▪ Advances in Scientific and Applied Accounting, ▪ ISSN 1983-8611 ▪ São Paulo ▪ v.17, n.2 ▪ p. 022-033 ▪ May. / Aug. 2024
ASAA
▪ DOI: 10.14392/asaa.2024170202

EVA and EBITDA: How Such Metrics Can Help in The Investment Decision-Making Process

Diogo Teixeira Gaspar Neto[1], Talles Vianna Brugni[2], Fernando Caio Galdi[3], Juliana Costa Ribeiro Prates[4]

[1, 2 e 3] FUCAPE Business School, Vitória, Espírito Santo, Brasil.
[4] Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brasil.

[1]diogotgn@yahoo.com.br
[2]tallesbrugni@fucape.br
[3]fernando.galdi@fucape.br
[4]julianacrprates@gmail.com

Edited by:
Moacir Manoel Rodrigues Junior

Abstract

Objective: EBITDA is the most widely disclosed non-accounting metric in reference forms and tends to be the most used by analysts. However, EVA is little publicized, despite its qualitative superiority and well-founded theoretical framework. Therefore, it was verified whether EBITDA can better explain the stock returns of Brazilian companies listed on B³. Employing two hypothetical portfolios, it was also verified which decision reference is more efficient and delivers a higher shareholder return, whether portfolios based on the companies' EVA or portfolios based on the companies' EBITDA.
Method: The analysis is based on data from the companies listed on B³ from 2010 to 2022, collected from the Economatica® database. Through panel data regressions the study hypotheses were tested. Two hypothetical portfolios were built based on firms' EBITDA and EVA, to empirically verify which of the two indicators is the most efficient in terms of generating investors' returns.
Results: Results indicate that EBITDA better explains the firm's return on the Brazilian stock market than EVA. Conversely, the portfolio built based on EVA obtained a higher return over the period studied.
Contributions: A comparative study of the explanatory power of both metrics in Brazil is relevant to the transformation experienced in the Brazilian capital market. Moreover, evaluating the explanatory power between them helps existing and potential investors to make their investment decisions.

Keywords:EVA; EBITDA; Explanatory power; Stock return.

How to cite:

Gaspar Neto, D. T., Brugni, T. V., Galdi, F. C., & Prates, J. C. R. (2024). EVA and EBITDA: How Such Metrics Can Help in The Investment Decision-Making Process. Advances in Scientific and Applied Accounting, 17(2), 009–021/022. https://doi.org/10.14392/asaa.2024170202

Submitted: 14 April 2023
Revisions required on: 30 December 2023
Accepted: 22 March 2024

Introduction

The analysis of financial statements identifies relevant aspects of the investment decision-making process. One of the objectives is to assess the company's value through the accounting data provided by these statements (Ou & Penman, 1989). According to Penman (1998), there is a wide variety of valuation techniques and the two most used are the discounted cash flow model and the residual income model.

The discounted cash flow model is the most widely used to assess firm value, and Earnings Before Interest, Tax, Depreciation, and Amortization (EBITDA) can be used as a starting point (Cunha et al.,2014).

The residual profit concept was also remodeled through the creation of the Economic Value Added (EVA) by Stern Stewart & Company (Young,1999). EVA differs from traditional performance indicators such as Return on Equity (ROE) or Return on Assets (ROA) because it is a residual income that has been discounted from all costs: cost of debt and cost of equity. In other words, the cost of capital employed at a rate inherent to the companies' business risk compensates investors (Stewart, 1994).

EBITDA is the exact opposite of EVA since EBITDA does not consider the cost of debt and the cost of equity. Besides, EBITDA is measured before interest, taxes, depreciation, and amortization which can provide a misleading evaluation (Stewart, 2019). Nevertheless, EBITDA is a metric widely used by managers, investors, and other stakeholders, for valuation purposes, debt contracting, and executive compensation (Rozenbaum, 2019).

In Brazil, the Securities and Exchange Commission (CVM) created Instruction No. 527/12 to standardize the calculation of EBITDA due to its indiscriminate use and several different calculation methodologies. KPMG's research (2016) ratified this fact, showing that EBITDA was the most widely disclosed non-accountable measure in reference forms in 2016. This shows the importance attributed to EBITDA by analysts, investors, and creditors in Brazil.

For the Australian stock market, Davern et al. (2019) also identified that EBITDA is a widely used metric. They found that the EBITDA value relevance (57%) is higher than that of net income (52%), EBIT (54%), and operating cash flow (49%). However, according to Stewart (2019), EBITDA is less correlated to the market value added (MVA). They found that EBITDA explains only 9% of changes in MVA while EVA explains 22% of these variations for Russell 3000 companies.

Therefore, given the fact that EBITDA seems to be a unanimous metric among analysts, creditors, and investors for companies' economic and financial analysis and considering the EVA theoretical and conceptual superiority over it, this study aims to answer the following research question: Which is the best indicator, between EVA and EBITDA, to explain the stock returns of Brazilian companies? Thus, this paper aims to verify whether EBITDA is better able to explain the stock returns of Brazilian companies listed on the Brazilian stock exchange (B^3) than EVA.

This research empirically verifies whether the metrics used in this study are useful for investors in the Brazilian stock market. The buy-and-hold investment strategy is used to compare the returns of the two portfolios. This strategy aims to obtain long-term returns bought in the same stock's portfolio (Hui & Yam, 2014; Yoshinaga & Rocco, 2020). Thus, two portfolios were created. One of them is composed of the companies' shares that generated the highest value, companies with the highest standardized EVA per revenue. The second portfolio contains the companies with the highest standardized EBITDA per revenue during the sample period.

This study is relevant as EVA is shown to be superior to other metrics such as EBITDA (Stewart, 2019). However, most of the previous studies reviewed (discussed in section 2.2.1) have assessed the explanatory power of EVA in comparison to other various market metrics, except for EBITDA. Therefore, it is critical to investigate this topic since EBITDA tends to be the indicator most used by the market (Rozenbaum, 2019; Davern et al., 2019).

Facing this dilemma, a comparative study of the explanatory power of both metrics in Brazil is relevant due to the economic peculiarities that emerging market economies have like political risk, economic risk, and financial risk. In addition, there has been a significant increase in new investors in the Brazilian stock market lately. Therefore, the primary contribution of this research is to evaluate the explanatory power between EBITDA and EVA to help existing and potential investors make their decisions.

