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Analysis of the importance of expenses on intangible assets in the market value of brazilian companies

Análise da importância dos gastos com ativos intangíveis no valor de mercado das empresas brasileiras

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ABSTRACT

Intangible assets are becoming more important for generating value in companies. However, according to the IASB (International Accounting Standard Board), there are many questions as to whether the accounting standards currently in force enable adequate accounting recognition of these assets in companies' balance sheets. Currently, a portion of internally generated expenses on Research and Development (R&D) and all internally generated expenses on Innovation and Strategy (I&S), which can generate future economic benefits for companies, must be accounted for as expenses and not as intangible assets. Consequently, international academic literature has indicated an increase in the gap between the market value and the book value presented in the financial statements. In this context, the objective of this research is to analyze the relationship between R&D and I&S expenses with the Market Value of non-financial companies listed on the Brazilian capital market, from 2018 to 2022. The analysis consisted of applying a linear multiple regression model with balanced panel data from 153 companies, as well as a subsample of 65 companies that disclosed R&D expenses and a subsample of 20 companies that issued American Depositary Receipts (ADR), traded on the New York Stock Exchange (NYSE). The results found did not confirm the influence of R&D and I&S expenses on the market value of companies, either for the sample or for the subsample of companies that disclosed R&D expenses. However, the evidence obtained demonstrates that there is a relationship between these expenses and the market value of the subsample of companies that issue ADR, confirming the findings of international studies. This research stands out for its originality, as it considers expenses on Innovation & Strategy in the analysis, as adopted in international studies, but absent in similar studies in Brazil. This research also contributes relevant evidence to the debate on the accounting challenge of determining the best treatment to be given to intangible assets generated internally in organizations.

Keywords: Intangible Assets, Research & Development Expenses, Innovation, Market Value.

1. INTRODUCTION

Intangible assets, whether generated internally or acquired externally, are the main factor in generating value in organizations, showing growth in the amount invested in recent years compared to investment in tangible assets. Furthermore, companies with greater investments in intangibles experience more increases in productivity than their peers (CORRADO et al., 2021).

According to Zambon et al. (2020, p. 8), expenses internally generated with brands, patents, reputation, user licenses, information systems, business models and processes, intellectual, organizational and human capital, technical skills, optimization of logistical and operational processes, customer portfolio and relationships, product development and marketing actions are considered investments in intangible assets. However, the current accounting standard still does not adequately mention or recognize the existence of these various intangible assets generated internally in companies, which are considered to be Innovation and Strategy (I&S) expenses. The only exception to the recognition of internally generated intangible assets refers to costs spent on Research and Development (R&D) projects, carried out in the

development phase and which meet the specific criteria defined in the standard. (GARANINA; HUSSINKI; DUMAY, 2021).

Aware of this difficulty, the IASB (International Accounting Standard Board) has created a specific project, to be developed between 2022 and 2026, to address this issue (IASB, 2022). In this context, the IASB has held meetings and lectures to stimulate academic studies in order to identify possible solutions to this major challenge of providing the appropriate accounting treatment for internally generated intangible assets.

The accounting of Intangible Assets is currently regulated in the Technical Pronouncement CPC 04 (R1) - Intangible Assets, issued by the Accounting Pronouncements Committee in 2010 and approved by the Federal Accounting Council (Resolution NBC TG 04 R3). This technical pronouncement has a direct correlation with the international accounting standard IAS 38 - Intangible Assets, issued by IASB.

In the academic environment, there has been an increase in the number of studies aimed at evaluating various aspects related to the recognition and measurement of intangible assets, including the studies conducted by Hulten and Hao (2008) and Iqbal et al. (2022), which analyzed the importance of R&D and I&S expenses in shaping the market value of North American companies. In Brazil, we have also seen progress in studies on the subject, with Figari et al. (2016); Oliveira et al. (2019); Tortoli et al. (2020) and Soares et al. (2023) standing out. However, these studies only consider expenses with R&D and do not consider the contribution of expenses with I&S in the formation of the market value of companies.

Therefore, in order to eliminate a gap in the academic literature, the aim of this study is to analyze the relationship between R&D and I&S expenses and the Market Value of Brazilian non-financial publicly traded companies from 2018 to 2022.

This research is important for several reasons, three of which stand out. Firstly, due to the novelty of evaluating the effects of expenses on Innovation and Strategy (I&S), which are usually considered expenses, on the formation of the Market Value of Brazilian companies. In addition, it considers the impacts of expenses on Research and Development (R&D), only part of which is considered intangible assets. To date, no national accounting study has explored the importance of the accounting information disclosed by Brazilian companies on I&S expenses in the formation of market value.

