Journal of Economics, Finance and Accounting Studies (JEFAS)
ISSN: 2709-0809
DOI: 10.32996/jefas
Journal Homepage: www.al-kindipublisher.com/index.php/jefas

JEFAS
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

The Efficient Market Hypothesis as an Extension of Neoclassical Theory: A Theoretical and Empirical Critique

Dr. Ricardo da Costa Nunes
Ministry of Finance, Brasília, Brazil
Corresponding Author: Ricardo Nunes, **E-mail**: rcrdnns11@gmail.com

| ABSTRACT

This article critically analyses the Efficient Market Hypothesis (EMH), proposed by Eugene Fama in 1970, as an extension of the principles of the neoclassical general equilibrium model to financial markets. The EMH asserts that asset prices fully reflect all available information, making it impossible to systematically achieve abnormal returns. The study begins by presenting the three forms of market efficiency—weak, semi-strong, and strong—and their implications for investment strategies. It then reviews theoretical and heterodox criticisms of the EMH, drawing on behavioural finance, historical institutionalism, and neo-Marxism to challenge the assumption of neutrality and informational symmetry in markets. Methodologically, the article combines conceptual analysis with empirical testing based on monthly data from the Brazilian stock market (Ibovespa) over the period 1997–2025. Four hypotheses were tested to assess the weak form of the EMH, using statistical techniques such as ANOVA, autocorrelation tests, variance ratio, and unit root tests. The results support the absence of seasonal effects and serial autocorrelation, as well as adherence to the random walk model and ergodicity. These findings suggest partial support for weak-form efficiency in the Brazilian context. This study contributes to a more comprehensive understanding of market efficiency by integrating theoretical critique with empirical analysis and by highlighting the importance of informational and behavioural imperfections in shaping asset price dynamics.
.

| KEYWORDS

Efficient Market Hypothesis; Neoclassical Economics; Behavioural Finance; Brazilian Stock Market; Informational Asymmetry.

| ARTICLE INFORMATION

ACCEPTED: 01 July 2025 **PUBLISHED:** 21 July 2025 **DOI:** 10.32996/jefas.2025.7.4.9

1. Introduction

The Efficient Market Hypothesis (EMH), proposed by Eugene Fama in 1970, has become a cornerstone of modern financial theory. The behaviour of asset prices has been the subject of intense academic research over the past decades, as scholars have sought to understand how markets process information. It posits that financial asset prices at all times reflect all available information, rendering it impossible to consistently achieve abnormal returns. Under this logic, when prices fully reflect the available information, the market is considered efficient. Put differently, the EMH implies that investors need not worry about whether a stock is overpriced or underpriced—its market price already incorporates all known information and therefore reflects its fair value. This hypothesis represents a direct application of neoclassical principles such as agent rationality, utility maximisation and self-regulating markets to the domain of financial assets.

Modern Portfolio Theory was developed by Harry Markowitz in 1952. It provides a mathematical model for diversification and the risk–return balance. The EMH is conceptually aligned with this theory. Both are grounded in the neoclassical framework. They assume rational agents and markets that move towards equilibrium. In efficient markets, as the EMH suggests, diversification is not only sufficient, it is rational. There is no need to search for under- or overvalued assets if prices already reflect all available information.

Investors monitor news and conduct analyses to estimate the true value of assets. If the market price is above this estimate, they sell; if it is below, they buy. Prices result from supply and demand. This means that, at the market price, the number of shares available for sale matches exactly the number of shares buyers wish to purchase. In other words, the number of investors who believe the asset is overvalued is balanced by those who believe it is undervalued. Theoretically, the market exhibits informational efficiency, as prices incorporate agents' expectations and the collective interpretation of available data.

However, although the EMH is theoretically sophisticated and has had a major influence on academic thinking, as evidenced by the Nobel Prize in Economic Sciences awarded to Eugene Fama in 2013, it was not well received by financial professionals on Wall Street, particularly in its semi-strong and strong forms. By questioning the effectiveness of both technical and fundamental analysis, the EMH directly challenged the core methods and strategies employed by analysts, traders and active fund managers, whose income often depends on selling investment advice and portfolio management services. One possible explanation for this resistance is that these professionals, being directly affected, may not have assessed the theory impartially, as its premises challenged their financial interests. This resistance highlights the practical implications of the hypothesis and anticipates the broader debate surrounding its theoretical and empirical validity.