2 Literature Review

2.1 Value Relevance

The approach to the explanatory power of accounting information is known as value relevance. Accounting amounts are considered value-relevant when they have a significant association with equity market values. This accounting amount should reflect the information that is relevant to the investors who assess these companies (Barth et al., 2001). According to Barth's et al. (2023), value relevance tests aggregate the relevance and faithful representation of items, which are two fundamental stated qualitative characteristics of useful financial information.

Value relevance is closely associated with accounting information quality. According to Barth et al. (2008), companies with higher-quality accounting information tend

to have a lower level of earnings management, timelier loss recognition, and greater value relevance. Therefore, the higher the accounting information quality, the more value relevant it will be and, therefore, the greater the explanatory power about these companies' market value.

The convergence of international accounting standards in Brazil has fostered several studies to assess the impact on accounting information quality. Edvaldo (2018) found that there was an increase in accounting information relevance after the IFRS adoption in Brazil. Additionally, foreign investments in the Brazilian stock market increased due to the IFRS adoption. Cavalcante and Santos (2014) and Eng, Figueiredo, and Lin (2019) show that the IFRS adoption in Brazil increased the net profit value relevance. In other words, it increased the relationship between the profit net explanatory power with the companies' market value or the share price.

Considering that EVA and EBITDA are derived from accounting figures, this study focuses on data from the change in accounting standards in Brazil, therefore after the full adoption of IFRS in 2010. Thus, the explanatory power of these metrics will not be influenced by the change in accounting standards.

2.2 The financial metrics role in capital markets

Ball and Brown (1968) and Beaver (1968) were the forerunners on value relevance. They investigated whether accounting data could explain firms' stock prices and whether this accounting information was able to predict earnings for future periods. Later came several studies, such as Abarbanell and Bushee (1997) and Piotroski (2000) who also through accounting information checked the relationship with stock prices to help construct a stock portfolio that would generate abnormal returns.

Abarbanell and Bushee (1997) evaluated how fundamental analysis affects the market participants' decisions. The approach is similar to that of Lev and Thiagarajan (1993), however, the authors also verified the relationship between the financial variables and the analysts' forecast regarding the future change in profits. Nine were the financial variables studied: inventories, accounts receivable, Capital Expenditures (CAPEX), gross margin, selling and administrative expenses, effective tax rate, LIFO earnings, audit qualification, and sales per employee. The authors concluded that part of the variables could explain only long-term profit growth and that analysts' forecasts do not fully capture the information contained in the accounting values and indicators.

Piotroski (2000) showed that the analysis based on the financial statements as an investment strategy can increase the portfolio return with a high book-to-market ratio. To choose the best high-book-to-market ratio companies, an aggregate signal measure called F_SCORE was created, composed of the sum of nine binary variables that cover the profitability, capital structure, and the companies' operational efficiency. Companies with F_SCORE between 8 and 9 were considered winners, while firms with F_SCORE between 0 and 1 were considered losers. The result obtained showed that a high book-to-market ratio composed of winning companies has an average annual return greater than, at least, 7.5% about a high book-to-market ratio portfolio without segregation between winners and losers.

Walkshäusl (2020) revisited Piotroski's research and found that companies with high F_SCORE tend to perform better than those with low F_SCORE in non-US developed countries and emerging markets. The study also found that this metric can predict returns effectively for all company sizes, even after considering factors such as book-to-market, momentum, operating profitability, and investment.

2.2.1 Economic Value Added – EVA

EVA is a performance metric that measures the actual wealth generated by the company for its shareholders. It is the actual economic profit, that is, the residual income remaining after deducting the cost of all capital invested in the company to generate operating profit at a rate that expresses the business risk (Stewart, 1994). The Net operating profit after tax (NOPAT) is the result generated from the companies' main business operations, as it is based on the operating profit after tax (Stewart, 2013).

Capital is the total amount of money invested in the company by creditors and shareholders, in assets associated with the company's core business (Stewart, 2013). There are two approaches to its calculation: the operational approach and the financing approach. The first is formulated by the sum of the company's cash except for cash equivalents, working capital requirement, and fixed assets. The second, used in this paper, is the subtraction between total assets and short-term non-interest-bearing liabilities (O'Byrne & Young, 2001).

The capital cost is divided into two: the cost of debt and the cost of equity. The first refers to the cost of debt with creditors and is calculated based on the rates charged on loans and financing taken by the company. The second is the opportunity cost, the minimum remuneration required by the investor compared to another investment of similar risk. For its calculation, the Capital Asset Pricing Model (CAPM) by Sharpe (1964) and Lintner (1965) was used. Then, the total capital cost was calculated by weighing both costs, that is, calculating the Weighted Average Cost of Capital (WACC). It represents the opportunity cost that reflects expectations of future returns needed to compensate investors for risks assumed (Beranek, 1975).

Multiplying the weighted average cost of capital and the

capital invested by the company gives the capital charge. The capital charge when deducted from NOPAT represents the actual value created by the company, the EVA. When NOPAT is greater than the capital charge, it means that value has been created for shareholders (Stewart, 2013).

EVA's distinctive theoretical framework has led several researchers to evaluate its explanatory power concerning stock returns, compared to other metrics. According to Behera (2021), EVA gained popularity in the 1990s when companies like Coca-Cola, AT&T, Chrysler, Quaker Oats, and Scott Paper claimed that there is a stronger association with stock return. Research on this topic began in the 1990s with O'Byrne (1996) who evaluated the explanatory power of EVA, NOPAT, and Free Cash Flow (FCF) on firm value. The study analyzed the performance of US firms over a decade, from 1983 to 1993. Results revealed that EVA was the most predictive metric among those examined.

Additionally, Biddle et al. (1997) analyzed the EVA explanatory power and other metrics such as Residual Income (RI), Operating Cash Flow (OCF), and Earnings Before Extraordinary Items (EBEI) on annual stock returns. They also explored a sample of U.S. firms over the period 1984 to 1993 but their results indicated that EBEI was the most powerful explanatory metric.

In the 2000s, Feltham et al. (2004) conducted three trials. The first one replicated the study by Biddle et al. (1997) using the same metrics and the same period but using a different sample. The result indicated EVA and RI as the metrics that best explained stock returns. The second test comprised a different period, from 1995 to 1999. They found different results, in which RI had the higher explanatory power. The sample from the third test was composed of Canadian companies from 1991 to 1998. EVA had the highest explanatory power resulting from the test, with a power far superior to the other metrics. According to Feltham et al. (2004), EVA's superiority in the Canadian capital market is explained, partly, by the difference between American and Canadian accounting standards.

