the adoption of the SDG, presence in the CSI portfolio, and Big Four audit of the financial statements.

Table 3 - Frequency of the categorical variables

Factors	Yes	Percentage	No	Percentage
SDG	314	34.66	592	65.34
CSI	119	13.13	787	86.87
AUDIT	639	70.53	267	29.47

It was found that 34.66% of the observations come from companies that published their reports considering the SDG, while 65.34% of the companies did not include the SDG in their sustainability reports. Observations from companies included in the CSI portfolio account for only 13.13% of the analyzed total. Regarding audit, 70.53% of the total of 906 observations are audited by Big Four firms.

Table 4 displays the Pearson correlation among the quantitative variables of the study.

Table 4 - Pearson correlation of the quantitative variables

Variables	SMOOT	S	INT	IND	SG
SMOOT	1				
SIZE	0.070*	1			
INTANG	-0.067*	0.104**	1		
IND	-0.005	-0.075*	0.057	1	
SALESG	0.017	0.001	-0.040	0.015	1

Notes: Significance levels: * Correlation is significant at the 0.05 level (2 edges). ** Correlation is significant at the 0.01 level (2 edges).

In Table 4, it can be observed that income smoothing and size have a positive and significant relationship at the 1% level, suggesting that as the size of the company increases, the smoothing index also increases. However, smoothing has a negative and significant relationship with intangibility, a situation that also occurs between leverage and company size. The other variables did not have significant relationships.

Although significant correlations are observed, they can be considered low (0.10 to 0.30) or moderate (0.40 to 0.60), as proposed by Dancey and Reidy (2006). This scenario allows the joint use of these explanatory variables in ordinary least squares models, as they capture distinct effects on the dependent variable and do not cause multicollinearity problems.

Table 5 displays the results of applying models aimed at analyzing whether there is an influence of income smoothing and responsible corporate behavior on the weighted average cost of capital (WACC) of companies listed on B3.

Table 5 - Results of models with panel data for WACC

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
SMOOT	-3.54*** (-0.0089)		-3.57*** (-0.0091)	-3.50*** (-0.0088)	-1.93* (-0.0059)	-3.01*** (-0.0106)	-3.34*** (-0.0085)	-2.99*** (-0.0083)
ESG		-0.37 (-0.0021)	-0.63 (-0.0034)		-1.69* (0.0130)			
SDG		-0.53 (-0.0032)	-0.72 (-0.0044)			0.23 (0.0020)		
CSI		0.10 (0.0007)	0.58 (0.0041)				-1.13 (-0.0181)	
RCB				-1.10 (-0.0001)				-1.11 (-0.0104)
SMOOT*ESG					-1.41 (-0.0001)			
SMOOT*SDG						0.97 (0.0053)		
SMOOT*CSI							-1.34 (-0.0221)	
SMOOT*RCB								-0.60 (-0.0042)
SALESG	-3.52*** (-0.0065)	-2.86*** (-0.0063)	-2.77*** (-0.0060)	-2.88*** (-0.0058)	-2.86*** (-0.0057)	-2.95*** (-0.0059)	-3.30*** (-0.0066)	-2.85*** (-0.0058)
INTANG	3.65*** (0.0606)	3.28*** (0.0552)	3.68*** (0.0614)	3.73*** (0.0618)	3.52*** (0.0587)	3.68*** (0.0615)	3.61*** (0.0600)	3.65*** (0.6093)
IND	-7.18*** (-0.0067)	-7.00*** (-0.0065)	-7.04*** (-0.0067)	-7.06*** (-0.0066)	-7.14*** (-0.0067)	-7.07*** (-0.0066)	-7.19*** (-0.0070)	-7.07*** (-0.0067)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
SALESG	-1.90* (-0.0148)	-1.91* (-0.0149)	-1.91* (-0.0149)	-1.88* (-0.0147)	-1.90* (-0.0149)	-1.88* (-0.0148)	-1.97** (-0.0153)	-1.88* (-0.0147)
AUDIT	1.25 (0.0072)	1.34 (0.0080)	1.39 (0.0081)	1.32 (0.0077)	1.28 (0.0074)	1.28 (0.0075)	1.20 (0.0069)	1.34 (0.0078)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	8.57*** (0.3049)	7.93*** (0.0315)	7.65*** (0.2969)	7.71*** (0.2945)	8.22*** (0.2981)	7.72*** (0.2940)	8.23*** (0.3069)	7.70*** (0.2944)
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Adjusted R^2	0.4941	0.4835	0.4946	0.4945	0.4959	0.4950	0.4950	0.4947
F statistic	18.91***	17.88***	17.69***	18.49***	18.31***	18.16***	17.96***	18.05***
VIF	1.14 a 2.58	1.22 a 2.57	1.15 a 2.58	1.14 a 2.59	1.22 a 3.56	1.22 a 3.57	1.18 a 7.67	1.22 a 4.26
DW	18.002	17.641	18.025	17.999	18.062	18.017	18.061	17.993
N	*906*	*906*	*906*	*906*	*906*	*906*	*906*	*906*