Despite the criticisms it has received, the EMH remains grounded in a set of internally consistent principles. Its theoretical structure is aligned with the logic underpinning neoclassical general equilibrium models, both of which are based on the assumption that markets tend towards equilibrium through automatic price adjustments. In financial markets, new information plays a central role in shaping expectations and guiding agents' decisions in a manner analogous to the function of relative prices in goods and factor markets. Even when not explicitly disclosed, the actions of market participants convey signals that assist other investors in the formation of prices. These signals may be obtained through discourse analysis of executives, patterns of share purchases, among other elements.

The expansion of passive investment, exemplified by ETFs and index funds, is often viewed as a practical consequence of the EMH. According to the hypothesis, if prices already reflect all available information, then attempting to "beat the market" is futile. As a result, passive management becomes a rational and efficient strategy to enhance both present and future income. From the perspective of the EMH, price unpredictability is not a flaw but rather a sign of market efficiency. A predictable market would allow systematic arbitrage, while an unpredictable one promotes fairness among agents and reflects all known information. In light of this reasoning, passive management emerges as a prudent approach, enabling investors to allocate resources at lower cost and with reduced exposure to judgment errors.

This critique is not limited to the empirical shortcomings evidenced by episodes such as the financial crises of 1987, 2000, 2008 and 2020, but also extends to the unrealistic theoretical assumptions underpinning the EMH. Among these assumptions are the belief that economic agents behave in a fully rational manner, the premise of frictionless markets including the absence of transaction costs, informational asymmetries and institutional constraints, and the notion that available information is immediately and fully incorporated into asset prices. Heterodox currents, such as historical institutionalism, Keynesianism, and neo-Marxism, emphasise the limitations of the neoclassical model in capturing the real dynamics of financial markets, highlighting the importance of institutions, radical uncertainty, and power structures. These approaches question not only the empirical validity of the EMH but also its assumption of neutrality and universality.

Economists often resort to an anecdote to illustrate the assumptions of the EMH. It is said that two professionals were walking down a street when they saw a 100-real banknote on the ground. As one of them moved to pick it up, the other said: If it were real, someone would have already taken it. This situation reflects confidence in market efficiency, which is the idea that no profit opportunity remains unexploited. It is reasonable to acknowledge that individuals who believe in market efficiency may, when faced with the prospect of extraordinary gains, see their theoretical convictions momentarily weakened by the desire for profit.

In light of the above, this article aims to analyse the EMH as an extension of neoclassical theory. As in marginalist theory, it is assumed that, in the absence of interference, markets tend to self-adjust, allowing the prices of financial assets to align with their intrinsic value in the long run. In this context, information plays a central role, functioning in a manner analogous to relative prices in goods markets, insofar as it guides agents' decisions and promotes the efficient allocation of resources. Just as the prices of goods tend to converge to marginal cost in competitive markets, the EMH holds that asset prices reflect, over time, all available information.

This article contributes to the literature by systematically analysing the EMH as a theoretical extension of the general equilibrium model in neoclassical economics. Its originality lies in the integration of distinct analytical dimensions—microeconomic foundations, methodological instrumentalism, and heterodox criticism, into a unified and structured argument. The study also interprets the EMH as a Weberian ideal type, highlighting its analytical value despite empirical limitations. By articulating the

hypothesis with concepts such as arbitrage, informational asymmetry, and Net Present Value (NPV), the article clarifies both the theoretical coherence and the practical restrictions of market efficiency. This critical synthesis, situated between theoretical abstraction and empirical observation, offers a balanced perspective that is particularly relevant to emerging markets.

The article is structured as follows. Section 2 examines the theoretical foundations of the EMH, its alignment with neoclassical principles, and the critiques arising from institutional and behavioural limitations. Section 3 introduces heterodox approaches and considers the EMH as a methodological construct. Section 4 surveys the empirical literature, focusing on evidence from both developed and emerging markets. Section 5 narrows the analysis to empirical tests applied to the Brazilian stock market, with an emphasis on the weak form of the hypothesis. Finally, Section 6 offers concluding remarks and discusses the theoretical and practical implications of the study

2. The Efficient Market Hypothesis, Market Self-Regulation, and the Critique of Institutional Capture

2.1 The Efficient Market Hypothesis and Its Connection to the Neoclassical Model

The Efficient Market Hypothesis (EMH), introduced by Eugene Fama in 1970, applies the core principles of neoclassical theory such as agent rationality and market equilibrium to financial markets. It is based on the notion that all available information is already reflected in asset prices, rendering any repeated attempts to achieve above-average profits ineffective. Under such conditions, the likelihood of successfully exploiting pricing inefficiencies becomes significantly reduced, even through arbitrage. As Oliveira Neto (2011) points out, this framework recognises that information guides investment decisions and contributes to the alignment of asset prices with market fundamentals.