Stewart (2019) provided a recent analysis of the EVA explanatory power relative to firms' market value added (MVA) and EBITDA. The analysis focused on a sample of firms in the Russell 3000 index and a period between the index's inception date (1984) to March 2019. The study was conducted in two different ways. Joint analysis with all the companies in the sample and separately by sectors. For the first test, the author found that EBITDA explains 9% of the changes in firm value, while EVA explains 22%. In the second test, the EBITDA average explanatory power across industries reached 38% and EVA 57% on average.

Stewart's (2019) study showed that while EBITDA is a widely used metric in the financial market, it does not necessarily better explain the variation in MVA in U.S. firms. However, other studies on EBITDA have shown unexpected results.

2.2.2 Earnings Before Interest, Taxes, Depreciation, and Amortization – EBITDA

While EVA is measured after taxes, after setting aside depreciation and amortization as a proxy for the cash needed to replenish wasting assets, and after ensuring that all investors, lenders as well as shareholders, are rewarded with competitive returns on their capital, EBITDA is different (Stewart, 2019).

According to Stewart (2019), EBITDA is only an operating income measure that does not consider the capital needed to generate it. Therefore, the easiest way to increase EBITDA is to invest more capital even if this additional investment does not generate a return greater than or equal to the current one. Thus, EBITDA is not comparable with the return on capital measures.

In addition, EBITDA is distorted by accounting rules that do not reflect true economic value. Companies that have high research and development expenses are initially penalized with lower EBITDA, although it is known that in the future they may benefit from these expenses. However, due to the adjustments inherent in the EVA, these expenses are capitalized and amortized over their useful life, providing a better economic sense to the operation. Finally, tax benefits generated on behalf of the company are not accounted for by EBITDA because its calculation methodology is pre-tax (Stewart, 2019).

Regardless of its weaknesses, EBITDA is one of the most widely used metrics by analysts to assess a company's ability to generate cash flow. In addition, it is used to make forecasts in valuation models, in which cash flow generation is one of the main assumptions. It is also commonly used for valuation through multiples (Macedo et al., 2012). In their study, Liu and Zhang (2020) analyzed a significant event in the history of companies, i.e., initial public offerings (IPOs). Through a sample of 300 US-based IPO firms from 2009 to 2013, they found that EBITDA and adjusted EBITDA are the most reported non-GAAP (Generally Accepted Accounting Principles) measures.

Davern et al. (2019) studied the financial statements' relevance for the valuation process of Australian companies from 1992 to 2015. They interviewed investors, regulators, and auditors to analyze how financial statements are used in investment decisions. The authors identified that financial statements are relevant to users, however, alternative sources of financial information, such as non-GAAP metrics, specifically EBITDA and EBIT, play an important role in this decision-making process. Respondents said that non-GAAP financial metrics are often used to help predict the companies' future performance. They also stated that these metrics help to predict future cash flow and profit better than GAAP metrics. One of the interviewees affirmed that EBITDA should be the metric that best reflects the companies' prospective future.

When analyzing the value relevance of non-GAAP metrics, Davern et al. (2019) obtained interesting results. First, comparing EBITDA with net profit, they identified that the first explains 57% on average of the variation in companies' share prices, while the net profit explains 52%. The EBITDA value relevance was also higher than EBIT (54%) and of operating cash flow (49%). These results confirm the high explanatory power of EBITDA on stock prices in the Australian market.

Due to the EBITDA widespread use and disclosure in Brazil through several different calculation methodologies, the CVM, in 2012, created Instruction No. 527/12. Its purpose was to make EBITDA more understandable and comparable among companies. Thus, the CVM standardized the EBITDA calculation (CVM, 2012).

This preference for EBITDA in the Brazilian market was tested by KPMG (2016) in a universe of 236 companies. The study showed that among the financial information disclosed in the Reference Form, the most used non-accountable measure in 2016, was EBITDA, and then the adjusted EBITDA (see Figure 1). Moreover, in 2015 EBITDA had already been the most used non-accounting measure.

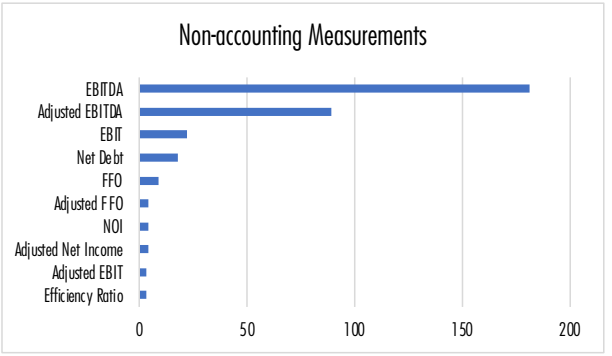

Figure 1. Non-accounting measurements.
Source: Adapted from KPMG (2016, p.6)

This study goes further by proposing the use of the buy-and-hold strategy. It makes it possible to empirically verify whether EVA and EBITDA are really useful for investor decision-making on the Brazilian stock exchange. It also makes it possible to assess the long-term performance of companies on the Brazilian capital market using these indicators.

Considering the mentioned studies on EBITDA and Stewart's (2019) findings, this paper aims to compare the explanatory power of EBITDA (the most recognized metric in the Brazilian market) with EVA, which does not have the same prominence but has a more robust economic-financial theoretical framework. Thus, it is proposed to test the following research hypotheses:

H1: The EBITDA explanatory power is greater than the EVA explanatory power on companies' stock returns.

H2: The portfolio composed by the upper quartile based on companies' EVA has a higher return than the portfolio formed by the upper quartile based on EBITDA.

EBITDA is expected to have a greater explanatory power on stock returns than EVA, considering that EBITDA is the most disclosed metric in financial reports and tends to be the most used in Brazil. However, it is expected that the portfolio based on EVA standardized by revenue will have a greater return than the portfolio based on EBITDA standardized by revenue. This expectation regarding EVA is due to its qualitative superiority and its well-founded theoretical structure, which better represents the companies' performance.

3 Methodology

3.1 Research sample

The data collected comes from the Economatica® database, the explanatory notes, academic websites, and government institutions' websites. These data refer to the shares of active Brazilian companies listed on B3 on 09/11/2023. The initial sample generated 5,135 observations, as can be seen in Table 1.

Table 1. Sample Treatment

All Economatica® companies for the years 2010-2022	Less: companies belonging to the financial sector and related	Less: companies with negative equity	Less: companies with insufficient data to calculate variables	Final Sample
5135	455	419	2479	1782

Source: Elaborated by authors.