Notes: Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Coefficient value in parentheses. VIF: Variance Inflation Factor. DW: Durbin-Watson d-statistic. N: number of observations

The study tested eight econometric panel data models to identify the direct effect and the moderating effect of independent variables on the dependent variable. In Model 1, income smoothing was considered; in Model 2, corporate social responsibility variables (ESG, SDG, and CSI) were used separately (individually); in Model 3, income smoothing, ESG, SDG, and CSI variables were used separately; in Model 4, corporate social responsibility was considered when the company had at least two proxies among ESG, SDG, and CSI, along with income smoothing; In Models 5, 6, and 7, tests were included with moderation between income smoothing and ESG, SDG, and CSI, respectively, in addition to the individual use of the variables; finally, Model 8 employs moderation between income smoothing and responsible corporate behavior, as well as the individual use of the variables. In all models, control variables were considered, with sector and year effects controlled.

Table 5 displays the results of applying multivariate linear regression between the explanatory variables and the weighted average cost of capital. It can be observed that the explanatory variables, as a whole, showed a statistically significant relationship with the dependent variable at the 1% level (F statistic), validating the models. The adjusted R^2 (explanatory power of the model) indicates that the independent variables included in the model explain between 48.35% and 49.59% of WACC. The remainder is explained by variables not included in the model, leaving avenues for future research.

It was found that the SMOOT variable showed a negative and statistically significant effect at the 1% level in explaining WACC, suggesting that companies with lower smoothing had a higher weighted average cost of capital (supporting H1). The result is consistent with the findings of Li and Richie (2016), Dewi et al. (2020) internationally, and Castro and Martinez (2009) and Meli (2015) nationally. The studies also identified that the use of income smoothing helps to reduce the cost of capital, based on the argument that smoothing equalizes the information provided by companies, reducing uncertainty for investors and banks by facilitating the projection of future cash flows and generating greater security, reliability, and predictability.

Regarding the responsible corporate behavior variables, companies with higher ESG scores, adherence to the SDG, and inclusion in the CSI portfolio did not generally show a lower WACC compared to their counterparts. The lack of significance was observed both in the individual presence of the proxies (ESG, SDG, and CSI) and in the combined use of the responsible behavior variable (being present in at least two of the three characteristics). The moderate use of smoothing with responsible corporate behavior proxies also did not indicate any influence on WACC. In general, the results contradict the findings of Balassiano et al. (2023), who identified a negative relationship between environmental issues and the cost of third-party capital. It should be considered that the current study was conducted with a specific sample of companies operating in the Brazilian market and included the years affected by the Covid-19 pandemic, a fact that may have influenced the results.

However, when the ESG proxy was used individually to represent responsible corporate behavior (Model 5), together with smoothing and control variables, it proved to be negative and statistically significant at the 10% level in influencing WACC. The results of Model 5 are consistent with the findings of Majid et al. (2024), Piechocka-Kału□na et al. (2021), Tawfiq et al. (2024), and Zahid et al. (2023) in the international context, and with the studies by Costa and Ferezin (2021) and Ramirez et al. (2022) in the national scenario. The results suggest that companies with higher ESG performance benefit from lower capital costs, which is in line with the idea that better ESG performance reduces perceived risk.

Regarding company size, the results indicated that larger companies presented a lower WACC, with significance at 1%. This result reflects that larger companies offer more guarantees to creditors, which reduces WACC, reinforcing the

findings of Ballestero et al. (2016), Oliveira et al. (2019), and Majid et al. (2024). Larger companies are associated with better reputation levels, positively affecting the perception of market agents and reducing fundraising costs (Fonseca et al., 2016).

More intangible companies were found to be subject to a higher weighted average cost of capital, statistically significant at the 1% level. The result suggests that creditors perceive greater risks for companies with lower levels of tangible assets as collateral. Fonseca et al. (2016) argue that higher levels of tangibility reduce managers' discretion in investment choices, which leads to a reduction in the cost of capital. The study's result is consistent with the assumption that, generally, more intangible companies tend to exhibit higher levels of risk, which, therefore, impacts the increase in WACC (Kayo & Famá, 2004).

In turn, indebtedness negatively impacted the cost of capital at a 1% significance level, indicating that more indebted companies had a lower WACC. In this regard, the study's results are similar to those of Balassiano et al. (2023), who found a lower WACC in more leveraged Brazilian companies. One explanation for these findings is that companies with higher debt are more likely to publish structured reports with greater information connectivity, making it easier to analyze credit risks and reduce capital costs (Eliwa et al., 2021).

It was possible to identify a negative impact on WACC with a significance of 5% to 10% for the sales growth variable (SALESG), that is, companies with higher sales growth were more likely to have a lower cost of capital. The result suggests that sales growth signals lower risks for investors and funders, given better expectations regarding the projection of future cash flows.