Secondly, because of the need to manually collect information on R&D expenses, which companies are obliged to disclose, but which is not available on the Economatica® platform. As a result, disclosure in Brazil is made in the notes to the annual financial statements, in a non-standardized way, making the collection process much more laborious and time-consuming.

Thirdly, in order to make the data analysis more robust and the results even more reliable, complementary analyses were conducted considering two subsamples of companies (one only for companies that disclosed R&D expenses and the other for companies with shares traded on the New York Stock Exchange - NYSE) and two statistical models that isolate the effects of the variables analyzed. Thus, in addition to increasing the robustness

of the analysis, the use of two subsamples allows the results to be compared with those observed in previous national studies, with the first subsample, as well as verifying the existing effects in Brazilian companies that receive international influences, with the second subsample.

There are two main contributions of this study. On the practical side, it provides new insights into the relevance of accounting information for understanding the formation of the market value of Brazilian companies. On the conceptual side, it provides new evidence related to the influence of the institutional environment of the capital market in Brazil.

2. LITERATURE REVIEW

There is a growing perception that the value of companies, their competitive edge and even their sustainability derives largely from the value of their intangibles, which are indispensable to the economy, not only in relation to technology from expenses on Research & Development (R&D) but also in relation to capital investments in Innovation and Strategy (I&S) (HULTEN; HAO, 2008; CHEN; GAVIOUS; LEV, 2015).

According to Haskel and Westlake (2018, p. 22), Lev and Gu (2016, p. 82) and Moustaghfir and Schiuma (2011, p. 115), expenses on Innovation and Strategy influences the market value of companies and generates future economic benefits.

Thus, some international researchers (CORRADO; HULTEN; SICHEL, 2006; HULTEN; HAO, 2008; PETERS; TAYLOR, 2017; BANKER et al., 2019; IQBAL et al, 2022) have dedicated themselves to analyzing the relationship between the capitalization of R&D and I&S expenses and the market value of companies.

The article by Hulten and Hao (2008) is a seminal study in the evaluation of the effects of accounting in companies' balance sheets, as intangible assets, of internally generated R&D and I&S expenses recorded as expenses in the Income Statement. Using data from 422 of the most R&D-intensive companies in the S&P 500 index, from 1988 to 2006, the researchers concluded that there is a significant difference in the book-to-market ratio of companies, before and after the capitalization of R&D and I&S expenses, and concluded that when the company is exposed to the capitalization of internally generated intangible assets, the presence of debt on the company's balance sheet takes on a new meaning for the evaluation of companies in the long term.

In conclusion, the study estimates that internally generated intangible assets, excluded from the balance sheet, explain between 40% and 50% of the market value of intensive R&D companies in the US.

Nine years later, Peters and Taylor (2017) analyzed a new proxy for calculating Tobin's Q, where the new ratio, called Total Q, is the relationship between market value and the sum of tangible and intangible capital, measured as replacement cost. The study incorporated into intangible assets the expenses on R&D and I&S, which are accounted for as an expense in the Income Statement, with the aim of consolidating the recognition of the value that intangible assets generated internally exert. The test used a sample of US publicly traded companies from 1975 to 2011. The

Marco Aurélio Goulart Canongia / Adolfo Henrique Coutinho e Silva

Table 1 - Sample composition

	2018	2019	2020	2021	2022	TOTAL	%
Companies active in the B3	395	395	395	395	395	1.975	100,0%
(-)Financial sector	(58)	(58)	(58)	(58)	(58)	(290)	-14,7%
Active and non-financial companies	337	337	337	337	337	1.685	85,3%
(-)Equity ≤ 0	(75)	(68)	(59)	(50)	(48)	(300)	-15,2%
(-)Companies with no market value	(84)	(88)	(69)	(49)	(43)	(333)	-16,9%
(-)Companies without revenue in 5	(3)	(3)	(3)	(3)	(3)	(15)	-0,8%
(-)Companies not present in the 5	(18)	(21)	(49)	(78)	(86)	(252)	-12,8%
(-)Outlier companies	(4)	(4)	(4)	(4)	(4)	(20)	-1,0%
Companies present in the 5 years	153	153	153	153	153	765	38,7%

Source: Prepared by the authors. | **Note**: Data collected from the Economatica® platform on 08/21/2023.

percentages of internally generated expenses on R&D and I&S were the same as those adopted by Hulten and Hao (2008). The results indicate that the inclusion of internally generated intangible capital produces a superior proxy for evaluating investment opportunities.