However, the final sample counted on 1,782 observations (see Table 1). Some companies were excluded from the sample: i) financial and insurance companies, due to their business model idiosyncrasies and for having a specific accounting treatment with different economic interpretations from the other companies; ii) companies with negative equity; iii) companies that did not present data for the variables used in the study.

The following research procedures were adopted to ensure the results are robust: i) Companies sampled were selected according to the most liquid share class; ii) All variables in the econometric models were winsorized at 1%; iii) The study was carried out between 2010 and 2022. Thus, the effect of accounting improvement due to the change in the accounting standards in Brazil to IFRS in 2010 may not affect the accounting variables' value relevance.

3.2 Model and Analysis Technique

Three econometric models were used to analyze this

study's first hypothesis.

$$lnRet_{i,t}=\alpha_{0}i+\beta_{1}BM_{i,t}+\beta_{2}TAM_{i,t}+\beta_{3}Endiv_{i,t}+\beta_{4}SELIC_{t}+\beta_{5}YCRISIS_{t}+\varepsilon_{i,t} \quad (1)$$

$$lnRet_{i,t}=\alpha_{0i}+\beta_{1}EVA_{i,t}+\gamma_{1}BM_{i},t+\gamma_{2}TAM_{i,t}+\gamma_{3}Endiv_{i,t}+\gamma_{4}SELIC_{t}+\gamma_{5}CRISIS_{t}+\varepsilon_{i,t} \quad (2)$$

$$lnRet_{i,t}=\alpha_{0i}+\beta_{1}EBITDAi,t+\gamma_{1}BM_{i,t}+\gamma_{2}TAM_{it}+\gamma_{3}Endiv_{i,t}+\gamma_{4}SELICt+\gamma_{5}YCRISIS_{t}+\varepsilon_{i,t} \quad (3)$$

Equation 1 is composed of control variables, already been studied by other researchers. They have informative content that can explain the companies' stock returns. Equations 2 and 3 present the EVA and EBITDA analysis respectively. Equation 1 is the reference structure for the construction of both. This structure aims to analyze the incremental information content that EVA and EBITDA generate when inserted into the model individually. The aim is to infer which of these metrics adds greater explanatory power.

Where $LnRet_{i,t}$ refers to the continuous return on the stock of company i in year t; $BM_{i,t}$ refers to the book-to-market ratio of the company i in year t; $TAM_{i,t}$ refers to the natural logarithm of the total assets of a company i in year t; $Endiv_{i,t}$ refers to the ratio between the total gross debt and the total assets of the company i in year t; $SELIC_{t}$ refers the annual average of the SELIC interest rate in year t; $YCRISIS_{t}$ is a dummy variable that assumes value one if the year is 2020 and zero otherwise; $EVA_{i,t}$ refers to the EVA of the company i in year t standardized by the total assets of the company i in year t and $EBITDA_{i,t}$ refers the EBITDA of the company i in year t standardized by the total assets of the company i in year t.

For this study, EVA and EBITDA were standardized by total assets according to Piotroski (2000). The natural logarithm of the stock price at time t divided by the stock price at time t-1 was used to calculate the stock return. Control variables BM, TAM, and SELIC that were used in the study by Galdi and Soares (2011) were included in the calculation. They identified the relationship between DUPONT models and stock returns in the Brazilian market. The control variable Endiv was also included, according to Aliabadi et al. (2013). They checked the relevance of performance variables about stock returns of U.S. and non-U.S. industrial sector companies following the IFRS accounting standard. Lastly, a financial crisis dummy was included in the study to control for the impact of the COVID-19 pandemic on the financial market in 2020.

Vuong's (1989) test was applied to compare the adjusted R^2 of models (2) and (3), following Biddle et al. (1997) and Li (2016). Biddle et al. (1997) and Li (2016) used the Vuong test to verify statistically the difference in the explanatory powers among the metrics used in their studies. To choose the appropriate panel data model, some tests were conducted whose results indicated fixed-effect panel data for all econometric models. Table 2 presents the results.

Table 2. Results of Specification Tests for the Panel Data Models

	Chow Test	Breusch-Pagan (LM) Test	Hausman Test
Models	Prob>F	Prob>chibar2	Prob>chi2
Model (1)	0.0000	0.0000	0.0000
Model (2)	0.0000	0.0000	0.0000
Model (3)	0.0000	0.0000	0.0000

Note. The table shows the Chow, Breusch-Pagan, and Hausman tests. Variables were winsorized (1% in the upper and lower limits).
Source: Elaborated by authors.

Model (1) refers to the benchmark econometric equation, i.e., only composed of the control variables BM, TAM, ENDIV, SELIC, and YCRISIS. Model (2) has the same structure as model (1) plus EVA standardized by total assets in the equation. Model (3) has the same structure as model (1) plus EBITDA standardized by total assets in the equation.

3.2.1 Research variables

In this section, it is presented all research variables. Table 3 shows the dependent, independent, and control variables used in the econometric models as well as the calculation methodology for each of them.

Table 3. Research Variables

Variable	Metric	Classification
LnRet	$Ln\ (P_{i,t}\ /P_{i,t-1})$	Dependent variable
EVA	$\frac{NOPAT - (Capital \times WACC)}{Total\ Assets}$	Independent variable
EBITDA	$\frac{EBITDA}{Total\ Assets}$	Independent variable
BM	$\frac{Equity}{Market\ Capitalization}$	Control variable
TAM	Ln(Total Assets)	Control variable
Endiv	$\frac{Total\ Gross\ Debt}{Total\ Assets}$	Control variable
SELIC	Average annual SELIC rate	Control variable
YCRISIS	YCRISIS = 1, if the year is 2020 And 0 otherwise	Control variable

Source: Elaborated by authors.

The research data was collected from Economatica®. Consolidated equity, total assets, gross debt, and EBITDA were collected from the 4th statement after the previous fiscal closing of each year (4th DAEFA). In addition, the closing price of shares (adjusted for dividends) and market capitalization were collected both on the 1st working day of May of the year after the company's accounting year closing. This date is just after the legal deadline for annual financial statements disclosure in Brazil.

There was no specific treatment for companies that have a year-end closing date other than December 31.

The SELIC rate was obtained from the Central Bank of Brazil (BCB) website and the annual average calculation considered the period between the 1st working day of May of the previous year and the 1st working day of May of the following year. Table 4 presents the variables that comprise the EVA calculation.