There is a clear conceptual overlap between the EMH and neoclassical theory, particularly in their reliance on the notion of self-regulating markets (Fama, 1970). These frameworks tend to assume conditions such as perfect competition and the rapid diffusion of information — at times bordering on the exaggeration that the world operates in full transparency. In theory, firms are expected to disclose reliable data, partly to preserve their credibility with investors. As Varian (2010) notes, general equilibrium is achieved when markets adjust simultaneously in order to balance supply and demand, with price signals acting as the primary mechanism for resource allocation. Nonetheless, the assumptions underpinning these models are frequently subject to scrutiny when confronted with the imperfections of real-world markets. Among the implicit assumptions of the EMH are the inexistence of transaction costs and the free and unrestricted availability of information to all market participants. These conditions are essential to ensure that arbitrage opportunities can be exploited instantly and without frictions, thereby allowing prices to fully and continuously reflect all relevant data.

The EMH embodies this idealised view of market functioning, according to which asset prices reflect all available expectations formed on the basis of known information. Only the incorporation of new information, whether from insiders or the public, can alter prices. Information regarding a future outcome, once disclosed in the present, affects prices immediately. Although the literature acknowledges that some favourable information is rapidly incorporated into prices, other types may take longer to be fully reflected (Wang, 2019). It is precisely the speed at which information is absorbed that determines whether the market is efficient; if there is a delay, the market is, by definition, inefficient.

It is assumed that information in financial markets guides investment decisions, just as relative prices influence consumption choices in goods markets—precisely the idea underlying the concept of informational efficiency. Birchler and Bütler (2007) describe information as a "magical commodity": widely accessible, essential for decision-making, and often treated as indisputable. Investors rely on such disclosures to estimate future cash flows and assess asset values, based on the belief that financial statements offer some indication of firms' actual conditions. This information, interpreted through individual judgement, serves a function similar to that of price signals in general equilibrium theory (Verrecchia, 2001).

Unlike the exact sciences, where a single contradictory observation can invalidate a theory—such as the proposition that all swans are white, refuted by the discovery of a black swan—in the social sciences, no hypothesis can be definitively rejected on the basis of a single counterexample. Popper (2009) argued that scientific theories must be falsifiable, meaning they must be testable and potentially refuted by observation. Yet the complexity of social phenomena and limited experimental control make the application of this criterion more difficult. Therefore, the validity of an economic theory like the EMH should be judged not by isolated exceptions but by a broader body of evidence and interpretations. As Caws (1972) notes, scientific knowledge also requires observation and descriptive accuracy.

2.2 Classification of the EMH and Financial Implications

Eugene Fama proposed the EMH in 1970, which may take three forms: weak, semi-strong and strong. According to the author, a market is considered efficient when prices adjust rapidly and accurately in response to new information. Positive information tends

to be incorporated into prices more quickly, whereas negative information is usually absorbed more slowly. This is because disclosures indicating poor performance are often delayed in order to protect the value of shares and to avoid immediate market reactions. The degree of informational incorporation varies across the three forms of efficiency, defining how prices respond to new data.

- Weak Form: This form holds that asset prices incorporate all historical information, including previous trading volumes and observed price patterns. In summary, the weak form of the hypothesis encompasses historical data, which follow a random walk trajectory, in which events are independent and identically distributed. As a result, technical analysis, when dealing with a randomly distributed dataset, does not allow for the prediction of future price quotations. Kendall (1953) supports this finding by analysing time series of share prices and observing that the variations followed a random pattern with no identifiable structure, rendering the statistical prediction of asset prices unfeasible.

Although the Efficient Market Hypothesis (EMH) associates price movements with a random walk, or as it is also known, a drunkard's path, this does not mean that prices move without limits. In reality, price fluctuations tend to occur within ranges determined by fundamentals, investor expectations and institutional factors. For example, a price may rise or fall by a few percentage points, but such variation is unlikely to reach 100 per cent. Thus, although future movements cannot be predicted with certainty, volatility is generally constrained, which means that, for instance, a stock with strong fundamentals is unlikely to fall to zero without a rich reason.