Two years later, the study by Banker et al. (2019) investigated whether there is an adequate perception on the part of market agents as to whether the intangible asset resulting from I&S expenses is a part of general and administrative expenses (SG&A). The study seeks to assess whether investors are able to distinguish between the component of SG&A that is an asset and the other that is an expense; assess the impact of the future value of SG&A expenses; and assess whether analysts understand the value of the intangible asset that makes up SG&A. Based on a sample of 214,115 observations from 1970 to 2014, the study concluded that the market partially recognizes the value creation implicit in SG&A, but fails to fully recognize this value.

Finally, Iqbal et al. (2022) innovated by using a new method for estimating internally generated intangible capital, applied to a sample of 65,854 observations of US companies from 1970 to 2019. With this data, the study defined the ideal percentages of R&D and SG&A expenses, such as I&S expenses, by industrial sector from the Fama-French classification of 48 industrial sectors. The findings indicated that there are substantial variations in the investment percentages of expenses on R&D and SG&A, such as expenses on I&S, by industrial sector. Subsequently, the results of this research were reproduced in Mauboussin and Callahan (2022) for the financial services consultancy Morgan Stanley, with a recommendation for adoption by companies and analysts in the North American market.

At the national level, it was not possible to identify the existence of studies that analyzed the effects of expenses on Innovation & Strategy on the market value of Brazilian companies. In general, the national studies (FIGARI et al., 2016; OLIVEIRA et al., 2019; TORTOLI et al., 2020; SOARES et al., 2023) focus their attention only on the analysis of R&D expenses, whether accounted for as intangible assets or as an expense.

Figari et al. (2016) sought to identify how much of the difference in the book-to-market ratio can be explained by expenses on R&D accounted for as an expense for a sample of 42 Brazilian non-financial companies. The statistical model used was multiple linear regression, with cross-sectional data for the year 2014.

The results showed that the book-to-market ratio was positively influenced by internally generated R&D expenses.

Another study worth mentioning due to its relationship with the aim of this study is the research conducted by Soares et al. (2023). The authors analyzed the relationship between market value and total assets (dependent variable) and the relationship between R&D expenses and total assets (independent variable) from 2010 to 2018, for a sample of 61 Brazilian publicly traded companies. The study found that expenses on R&D negatively influence the market value of the companies analyzed, indicating that an increase in this expense reduces market value.

It is worth noting that accounting standard CPC 04 (R1) only deals with investments in R&D. For these expenses, if the origin of the R&D investment is through external acquisition, either separately or as part of a business combination, manifested through goodwill, recognition as an intangible asset is permitted. On the other hand, if the origin of the R&D investment is internal generation, the standard prevents recognition as an intangible asset, and the expense must be disclosed in the notes and accounted for as an expense in the income statement. The only exception to internal generation accepted by CPC 04 (R1) for accounting in the Balance Sheet is for costs spent on R&D projects in the development phase, provided they meet the specific criteria defined in the standard (DE OLIVEIRA et al., 2014; GARANINA; HUSSINKI; DUMAY, 2021).

For many scholars, this dichotomous treatment leads to distortions in the content of the financial statements, because whether the origin of the intangible asset is through external acquisition or internal production, there should not be this difference in accounting treatment in the standard.

Based on the findings of previous studies, two hypotheses were formulated for analysis in this research, namely:

> *H0a: Internally generated R&D expenses accounted for as expenses is positively related to the market value of Brazilian non-financial publicly traded companies between 2018 and 2022.*

> *H0b: The internally generated expenses on I&S accounted for as expenses is positively related to the market value of Brazilian non-financial publicly traded companies between 2018 and 2022.*

Table 2 - Variables used in the research

Type of Variable	Variable	Description	Form of Calculation	Source References
Dependent	MtB	Market-to-Book	$\dfrac{\text{Market Value}}{\text{Net Equity}}$	Market Value = obtained on December 31st of the year t Equity = obtained on December 31st of the year t	Hulten and Hao (2008); Penman (2009)
Independent	R&D	Expenses on research and development	$\dfrac{\text{Expenses on R\&D}}{\text{Revenue}}$	R&D expenses = obtained from the reports and explanatory notes of the statements for the year t Revenue = Total revenue, obtained on December 31st of the year t	Tung and Binh (2021); Xiang *et al.* (2020); Xie and Zhang (2021); Barker *et al.* (2021); Chen, Gavious and Lev (2015)
	I&S	Expenses on Innovation and Strategy	$\dfrac{\text{n*(Expenses Salles and Adm)}}{\text{Revenue}}$	Expenses Sales and Adm = (Desp Sales + Desp Adm), obtained on December 31 of year t Revenue = Total revenue, obtained on December 31st of the year t	Hulten and Hao (2008); Banker *et al* . (2019); Peters and Taylor (2017); Iqbal *et al* . (2022)
	RENTAB T	Rentability	$\dfrac{\text{EBI}}{\text{Total Assets}}$	EBIT = obtained on December 31st of the year t Total Assets = obtained on December 31st of the year t	Radenovic *et al.* (2023); Costa *et al.* (2022); Crisóstomo and González (2006)