Table 4. EVA Variables

Variables	Definition
NOPAT	EBIT-IR-CSLL-Tax benefit
Capital	Total Assets – current liabilities + Short-term loans and financing
WACC	Ke (E/D+E) + Kd (D/D+E) x (1-T)
Kd	Financial Expense / Total Gross Debt
Ke	Rf + β x (Rm - Rf)
E (Equity)	Market Capitalization
D (Debt)	Total net Debt
T	34% tax rate
β_L	β_U x [1 + (D/E x (1 – T))]

Source: Elaborated by authors.

EVA is comprised of NOPAT minus the capital charge, which is the product between capital employed and the WACC rate (Stewart, 2013). To calculate the NOPAT, the EBIT (Earnings Before Interest and Taxes) was used minus taxes and the tax benefit. In terms of taxes, Income Tax (IR) and Social Contribution on Net Income (CSLL) are considered. For tax benefit calculation, it was used the interest expenses with a 34% rate. EBIT, income tax, and CSLL were obtained from the 4th DAEFA, from Economatica®. Interest expenses (financial expenses) were extracted from the companies' explanatory notes of the annual financial statements.

Stewart (2013) suggested some adjustments in NOPAT and Capital to avoid distortion in the measurement of the firm's operating performance. However, no adjustments were made to bring the metrics closer to the operating residual profit concept. Capital was calculated by the financial approach: total assets minus short-term non-financial liabilities (O'Byrne & Young, 2001) and added short-term loans and financing. It must be emphasized that all variables that make up capital were obtained from Economatica®'s 4th DAEFA.

The WACC calculation is based on the weighting of the cost of equity and the cost of third-party capital. The cost of third-party capital (Kd) was calculated through the ratio between interest expenses and total gross debt. Data was extracted, respectively, from the companies' explanatory notes found in the annual financial statements and from Economatica®.

In order to determine the cost of equity (Ke), we utilized the CAPM model. The company's β values from Economatica® as of December 31st of each year were used. For companies that did not have such data, the leveraged β (βL) was used by using the unleveraged and cash-adjusted sectoral β (βu), based on emerging country companies (collected from Professor Damodaran's website). The market portfolio return (Rm) was calculated by the annual return of the S&P 500 using its index data obtained from Economatica®. To calculate the risk-free rate (Rf), the annual average of the 10-year US Treasury bond was used, obtained from the US Treasury website.

To calculate Equity (E) was used market capitalization and to calculate Debt (D) was used the total net debt. Both were collected from Economatica®. For the first, the collection date was December 31, and for the other the 4th DAEFA. To calculate the tax benefit, the tax rate of 34% (T) was applied.

3.2.2 Testing the Buy-and-Hold Strategy

The buy-and-hold strategy consists in forming a stock portfolio to obtain long-term returns (Hui & Yam, 2014). The purpose of testing this strategy is to empirically verify whether the metrics used in this study are useful for investors' decision-making processes in the Brazilian stock market. There are four assumptions for each portfolio composition: The first assumption is that the data taken from the Economatica® database refers to the shares of active Brazilian companies listed on the B3 on 09/11/2023. Companies in the financial and insurance sectors were excluded from this sample, as well as companies with negative shareholders' equity. Companies that did not present data for the variables used in the study were also excluded from the sample.

The second assumption is that EVA and EBITDA follow the same calculation methodology explained previously. The stock return was calculated according to Galdi and Soares (2011), that is, $R_{i,t} = (P_{i,t} - P_{i,t}\text{-}1)/ P_{i,t}\text{-}1$, where $R_{i,t}$ is the return of company i's stock at time t and Pi,t is the price of company i's stock at time t. For the standardization of EVA and EBITDA, it was used the Revenue metric from the Economatica® database (4th DAEFA of each year). The final sample consisted of 1,768 observations.

The third assumption is that the companies were annually ranked in ascending quartile order by standardized EVA (EVA divided by company revenue) and standardized EBITDA (EBITDA divided by company revenue). The last assumption is that two equally weighted portfolios were formed. The first portfolio with the 4th quartile is based on standardized EVA, i.e., 25% of the companies with

the highest standardized EVA, and the second portfolio with the 4th quartile is based on the companies' highest standardized EBITDA.

Additionally, the portfolios were rebalanced annually, that is, each year a new portfolio was formed with the 4th quartile of the companies with the highest standardized EVA and EBITDA in the previous period. The average annual return obtained by the portfolio with the highest standardized EVA and EBITDA were compared using the mean test (t-test) to verify which portfolio achieved the highest return.

4 Results and data analysis

4.1 Descriptive Analysis

The independent variable EVA presented a negative average, and the independent variable EBITDA presented a positive average (see Table 5). Thus, the analyzed Brazilian companies, despite having positive results on average, have destroyed value. The dependent variable average was negative, approximately -0.2%. The LnRet, EVA and BM variables had a standard deviation greater than the mean, so they showed greater variability than the other metrics.

Table 5. Descriptive Statistics

Variable	n	Average	Standard deviation	Min.	percentile 25	Median	percentile 75	Max.
LnRet	1782	-0.017	0.463	-1.451	-0.257	0.016	0.267	1.264
EVA	1782	-0.020	0.158	-0.545	-0.095	-0.003	0.063	0.395
EBITDA	1782	0.103	0.081	-0.165	0.062	0.104	0.149	0.330
BM	1782	1.042	1.064	0.066	0.395	0.699	1.259	6.046
TAM	1782	15.549	1.526	12.028	14.524	15.379	16.520	19.661
Endiv	1782	0.301	0.176	0.009	0.175	0.296	0.411	0.717
SELIC	1782	0.091	0.036	0.021	0.073	0.093	0.135	0.139

Note. winsorized variables (1% at lower and upper bound).
Source: Elaborated by authors.

4.2 Models Results Analysis

Table 6 presents the panel data regression results with a fixed effect for the three econometric models referring to equations (1), (2), and (3).

Table 6. Regression Results

Variables	Regression 1	Regression 2	Regression 3
EVA	-	0.25051***	-
EBITDA	-	-	0.92354***
BM	-0.22694***	-0.21729***	-0.20196***
TAM	-0.17004***	-0.17642***	-0.17723***
Endiv	-0.55862***	-0.52547***	-0.46881***
SELIC	1.13326***	0.53357	1.01521***
YCRISIS	0.52134***	0.49790***	053641***
R^2 Adjusted	0.32324	0.32868	0.33761

Note. Models with unbalanced fixed-effect panel data. Model 1 is the benchmark econometric equation. Model 2 is model 1 including the EVA variable. Model 3 is model 1 including the EBITDA variable. Variables were winsorized (1% at the lower and upper bounds). The R^2 reported indicates the adjusted R^2 of models (1), (2), and (3). The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.
Source: Elaborated by authors.