Unlike expected companies with Big Four audits were shown to be more subject to a higher weighted average cost of capital; however, the results were not statistically significant. The result contradicts the findings of Albuquerque et al. (2011), which identified that companies audited by the Big Four have a lower cost of debt capital.

Table 6 displays a summary of the results related to the hypotheses proposed by the research, based on the procedures and tests carried out.

Table 6 - Results of the hypotheses

Hipótese	Decisão
H_1 – There is a negative relationship between income smoothing and the weighted average cost of capital;	Accept the hypothesis
H_2 – There is a negative relationship between ESG practices and the weighted average cost of capital;	Inconclusive
H_3 – There is a negative relationship between the adoption of the SDG in sustainability report disclosure and the weighted average cost of capital;	Reject the hypothesis
H_4 – There is a negative relationship between participation in the CSI portfolio and the weighted average cost of capital;	Reject the hypothesis
H_5 – ESG practices moderate the negative relationship between income smoothing and the weighted average cost of capital;	Reject the hypothesis
H_6 – The adoption of the SDG in the disclosure of the sustainability reports moderates the negative relationship between income smoothing and the weighted average cost of capital;	Reject the hypothesis
H_7 – Participation in the CSI portfolio moderates the negative relationship between income smoothing and the weighted average cost of capital.	Reject the hypothesis

Some possible explanations can be attributed to the fact that most of the hypotheses were rejected. First, the implementation process of socio-environmental practices may still be in a stage of development at the national level. Second, there may be a low perception among investors and funders regarding the long-term benefits of responsible corporate behavior. Finally, the coronavirus pandemic period may have impacted both the dependent variable and some independent variable(s), influencing the results.

5 FINAL CONSIDERATIONS

The aim of the study was to analyze the influence of income smoothing and responsible corporate behavior on the cost of capital of publicly traded companies listed on [B3]. Based on the research conducted, important results were observed. The findings were consistent in indicating that companies with higher levels of income smoothing are associated with a lower weighted average cost of capital. In turn, companies adhering to the SDG and included in the CSI portfolio are not rewarded with a lower WACC. Regarding ESG, the results were inconsistent. Nevertheless, when used in a non-concomitant manner with another proxy for responsible behavior, it proved significant for a lower weighted average cost of capital.

As expected, the practice of income smoothing showed benefits in raising capital and was found to be related to a lower cost of capital. Therefore, the possible opportunistic behavior of managers turned into economic benefits, reflect-

ed in the reduction of fundraising costs. However, investors may penalize smoothed results if they perceive a lack of operational fundamentals.

In turn, responsible corporate behavior did not prove to be significant in influencing fundraising overall. The exception was the impact of ESG on reducing the cost of capital. The results may stem from the maturation process of socio-environmental practices or from low awareness on the part of investors and funders in relation to the long-term benefits of such corporate behavior. A suggested managerial measure is the adoption of independent assurance of ESG reports, to enhance the company's reputation and convert socio-environmental responsibility into a reduction in the cost of capital.

Furthermore, the period under investigation includes the years 2020 and 2021, during which the Covid-19 pandemic occurred. The effects of the pandemic may have impacted business results and led to changes in managerial behavior, both regarding income smoothing practices and responsible behavior.

The research differed from previous studies by using the moderation of corporate behavior and its impact on the relationship between smoothing and WACC. As evidence, there is a clear demonstration of the lack of confirmation that responsible behavior can alter the influence of income smoothing practices on the cost of capital of the investigated organizations.

The study contributes to the literature investigating factors influencing companies' cost of capital. Previous studies have focused on the interrelationships of responsible corporate behavior with single proxies or income smoothing, separately. The study adds an approach to the investigated topic by considering the joint treatment of these aspects. Accordingly, it presents implications for corporate managerial practice, as it provides additional empirical evidence on the subject. The findings originally reveal that the perception on the part of funders and investors is more favorable toward income smoothing when compared to responsible practices.

Beyond the possibilities, study also has limitations. The first is that it only reports on publicly traded companies with specific characteristics and does not represent all types of companies. Another limitation is the predominantly quantitative analysis, without examining the qualitative aspects of disclosures and business relationships with stakeholders. In addition, the approach does not allow for verification of responsible corporate performance due to the volume of observations. Another important point to note concerns the understanding that smoothing results has a limit between helping or harming an outcome, and it is necessary to understand to what extent it can be beneficial for the company's financial health.

One final consideration is related to the ESG data collection base, which, due to the substantial divergence among rating agencies (Christensen et al., 2022), may impact the results. The limitations serve as a pathway for future studies to expand discussions on the topics covered in this research. Furthermore, other studies may consider disaggregated ESG scores by pillar, measure the intensity of SDG adoption (effective number of reported goals), and weight the CSI variable by portfolio holding time. The lagged use of responsible behavior variables is a methodological alternative to be tested in future research.

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