- Semi-Strong Form: Beyond historical data, this form asserts that asset prices reflect all publicly available information, including financial reports, market news, and economic indicators. This includes information such as a company's earnings, outstanding debts, tax obligations, business segments, planned investments, and its sensitivity to macroeconomic conditions. Consequently, neither technical nor fundamental analysis would enable investors to consistently achieve abnormal returns, as the market has already integrated such information into asset prices. In other words, predicting asset price movements fundamentally requires the ability to anticipate new information or to forecast how the market will respond to it. Within this framework, asset price fluctuations are mainly driven by the emergence of new information, which investors swiftly incorporate into their valuation processes. It is the dissemination and interpretation of this information that triggers changes in asset quotations.

As a result, asset prices may fluctuate significantly from one year to the next, as investors reassess the value of their holdings based on updated expectations and market conditions. If the release of new information results in overreactions or underreactions in prices, then the market cannot be deemed efficient. According to the EMH, such anomalies should not persist, as prices are expected to reflect all pertinent information accurately. According to this perspective, although inefficiencies may occasionally arise, they are relatively small and infrequent, and tend to be corrected through arbitrage and competitive dynamics. In other words, due to competition among investors, markets tend to become increasingly efficient. This leads to a form of equilibrium in which mispricing persists only to the extent that it can be detected and exploited by particularly skilled individuals. For the majority of market participants, however, the costs of collecting and processing information outweigh the potential gains.

For instance, if an economist were to develop a statistical model capable of predicting the future appreciation of certain assets, it would still not be possible to achieve above-average returns. This is because other investors would likely quickly adopt such a model, neutralising the creator's initial advantage. As a result, the application of the model would lead to an immediate rise in the prices of those assets, since the expectation of future gains would be instantly incorporated into current prices. This would render the prediction itself ineffective for generating abnormal profits, as the information would be rapidly absorbed and reflected by the market.

- Strong Form: This version asserts that asset prices incorporate all relevant information, including both public and private (insider) data. Under such conditions, even investors with privileged access are unable to consistently achieve abnormal returns, as all available knowledge is already reflected in market prices. In this scenario, the possibility of earning superior profits is virtually eliminated, since no informational advantage can be exploited. In such a setting, all investments available to market participants would have a Net Present Value (NPV) of zero, as prices fully incorporate expected cash flows discounted at the appropriate rate. The strong form is the most difficult to test, and empirical results tend to refute it. In an efficient market, investors receive exactly what their equity and debt securities are worth at the time of issuance. This efficiency is driven by competition among investors, which ensures that prices reflect all available information.

The EMH sets out theoretical scenarios that describe how investors might approach investment, depending on how efficiently markets incorporate information. If markets are indeed efficient, the rationale for active portfolio management, based on identifying undervalued or mispriced assets, becomes considerably weaker. In such a context, passive investment strategies, which aim to track market indices, tend to offer a more reasonable alternative, as efforts to outperform the market would likely be futile in an environment where all available information is already reflected in prices. Under the Efficient Market Hypothesis, investors do not seek to construct a portfolio with the aim of outperforming the market, but rather select allocations consistent with their risk profile, whether risk-averse, neutral or risk-seeking, viewing the market portfolio as a theoretically efficient composition.

In practical terms, the EMH suggests moving away from the pursuit of pricing anomalies through technical or fundamental analysis. As this line of inquiry loses ground, some roles tied to market research — particularly those held by financial analysts — may be redefined or gradually phased out. Relying on historical data to anticipate future price movements becomes futile, given the lack of any discernible pattern. If prices already reflect all publicly available information, then efforts to spot undervalued assets or predict trends offer limited results at best. In recent years, this way of thinking has led many investors to favour passive forms of investment, not out of ideology, but because there appears to be little room left for consistent outperformance.

Even so, many investors continue to seek above-average returns. As Markowitz (1952) observed, the pursuit of higher returns inevitably involves assuming greater levels of risk—something that must be carefully considered. From the 1990s onwards, the growing preference for passive strategies was evident in the rapid expansion of index funds, particularly across developed markets. Nonetheless, recent periods of heightened volatility, such as the 2020 market turmoil, have reignited discussions about the relevance and effectiveness of active portfolio management during times of greater uncertainty.

Despite its theoretical appeal, the EMH has not gone unchallenged. Empirical studies have identified anomalies, such as the January effect, the size effect, and the value effect, that question the premise of market efficiency. Moreover, the assumption of fully rational investors has been increasingly questioned by behavioural finance research, which reveals the influence of cognitive biases and emotional factors. These issues, explored in more detail in Section 2.4, call into question the universal applicability of the EMH in real-world financital contexts.