Equation (1) is only composed of the control variables BM, TAM, ENDIV, SELIC, and YCRISIS. All of them presented statistical significance as expected. The regression explanatory power, or adjusted R^2, is 32.32% about the continuous stock return.

Equation (2) has the same structure as Equation (1) plus EVA standardized by total assets. There is strong statistical evidence that there is a positive relationship between the independent variable EVA and the dependent variable LnRet. Since EVA is a value-creating metric, the higher the EVA, the higher the return on the company's stock. This concept is ratified by its coefficient. There was an increase in the explanatory power after the inclusion of EVA, which was 32.32% before and rose to 32.87%.

Equation (3) has the same structure as model (1) plus the EBITDA standardized by total assets. There is also strong statistical evidence that there is a positive relationship between the independent variable EBITDA and the dependent variable LnRet. It can be inferred that the higher the EBITDA, the higher will be the return on the on the companies' shares. There was an increase in the explanatory power after EBITDA insertion in the model, which before was 32.32% and increased to 33.76%.

To analyze the variables' explanatory power, that is, EVA and EBITDA, the Vuong test (1989) was used to ratify the difference between the adjusted R^2 found in model (2) and model (3). The test was significant at 10% indicating that there is a difference (see Table 7).

Table 7. Vuong Test Result

P> |t|	0.078

Source: Elaborated by authors.

The result is in line with previous expectations regarding hypothesis 1 (H1). EBITDA showed greater explanatory power than EVA. As previously discussed, it was expected that EBITDA would be more relevant to explain the firms' return, considering that this metric is the most used by market agents to make investment decisions in the Brazilian market. These results corroborate KPMG's (2016) study that showed EBITDA was the most widely disclosed non-accountable measure in reference forms in 2015 and 2016. This shows the importance attributed to EBITDA by analysts, investors, and creditors in Brazil. This result also corroborates Davern's et al. (2019) results which analyzed EBITDA value-relevance and found that this widely used metric in investment decisions in the Australian market is higher than other metrics. However, an EBITDA value-relevance higher than EVA diverges from the results of Stewart's (2019) study which found that EBITDA explains only 9% of changes in MVA while EVA explains 22% of these variations for Russell 3000 companies.

To validate the result empirically, it was compared the returns of the two portfolios based on the buy-and-hold investment strategy (Hui & Yam, 2014). Two equally weighted portfolios were used, one with the 4th quartile based on Revenue Standardized EVA, or 25% of the companies with the highest standardized EVA, and the other portfolio with the 4th quartile based on the highest Revenue Standardized EBITDA as described in section 3.2.2.

As previously mentioned, the portfolios were rebalanced annually, so each year a new portfolio was formed with the 4th quartile of the companies with the highest standardized EVA and EBITDA. Table 8 shows the average annual stock return (Ret), calculated according to Galdi and Soares (2011). It shows the period of each share set by quartile in ascending order.

Table 8. Portfolio Returns

	EVA Portfolio				EBITDA Portfolio			
	1° Quartile	2° Quartile	3° Quartile	4° Quartile	1° Quartile	2° Quartile	3° Quartile	4° Quartile
n2010-2022	446	441	443	438	446	441	443	438
Ep2010-2022	-4.8455	-0.1014	0.0334	0.5216	-2.2639	0.1394	0.2229	0.6392
Ret2010-2022	0.2362	0.0805	0.1434	0.2414	-0.0818	0.0999	0.5373	0.1472

Note. The companies were ranked annually in ascending order, from lowest to highest, in quartiles by standardized EVA (EVA divided by company revenue) and standardized EBITDA (EBITDA divided by company revenue).
Source: Elaborated by authors.

The 1st quartile is formed by the companies with the lowest standardized EVA and the lowest standardized EBITDA, and the 4th quartile, the object of interest in this study, with the highest standardized EVA and the highest standardized EBITDA. The number of observations is represented by n, followed by the respective period, and shows the number of companies in each quartile.

The standardized EVA and EBITDA are represented by Ep, followed by the respective period, and the values in the 1st quartile refer to the 25th percentile (25%) of each portfolio, in the 2nd quartile to the 50th percentile (50%), in the 3rd quartile to the 75th percentile (75%) and the 4th quartile to the 99th percentile (99%).

The average annual return obtained by the portfolio formed by the companies with the highest standardized EVA in each year from 2010 to 2022 was 24.14% p.a. (per annum), 9.42 percentage points higher than the portfolio formed by the companies with the highest standardized EBITDA, which obtained 14.72% p.a.

A mean test was conducted to confirm the differences between the portfolio returns. The results show that there is a statistically significant difference between them, suggesting that the portfolio with companies with EVA in the top quartile has statistically superior return levels, at 5% significance, compared to the portfolio composed of companies with EBITDA in the top quartile (see Table 9). This finding is in line with expectations regarding hypothesis 2 (H2).

Table 9. Mean test results.

Pr (T < t)	0.9864
Pr (|T| > |t|)	0.0272
Pr (T > t)	0.0136

Source: Elaborated by authors.

EBITDA, being a widespread metric and probably widely used by investors, tends to better explain the stock returns fluctuation over time. However, for a buy-and-hold strategy, the standardized EBITDA portfolio formation strategy was not as efficient as the standardized EVA strategy. This result can be explained by the EVA theoretical framework. According to Stewart (2019), EVA is measured after taxes, after setting aside depreciation and amortization as a proxy for the cash needed to replenish wasting assets, and after ensuring that all investors, lenders as well as shareholders, are rewarded with competitive returns on their capital, i.e., its calculation includes the total cost of capital. In contrast, EBITDA is only an operating income measure that does not consider the capital needed to generate it and is not comparable with the return on capital measures.

This study is relevant because, unlike previous studies, it shows that theory and empiricism complement each other. The buy-and-hold investment strategy, used to compare the returns of two portfolios, showed that empirically, EVA can be more useful to help market agents in their decision-making when buying assets, more specifically company shares. Despite his explanatory power being lower than EBITDA.

The difference between the results of the explanatory power and the buy-and-hold strategy can be explained through the behavior of each quartile return. The EBITDA returns show to be more coherent because the 1st quartile, which comprises the companies with the worst standardized EBITDA, obtained a negative annual average return. Whereas the 1st quartile, comprising the companies with the worst standardized EVA, obtained a positive average annual return.