Pensar Contábil, Rio de Janeiro v. 26, n. 91, p. 14-24, sep/dec 2024.

17

Control	SIZE Size	ln (Market Value)	Market value = obtained on December 31st of the year t	Denicolai, Ramusino and Sotti (2014); Grimpe $et\ al$. (2017); Oliveira $et\ al$. (2019)
	ENDIV Indebtedness	$\dfrac{\text{Total Debt}}{\text{Equity}}$	Total Debt = (Current Liabilities + Non-Current Liabilities), obtained on December 31st of the year t Equity = obtained on December 31st of the year t Current Assets = obtained on December 31st of the year t Current Liabilities = obtained on December 31st of year t Total Assets = obtained on December 31st of year t	Khan and Iqbal (2022); Albuquerque Filho $et\ al$. (2019)
	Net Working Capital	$\dfrac{\text{(Current Assets-Current Liabilities)}}{\text{Total Assets}}$		Figari $et\ al$. (2016); Santos (2018)

Source: Prepared by the authors.

Notes: (1) Market Value = (total outstanding shares* price on December 31st, not adjusted for dividends). Method adopted by Economatica®.

(2) EBIT = Earnings Before Interest and Taxes.

(3) (3) The value of "n" in the calculation form for the I&S variable corresponds to the percentage of 30%, the same adopted by Hulten and Hao (2008) and Peters and Taylor (2017).

(4) (4) All the indicators used in the calculations were taken from the Economatica® platform, with the exception of R&D Expenditure, which was obtained manually.

(5) (5) Year t corresponds to the years from 2018 to 2022.

(6) ln ( ) = natural logarithm

18

Pensar Contábil, Rio de Janeiro v. 26, n. 91, p. 14-24, sep/dec 2024.

Figure 1 – Distribution of R&D, I&S and MtB variables by sample and subsample
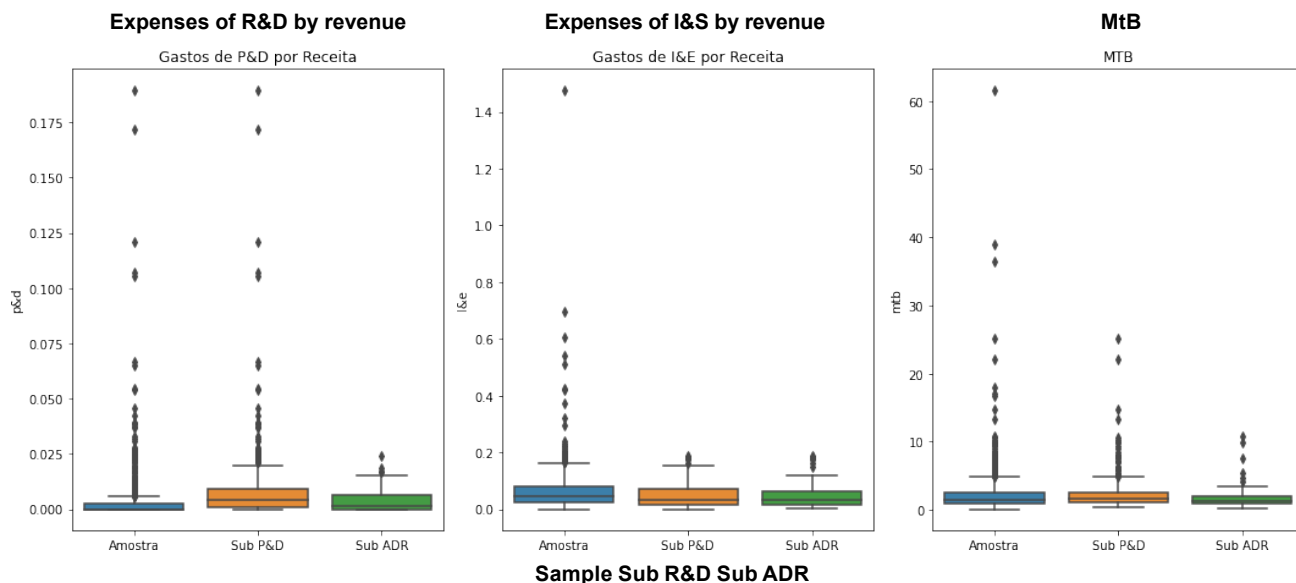
Source: Prepared by the authors. | Notes: (1) Variables in the model: MtB = Market-to-Book; R&D = Expenses on Research and Development; I&S = Expenses on Innovation and Strategy. (2) N = Sample: 765 observations from 153 companies; R&D Subsample: 325 observations from 65 companies; ADR Sub-sample: 100 observations from 20 companies; in the period from 2018 to 2022.