As Keynes (1982) observed, herd behaviour may emerge when analysts follow the prevailing opinion. These investors presume that others possess information capable of anticipating future prices, which leads them to engage in buying or selling at values far removed from the assets' intrinsic worth. The result may even be a market crisis, such as the 1929 crash on the New York Stock Exchange. This dynamic has led many authors to describe such investors as irrational. In response to this approach, Shiller (2015), among others, proposed an alternative model: the hypothesis of irrational markets, which integrates behavioural tendencies, informational fragility and narrative economics to explain price fluctuations.

Although the EMH remains a controversial topic, the theory has served as a basis for the creation of regulations requiring companies to disclose their information, and also encourages investors to seek gains in the stock market, given that price adjustments do not always occur immediately. The enactment of legislation has introduced regulatory standards, such as disclosure requirements and external audit procedures, in order to enable investors to monitor the condition of companies in which they have an interest. In addition, corporate governance frameworks have been established with the aim of enhancing transparency regarding firms' financial position. The rationale behind these measures is based on the premise that greater informational transparency contributes to the more efficient functioning of markets, as a larger number of investors gain access to relevant information.

Investors rely on a range of techniques to assess firms' conditions, including fundamental analysis of financial statements, monitoring of executives' transactions in the stock market, observation of significant corporate events, evaluation of governance structures and, more recently, the use of tools aimed at interpreting the content of speeches and reports based on sentiment indicators.

Nevertheless, these developments do not diminish the relevance of the EMH as a theoretical framework, even in the face of the complexities of real-world markets. The EMH represented a major advance in financial theory by providing a coherent model for understanding how asset prices reflect available information. Over time, its application has also shown the value of incorporating additional perspectives that take into account behavioural tendencies and informational frictions. The global financial crisis of 2008, for example, highlighted certain vulnerabilities in how markets process risk, encouraging further discussion about the conditions under which efficiency holds, rather than disproving the central assumptions of the EMH.

2.3 Regulation, Information, and Criticisms of Efficiency

Wang's (2019) empirical work supports the EMH proposition. The author showed that analysts and corporate insiders contribute in a complementary manner to asset pricing. Wang emphasised that the relevance of each agent's contribution depends on the type of information already incorporated into market prices. When firm-specific data provided by insiders is more proportionally reflected in prices, analysts' recommendations tend to be more informative. Conversely, in markets dominated by broader sector-level signals, insider transactions offer more relevant insights.

This interaction between the information sources of analysts and insiders shows that they are complementary, and that the informational usefulness of each depends on the relative contribution of their inputs to price incorporation. This finding apparently contradicts the assumption that all relevant data are always fully reflected in asset prices, as posited by the strong form of the

EMH. It is worth noting, however, that economic hypotheses often rely on abstraction to highlight theoretical mechanisms that help explain how markets function. By recognising the complementary roles of different informational agents, the study offers a more realistic view of how markets process information and underscores the continued relevance of disclosure regulations.

The EMH assumes self-regulating markets, in which free competition and rational agents ensure the efficient allocation of resources. Investors, being rational, prefer more to less and therefore seek to maximise their expected income. These agents aim to acquire assets that offer higher returns relative to the risk undertaken, continually evaluating the information available. In a competitive market, such investors do not hold monopoly power that would allow them to manipulate prices or secure systematic advantages; in this context, prices are taken as given and function as signals that guide decision-making. Thus, it is assumed that the interaction between rational, return-seeking agents and perfect competition leads to allocative efficiency—that is, the optimal distribution of scarce resources.

These assumptions have been criticised on the grounds that regulation may hinder the proper disclosure of firms' accounting and administrative information. Regulatory standards can create suboptimal procedures which, rather than promoting transparency, may lead to a formal and mechanised compliance with legal requirements, thereby undermining the disclosure of relevant information. The issuance of such standards overlooks marginalist theory, which holds that agents make rational decisions based on incentives and individual preferences. Evidence of market failures, such as informational asymmetries and externalities, challenges this view. Stiglitz (2002) argues that imperfect information and misaligned incentives may result in inefficient allocations, thereby justifying regulatory intervention to correct such distortions. In the face of these failures, state intervention is accepted as a mechanism for correction and market rebalancing.