A possible explanation for these results is the companies' recovery that had bad results from previous periods. As EVA is a value-creating metric, it accounts for the total cost of capital and takes some time to capture the companies' recovery. EBITDA, on the other hand, is a very sensitive metric, because it is a proxy for companies' operating income. Thus, companies that recover from negative operating results can obtain positive returns even with negative net income or negative EVA.

A strategy that combines both EVA and EBITDA can prove to be advantageous for several users. For investors, for instance, one can buy shares of companies that have highly standardized EVA and sell shares of companies with poorly standardized EBITDA. The average return obtained from the portfolio with the most standardized EVA was 24.14% p.a. over the period between 2010 and 2022. Whereas the average return for the portfolio with the lowest standardized EBITDA was -8.18% p.a. for the same period.

5 Conclusions

This study aimed to verify whether EBITDA can better explain the return on shares of companies listed on the Brazilian Stock Exchange (B^3) when compared to EVA. Through a buy-and-hold strategy, it was empirically verified whether EVA and EBITDA are really useful for investor decision-making on the Brazilian stock exchange. This strategy also made it possible to assess the long-term performance of companies on the Brazilian capital market using these indicators.

EBITDA showed significant statistical evidence that its incremental explanatory power was higher than EVA. The results were consistent with the expectations of hypothesis 1 (H1), since EBITDA tends to be the most widely used metric in Brazil. Therefore, H1 was confirmed.

This result corroborates KPMG's (2016) study that showed EBITDA was the most widely disclosed non-accountable measure in reference forms in 2015 and 2016 and also corroborates Davern's et al. (2019) results which analyzed EBITDA value relevance in the Australian market. However, an EBITDA value relevance higher than EVA diverges from the results of Stewart's (2019) study which found EVA showed higher explanatory power than EBITDA.

Furthermore, it was empirically verified whether these metrics are useful for decision-making by investors in the Brazilian stock market. The portfolio based on standardized EVA obtained a return of 24.14% p.a. against a return of 14.72% p.a. for the portfolio based on the highest standardized EBITDA. The results revealed that investing in the Brazilian stock market based on EVA outperforms EBITDA, confirming hypothesis 2 (H2).

EVA is little publicized but has a qualitative superiority and a well-founded theoretical framework, i.e., according to Stewart (1994), it is a residual income that has been discounted from all costs: cost of debt and cost of equity. In contrast, EBITDA is only an operating income measure that does not consider the capital needed to generate it and is not comparable with the return on capital measures (Stewart, 2019).

In general, it was found that EBITDA best explains the fluctuation of companies' returns and best signals which companies are undergoing a turnaround, which have the worst operating performance and the worst returns on average. On the other hand, EVA is an efficient metric for determining which companies have the best market performance and average returns. Therefore, the main implication of these results is that the combination of both indicators can be essential for investors, analysts, and other users of accounting information to make informed decisions. In the capital markets, for example, buying companies with a higher standardized EVA and selling companies with a lower standardized EBITDA to obtain higher returns.

This study adds to the existing literature on accounting and has implications for the financial market. Unlike previous studies, the buy-and-hold investment strategy was used to compare the returns of two portfolios, besides analyzing their explanatory power. The results may help market agents in their decisions to purchase assets, specifically company shares.

References

Abarbanell, J. S., & Bushee, B. J. (1997). Fundamental Analysis, Future Earnings, and Stock Prices. Journal

of Accounting Research, 35(1), 1-24. https://doi.org/10.2307/2491464

Aliabadi, S., Dorestani, A. & Balsara, N. (2013). The Most Value Relevant Accounting Performance Measure by Industry. Journal of Accounting and Finance, 13(1), 22-34. https://doi.org/10.18374/JABE-13-1.3

Ball, R., & Brown, P. (1968). An Empirical Evaluation of Accounting Income Numbers. Journal of Accounting Research, 6, 159-177. https://doi.org/10.2307/2490232

Banco Central do Brasil. (2023, setembro 10). Taxa de Juros SELIC. Recuperado de https://www.bcb.gov.br/htms/SELIC/SELICdiarios.asp?frame=1.

Barth, M. E., Beaver, W. H., & Landsman, W. R. (2001). The relevance of the value literature for financial accounting standard setting: another view. Journal of Accounting and Economics, 31(1-3), 77-104. https://doi.org/10.1016/S0165-4101(01)00019-2

Barth, M. E., Landsman, W. R., & Lang, M. H. (2008). International Accounting Standards and Accounting Quality. Journal of Accounting Research, 46(3), 467-498. https://doi.org/10.1111/j.1475-679X.2008.00287.x

Barth, M. E., Li, K., & McClure, C. G. (2023). Evolution in Value Relevance of Accounting Information. The Accounting Review 98(1):1-28. https://dx.doi.org/10.2139/ssrn.2933197

Beaver, W. (1968). The information Content of Annual Earnings Announcements. Journal of Accounting Research, 6, 67-92. https://doi.org/10.2307/2490070

Behera, S. (2021). Does EVA Valuation Model Outperform Earnings Valuation Model in Explaining Market Value Equity?. International Journal of Finance & Economics 26:6312-6337. https://doi.org/10.1002/ijfe.2121

Beranek, W. (1975). The Cost of Capital, Capital Budgeting, and the Maximization of Shareholder Wealth. Journal of Financial and Quantitative Analysis, 10(1), 1-20. https://doi.org/10.2307/2330314

Biddle, G. C., Bowen, R. M., & Wallace, J. S. (1997). Does EVA™ beat earnings? Evidence on associations with stock returns and firm values. Journal of Accounting and Economics, 24, 301-336. https://doi.org/10.1016/S0165-4101(98)00010-X

Cavalcante, P. R. N., & Santos, M. A. C. (2014). O Efeito da Adoção dos IFRS sobre a Relevância Informacional do Lucro Contábil no Brasil. Revista de Contabilidade e Finanças, 25(66), 228-241.