Considering the proposed hypotheses, a significant positive relationship is expected between expenses on R&D and the market value of companies, based on the assumption that, although the Brazilian institutional environment is different from that of the US, the investor in the Brazilian capital market reacts similarly to the foreign counterpart. Other arguments that contribute to the expectation of positive significance of market value creation are pointed out in the studies by Figari et al. (2016), Grimpe et al. (2017) and Zambon et al. (2020). However, a negative effect may also be found, as suggested by Soares et al. (2023). These are cases in which, in the long term, the history of investments made in R&D has not converted into better results such as greater profitability or, in the short term, because R&D expenses, being accounted for as an expense, is perceived by investors only from this aspect, reducing the profit for the fiscal year. Other arguments are cited by Zambon et al. (2020, p. 52).

A significant positive relationship is also expected between expenses on I&S and the market value of companies, based on the same assumption that Brazilian investors react similarly to their foreign counterparts (ZAMBON et al., 2020, p. 61). However, a negative effect can also be found. These are long-term cases, in which the historical investments made in advertising, marketing and reputation have not been converted into greater profitability, according to Khan and Iqbal (2022, p. 104).

Hypothesis H0b is unprecedented in Brazil, broadening the scope and importance of this research. Due to the fact that all the companies in the sample spent money on I&S, the results of the tests of hypothesis H0b can be compared to the results of previous international studies.

3. METHODOLOGY

3.1. Sample composition

Table 1 shows the composition of the sample, which totaled 153 companies with data for the years 2018 to 2022, making a total of 765 observations.

The selection criteria for the companies followed the following steps: (i) only consider active companies with shares traded on B3; (ii) exclude companies in the financial sector (banks, insurance companies and the equivalent), which have very specific characteristics; (iii) exclude companies with negative Shareholders' Equity, since they have a negative Market-to-Book proxy, altering the concept of this index (LOPES; CARVALHO, 2020; COSTA et al, 2022); and (iv) exclude companies without Market Value and Income data, in any of the five years of the period studied. In addition, following a practice usually used in statistical studies, 4 outlier companies were excluded, corresponding to 2.5% of the remaining sample.

It is important to note that the option of adopting a balanced panel, i.e. one that considers the same number of companies in each year of the study, reduces the complexity of statistical treatment and the imprecision of results, simplifying the application of multiple linear regression in panel data (WOOLDRIDGE, 2010, p.828).

3.2. MODEL ANALYZED, VARIABLES USED AND DATA COLLECTION METHOD

To answer the research hypotheses, the multiple linear regression model presented below was adopted, which was adapted from the models used in the studies by Figari et al. (2016)

Pensar Contábil, Rio de Janeiro v. 26, n. 91, p. 14-24, sep/dec 2024.

19

Marco Aurélio Goulart Canongia / Adolfo Henrique Coutinho e Silva

and Soares et al. (2023). The description and calculation of the variables used are shown in Table 2.

$$MtBi,t = \beta 0 + \beta 1 R\&Di,t + \beta 2 I\&Si,t + \beta 3 RENTABi,t + \beta 4 PORTEi,t + \beta 5 ENDIVi,t + \beta 6 CGLi,t + \xi i,t$$

The adaptations of the models by Figari et al. (2016) and Soares et al. (2023) mainly cover the inclusion of the independent variable I&S referring to Innovation & Strategy expenses. In this research, following the procedures adopted in the studies by Hulten and Hao (2008) and Peters and Taylor (2017), the amounts spent on I&S correspond to the percentage of 30% of sales and administrative expenses for each year. Furthermore, unlike the R&D expenses variable in the studies by Figari et al. (2016) and Soares et al. (2023) being related to Total Assets, in this research the R&D and I&S variables are expenses on R&D and I&S related to Revenue, respectively.

The data for the analysis was collected in two stages: the first took place on August 21, 2023, automatically using the Economatica® platform, to obtain annual financial data for the period from 2018 to 2022 from active, non-financial Brazilian companies. The second stage consisted of manually collecting the annual values of R&D expenses, through individual analysis of the explanatory notes to the annual financial statements of the 153 companies in the final sample extracted in the first stage. A value of zero was assigned to the R&D expenses of companies where this information was not identified in the financial statements.

3.3. Data analysis

To conduct the statistical tests, in order to provide greater robustness to the results of the analysis, in addition to the model indicated above (Model 1), the statistical tests were conducted considering two other models. Model 2 only considered the effects of the independent variable R&D, and Model 3 only considered the effects of the independent variable I&S.

In addition, the analyses were performed considering the complete sample (153 companies with data from 2018 to 2022) indicated in item 3. 1 and two subsamples, namely: (i) R&D subsample - which only considers companies with disclosed R&D expenses, totaling 65 companies in the period analyzed (325 observations); and (ii) ADR subsample - which only considers companies listed on the New York Stock Exchange (NYSE), which are required to comply with the disclosure requirements of the U.S. Securities Exchange Commission (SEC), totaling 20 companies in the period analyzed (100 observations).

It is worth noting that the analysis of Model 1 applied to the complete sample tests hypotheses H0a and H0b. The analysis of Model 2 applied to the R&D subsample makes it possible to compare the results with those observed in previous national studies. The analysis of Model 1 applied to the ADR subsample is the most adherent to the comparability of the results with previous international studies.

The statistical analyses included univariate data analysis (descriptive statistics and Pearson correlation) and, above all, multivariate data analysis (multiple linear regression test with ba-

lanced panel data). Previously, the panel data diagnostic statistical tests were applied, which validated the use of the fixed effects estimator, and the analysis of assumptions for panel data, which confirmed the applicability of the Arellano robust standard error estimator (2019).

4. RESULTS

4.1. Analysis of results

Figure 1 shows the boxplot graph of the behavior of the three main variables in this study, for the period from 2018 to 2022. It can be seen that the mean and median of the R&D and I&S variables are close to zero, while the Market-to-Book (MtB) index shows great variability, with a minimum value of 0.103 and a maximum value of 61.64. It is important to note that the vertical scales are different for each variable.

As for the correlation matrix between the variables, both for the sample and the subsamples the correlations are weak. The exception is the correlation between the MtB and ENDIV variables: 0.712 for the sample; 0.420 for the R&D subsample, and 0.659 for the ADR subsample, all with a p-value < 1%. Among the three main variables, the correlations are positive and low, with a p-value of < 1% between the variables MtB - I&S in the sample and MtB - I&S and R&D - I&S in the R&D subsample. There is no correlation with a p-value < 1% between the three main variables in the ADR subsample.

Table 3 shows the results of the multivariate statistical analysis applied to the main sample and the two subsamples for the models defined in the methodology.

Although all the models are statistically significant, it can be seen from the results of Panels 1 and 2 that the independent variables R&D and I&S have no statistically significant relationship with Market Value, represented by the Market-to-Book ratio, for Brazilian companies in the years 2018 to 2022.

However, the results of Panel 3, relating to the ADR subsample of companies listed on the NYSE, show that the expenses on I&S is positively related to Market Value, both on its own (8.5317, p-value < 10%) and together with the R&D variable (9.6536, p-value < 5%). In addition, R&D expenses is also positively related to the Market Value of Brazilian companies, when the I&S variable is considered in the analysis (24.7196, p-value < 10%).

Notably for the ADR subsample, which includes 20 companies (100 observations), it was possible to observe a reduction in the maximum value of the R&D (reduction of 87.1%) and MtB (57.1%) variables, and an increase in the dispersion coefficient of the I&S variable (18.2%). These changes influenced the results of the multivariate statistical analysis of the data.

In general terms, there is statistical evidence to reject hypotheses H0a and H0b in the complete sample (Panel 1 - Table 3) and in the R&D subsample (Panel 2 - Table 3), while in the ADR subsample (Panel 3 - Table 3) there is no statistically significant evidence to reject the hypotheses proposed in the research. In other words, only for the ADR subsample there is evidence that a significant relationship exists between the variables analyzed.