Cunha, M. F., Martins, E. & Neto, A. A. (2014). Avaliação de Empresas no Brasil pelo Fluxo de Caixa Descontado: Evidências Empíricas sob o ponto de Vista dos Direcionadores de Valor nas Ofertas Públicas de Aquisição de Ações. Revista de Administração, 49(2), 251-266. https://doi.org/10.5700/rausp1144

Davern, M., Gyles, N., Hanlon, D., & Pinnuck, M. (2019). Is Financial Reporting Still Useful? Australia Evidence. Journal of Accounting, Finance and Business Studies, 55(1), 237-272. https://doi.org/10.1111/abac.12152

Edvaldo, D. S. F. (2018). A Adoção das Normas Internacionais de Contabilidade e os Investimentos Estrangeiros no Mercado Brasileiro (Dissertação de mestrado). Fundação Instituto Capixaba de Pesquisas em Contabilidade, Economia e Finanças – FUCAPE, Vitória, ES, Brasil. Recuperado em 08 de dezembro, 2019, de http://www.fucape.br/_public/producao_cientifica/8/Disserta%C3%A7%C3%A3o%20-%20Edvaldo%20Dias%20da%20Silva%20Filho.pdf

Eng, L. L., Figueiredo, J. N., & Lin, J. (2019). International Financial Reporting Standards adoption and information quality: Evidence from Brazil. Journal of International Financial Management & Accounting, 30, 5-29.

Feltham, G. D., Isaac, G. E., Mbagwu, C., & Vaidyanathan, G. (2004). Perhaps EVA™ does beat earnings – Revisiting previous evidence. Journal of Applied Corporate Finance, 16(1), 83-88. https://doi.org/10.1111/j.1745-6622.2004.tb00598.x

Galdi, F. C., Soares E. R. (2011). Relação dos modelos DuPont com o retorno das ações no mercado brasileiro. Revista de Contabilidade e Finanças, 22(57), 279-298. https://doi.org/10.1590/S1519-70772011000300004

Hui, E. C. M., & Yam, S. P. (2014). Can We Beat the "Buy-and-Hold" Strategy? Analysis of European and American Securitized Real State Indices. International Journal of Strategic Property Management, 18(1), 28-37. https://doi.org/10.3846/1648715X.2013.862190

Instrução CVM nº 527, de 4 de outubro de 2012. Dispõe sobre a divulgação voluntária de informações de natureza não contábil denominadas LAJIDA e LAJIR. Recuperado de http://www.cvm.gov.br/legislacao/instrucoes/inst527.html

KPMG (2016). Divulgações Contábeis 2016: Um estudo sobre as políticas contábeis críticas, medições não contábeis e as modificações no relatório do auditor independente. Recuperado de https://assets.kpmg/content/dam/kpmg/br/pdf/2016/11/br-divulgacoes-contabeis-outubro-2016.pdf.

Lev, B., & Thiagarajan, S. R. (1993). Fundamental Information Analysis. Journal of Accounting Research,

31(2), 190-215. https://doi.org/10.2307/2491270

Li, N. (2016). Performance Measures in Earnings-Based Financial Covenants in Debt Contracts. Journal of Accounting Research, 54(4), 1149-1186. https://doi.org/10.1111/1475-679X.12125

Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stocks portfolios and capital budgets. Review of Economics and Statistics, 47(1), 13-37. https://doi.org/10.2307/1924119

Liu, B., & Zhang, D. (2020). The Use of Non-GAAP Measures in Initial Public Offerings. Journal of Corporate Accounting & Finance, 31:60-72. https://doi.org/10.1002/jcaf.22463

Macedo, M. A. S., Machado, M. R., Machado, M. A. V., & Murcia, F. D. (2012). Análise da Relevância do EBITDA versus Fluxo de Caixa Operacional no Mercado de Capitais Brasileiro. Advances in Scientific and Applied Accounting, 5(1), 99-130. https://doi.org/10.14392/ASAA/2012050105

New York University (2023, setembro 10). Betas by Sector (US). Recuperado de http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html

O'Byrne, S. F., & Young, D. S. (2001). EVA® and Value-Based Management. Estados Unidos: McGraw-Hill.

O'Byrne, S. F. (1996). EVA™ and Market Value. Journal of Applied Corporate Finance, 9(1), 116-125. https://doi.org/10.1111/j.1745-6622.1996.tb00109.x

Ou, J. A., & Penman, S. H. (1989). Financial Statement Analysis and the Prediction of Stock Returns. Journal of Accounting and Economics, 11, 295-329. https://doi.org/10.1016/0165-4101(89)90017-7

Penman, S. H. (1998). A Synthesis of Equity Valuation Techniques and the Terminal Value Calculation for the Dividend Discount Model. Review of Accounting Studies, 2, 303-323. https://doi.org/10.1023/A:1023688704798

Piotroski, J. D. (2000). Value Investing: The use of Historical Financial Statement Information to Separate Winners from Losers. Journal of Accounting Research, 38, 1-41. https://doi.org/10.2307/2672906

Rozenbaum, O. (2019). EBITDA and Managers' Investment and Leverage Choices. Contemporary Accounting Research, 36(1), 103-117. https://doi.org/10.1111/1911-3846.12387

Sharpe, W. F. (1964). Capital asset prices: a theory of market equilibrium under conditions of risk. Journal of Finance, 19(7), 425-442. https://doi.org/10.1111/j.1540-6261.1964.tb02865.x

Stewart, G. B. (2013). Best-Practice EVA: The Definitive Guide to Measuring and Maximizing Shareholder Value. New Jersey, USA: John Wiley & Sons, Inc. https://doi.org/10.1002/9781119204893

Stewart, G. B. (2019). EVA, Not EBITDA: A New Financial Paradigm for Private Equity Firms. Journal of Applied Corporate Finance, 31(3), 513-545. https://doi.org/10.1111/jacf.12365

Stewart, G. B. (1994). EVATM, Fact, and Fantasy. Journal of Applied Corporate Finance, 7(2), 71-84. https://doi.org/10.1111/j.1745-6622.1994.tb00406.x

U.S. Department of the Treasury. (2023, setembro 10). Daily Treasury Yield Curve Rates. Recuperado de https://home.treasury.gov/policy-issues/financing-the-government/interest-rate-statistics

Vuong, Q. H. (1989). Likelihood Ratio Tests for Model Selection and Non-Nested Hypotheses. Econometrica, 57(2), 307-333. https://doi.org/10.2307/1912557

Walkshäusl, C. (2020). Piotroski's FSCORE: International Evidence. Journal of Asset Management (2020) 21:106–118. https://doi.org/10.1057/s41260-020-00157-2

Yoshinaga, C., & Rocco, F. (2020). Investor Attention: Can Google Search Volumes Predict Stock Returns?. Brazilian Business Review, 17(5), 523–539. https://doi.org/10.15728/bbr.2020.17.5.3