Table 3 - Analysis of the models applied to the sample and subsamples

Panel 1: Test of the Models applied to The Sample

	Model 1		Model 2		Modelo 3	
	COEFFICIENT	*SIGNIF.*	*COEFFICIENT*	*SIGNIF.*	*COEFFICIENT*	*SIGNIF.*
const	−22,5897	***	−22,6719	***	−22,6870	***
R&D	−15,8795		−15,8380		N/A	N/A
I&S	−0,7438		N/A	N/A	−0,7345	
RENTAB	1,7295	*	1,7991		1,8141	*
PORTE	1,5406	***	1,5425	***	1,5429	***
ENDIV	0,7124	***	0,7109	***	0,7124	***
NWC	0,7464		0,7767		0,6975	
R² LSDV	0,8786		0,8785		0,8782	
p-value of F-test	0,0000	***	0,0000	***	0,0000	***
p-value of autocorr test	0,0004	***	0,0004	***	0,0004	***

Panel 2: Test of the Models applied to the R&D SubSample

	Model 1		Model 2		Modelo 3	
	COEFFICIENT	*SIGNIF.*	*COEFFICIENT*	*SIGNIF.*	*COEFFICIENT*	*SIGNIF.*
const	−27,9000	***	−27,9167	***	-28,2101	***
R&D I&S	−15,4461		−15,4473		N/A	N/A
	−0,2787		N/A	N/A	−0,3189	
RENTAB	0,6366		0,6431		0,7671	
PORTE	1,8388	***	1,8389	***	1,8499	***
ENDIV	0,6038	***	0,6038	***	0,6025	***
NWC	0,2598		0,2596		0,1266	
R² LSDV	0,8320		0,8320		0,8305	
p-value of F-test	0,0000	***	0,0000	***	0,0000	***
p-value of autocorr test	0,2506		0,2508		0,2473	

Panel 3: Test of the models applied to the ADR subsample

	Model 1		Model 2		Modelo 3	
	COEFFICIENT	*SIGNIF.*	*COEFFICIENT*	*SIGNIF.*	*COEFFICIENT*	*SIGNIF.*
const	−15,0720	***	−14,7988	***	-15,0486	***
R&D	24,7196	*	9,9623		N/A	N/A
I&S	9,6536	**	N/A	N/A	8,5317	*
RENTAB	2,6529		2,2582		2,5787	
PORTE	0,7987	***	0,8161	***	0,8070	***
ENDIV	1,0030	***	1,0004	***	1,0021	***
NWC	2,7573	*	2,7533	*	2,6278	*
R² LSDV	0,8832		0,8799		0,8826	
p-value of F-test	0,0000	***	0,0000	***	0,0000	***
p-value of autocorr test	0,0000	***	0,0000	***	0,0000	***

Source: Prepared by the authors. | Notes: (1) Variables of the model: MtB = Market-to-Book; R&D = Expenses on Research and Development; I&S = Expenses on Innovation and Strategy; RENTAB = Rentability; PORTE = Size; ENDIV = Indebtedness; NWC = Net Working Capital. (2) All panel diagnostics validated the Fixed Effects hypothesis. (3) N = Sample: 765 observations from 153 companies; R&D subsample: 325 observations from 65 companies; ADR subsample: 100 observations from 20 companies; in the period from 2018 to 2022. (4) Arellano robust standard error adopted (COTTRELL; LUCHETTI, 2023) due to the presence of heteroscedasticity and autocorrelation in the sample and subsamples. (5) Significance level of p-value: 10% = *; 5% = **; 1% = *** (6) N/A: Not Applicable

4.2. Discussion of results

The statistical analyses conducted suggest that the results of the research are sensitive to the composition of the sample used. Although, in general, there is evidence that expenses on Research and Development (R&D) and expenses on Innovation & Strategy (I&S) has no relationship with the market value of Brazilian non-financial publicly traded companies, specifically for the subgroup of companies listed as ADRs on the US market, there is evidence that these expenses are positively related to the market value of companies.

North American market, there is evidence that these expenses are positively related to the market value of companies. (Table 3 next page)

Compared to previous national studies, adopting the results of Model 2 applied to the R&D subsample, where all companies have expenses on R&D, this study did not identify a relationship between the dependent variable MtB and the independent variable R&D, unlike the study by Soares et al. (2023), which identified a positive correlation of 0.336 (p-value < 5%), also not confirming the findings of Figari et al. (2016).

However, it is worth re-emphasizing the methodological differences found between this research and the studies by Soares et al. (2023) and Figari et al. (2016), in addition to the fact that the periods studied were different. As for Soares et al. (2023), the methodology uses unbalanced panel data. As for Figari et al. (2016), the methodology uses cross-sectional data.

Comparing the results of international studies with those observed in Model 1 for the full sample (Panel 1 - Table 3) and in the R&D subsample (Panel 2 - Table 3), it can be seen that the results are different. Several researchers, most notably Corrado, Hulten and Sichel (2006), Moustaghfir and Schiuma (2011, p. 115); Lev and Gu (2016, p. 82); Haskel and Westlake (2018, p. 22); Barth, Li and McClure (2023); Zambon et al. (2020) and Crouzet et al. (2022), suggest that R&D expenses is positively related to market value, but this result is not observed in the institutional environment of the Brazilian capital market.

On the other hand, the results for the ADR subsample (Panel 3 - Table 3), which includes companies with dual listings (registered on B3 and NYSE) and, consequently, are influenced by both the Brazilian and North American institutional environments, show significant evidence that expenses on R&D and I&S have a positive relationship, with statistical significance, with market value. Thus, in comparison with international studies, these results corroborate the findings presented in previous international studies, notably Hulten and Hao (2008), Peters and Taylor (2017) and Iqbal *et al*. (2022).

5. CONCLUSIONS

This study analyzed the relationship between expenses on R&D and I&S and the Market Value of Brazilian non-financial publicly traded companies between 2018 and 2022. To this end, a sample of 153 companies and two subsamples of 65 and 20

companies each were analyzed. In the first subsample, only companies that disclosed R&D expenses were considered, and in the second subsample, only companies listed as ADRs on the American stock exchange (NYSE) were considered.

The evidence obtained in this research suggests that there is only a positive relationship between R&D and I&S expenses and Market Value for the ADR subsample, in the period from 2018 to 2022. Thus, with the exception of Brazilian companies with dual listings, no statistically significant relationship was identified between the variables analyzed, allowing the two hypotheses formulated to be rejected.

The results found in this study confirm the findings of the studies by Hulten and Hao (2008) and Peters and Taylor (2017), which use samples of mostly North American and intangible-intensive companies, especially with regard to the importance of I&S expenses to explain the market value of companies. On the other hand, the results found do not support the findings observed in the national studies by Figari et al. (2016) and Soares et al. (2023).

In the first case, even though only Brazilian companies were analyzed, it is possible to infer that the results are convergent due to the fact that the 20 companies analyzed are also exposed to the North American institutional environment, as they are dual-listed companies, traded both on B3 and NYSE.

In the second case, since the results do not corroborate any of the two previous national studies and considering that those studies themselves no longer converged in their results, this research is not conclusive. However, it should be considered that these are different methodologies, demonstrating the need for further studies on the subject. In any case, the results compared are relevant in suggesting that in the Brazilian capital market the relationship between expenses on R&D and I&S and market value is sensitive to the robustness of the method adopted.

The results of this research suggest that Morgan Stanley's recommendation (MAUBOUSSIN; CALLAHAN, 2022) to financial agents to improve financial statement indicators by capitalizing R&D and I&S expenses, according to the method of the internally generated intangible capital of Iqbal et al. (2022), should be applied with caution, as not all capital markets can present such an influence. According to the evidence obtained in this research, for the institutional environment of the Brazilian capital market, when we consider the full sample of companies analyzed, we find that there is no relationship between R&D and I&S expenses and the market value of companies. Therefore, Morgan Stanley's recommendation seems to have no practical effect.

Finally, it is important to highlight that the results observed in this study may be relevant evidence to support the arguments of those professionals and researchers who believe it is necessary to review the accounting procedures associated with the recognition of intangible assets. Notably, the dichotomous situation regarding the capitalization of R&D expenses through internal generation or external acquisition, and the omission of the recognition in the balance sheets of intangible assets arising from I&S expenses, as recommended by the accounting standards in force (CPC 04 (R1) and IAS 38), lead to distortions in the financial statements and can greatly explain the lack of a relationship in the variables studied.

Thus, there seems to be an urgent need to improve the accounting treatment given to internally generated intangible assets, an issue that will still be addressed in a specific project defined by the IASB for the period from 2022 to 2026 (IASB, 2022). After all, since intangibles have increasingly become the main determinants of economic activity, as suggested by Skinner (2008, p.191), accounting standards cannot fail to recognize these assets in financial statements.

As for future studies, we recommend a sensitivity analysis of the percentage to be applied to sales and administrative expenses as I&S expenses and a comparative analysis of Brazilian companies with companies from other countries, based on extractions of accounting information from other capital markets, different from the US market.

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