As Grossman and Stiglitz (1980) demonstrated, if acquiring information entails a cost, market prices cannot fully reflect all available information, since doing so would eliminate the incentive to gather information and, in turn, undermine the competitive functioning of the markets themselves. The only way for informed agents to profit in the market is by holding an informational advantage over uninformed participants. Without the disclosure of information, investors are unable to distinguish between more profitable and less profitable companies, leading them to evaluate all firms based on an average.

Some authors have observed that financial markets may respond to new information faster than accounting statements do (Ball & Brown, 1968; Beaver, 1968; Basu, 1997). This effect, often referred to as delayed recognition, reflects the fact that accounting relies on formal criteria and conservative principles, which can postpone the recognition of certain economic events. Meanwhile, investors tend to anticipate such developments based on expectations and market signals, which may be reflected in asset prices before financial reports are updated.

The extent to which off-balance sheet information is perceived and processed by the market depends on its level of informational sophistication. In environments with more experienced investors, such signals may be incorporated into asset prices more rapidly, even in the absence of formal disclosure. In the face of such limitations, investors seek alternative mechanisms for interpreting signals and evaluating risk, which helps sustain a degree of market functionality despite informational frictions.

In addition to financial and structural indicators, investor perception is also shaped by the language and behaviour of corporate executives during earnings calls, interviews, and public disclosures. Empirical studies increasingly show that the tone, clarity, and consistency of managerial discourse can function as informal signals of credibility or risk. Investors often scrutinise such communications to detect signs of deception, overconfidence, or uncertainty, elements that may not be evident in formal financial statements. Subtle cues such as evasive language, inconsistencies in messaging, or reluctance to address key risks can lead investors to question the reliability of the information being presented, thereby influencing their assessment of the firm's governance quality and future performance.

In contexts marked by informational asymmetries, market efficiency may still be partially preserved through signalling mechanisms. As initially formulated by Spence (1974) in the labour market, signalling theory suggests that agents with private information can credibly convey their type or quality to less-informed counterparts by undertaking observable and costly actions. In financial markets, this logic applies to a wide range of scenarios: companies may use dividend payments, capital structure decisions, or investment behaviour to signal profitability, creditworthiness, or managerial competence. According to Kreps (1994), signalling offers a potential solution to adverse selection, allowing informed agents to reveal private knowledge through their actions. Coco (2000) and Rasmusen (1992) further argue that signals help differentiate among agents in a transaction, enabling more accurate assessments and contract structuring.

Macho-Stadler and Pérez-Castillo (1997) illustrate that financial signalling can operate on two levels. On one level, managers who know the true value of their firms may seek to communicate this to the market, particularly when issuing new equity and aiming

for a fair valuation. On another level, the market itself interprets observable financial indicators, such as low leverage or stable cash flows, as signals of solvency and responsible governance. This interpretation encourages firms to adopt conservative financial policies to maintain investor confidence and facilitate access to capital under favourable conditions. Molho (1997) highlights that signalling processes may originate either from the informed party (e.g. choosing an education level to attract employers) or from the uninformed side (e.g. firms offering differentiated contracts to screen worker types), underscoring the strategic nature of signal transmission.

In credit markets, the procedures involved in granting loans are similar to the assessments made by investors. Analysts examine a company's financial statements, cash flows, and liability structure to judge its ability to meet financial obligations. Dividend payments are also regarded as an important indicator of financial robustness, based on the view that only companies with strong and consistent liquidity positions are able to sustain such distributions over time.

The motivation for accounting regulation stems from the recognition that market forces alone may not be sufficient to ensure informational symmetry. Accounting information is a public good that is subject to informational asymmetry. As such, when treated as a public good, society benefits from broader dissemination of accounting disclosures. This generates a positive externality, as investors can access information at no cost to identify the most profitable investment opportunities. Modern communication tools have broadened public access to accounting information (Tostes and Varsahely, 2010). Clear and objective disclosure enhances the credibility of accounting information as a basis for decision-making. As noted by Murcia and Santos (2010), broader public access helps reduce informational asymmetry and contributes to more timely and relevant disclosures.

Even in a scenario of limited transparency, such constraints may be partially offset by the interpretation of observable actions as meaningful signals. As noted by Birchler and Bütler (2007), decisions made by informed agents, such as corporate executives, may reveal traits or intentions that are not explicitly stated. The case of Enron provides a striking illustration: the large-scale sale of shares by senior management was interpreted by investors as a warning sign, undermining confidence well before the company's eventual collapse. The CEO had publicly assured that the company's financial position was strong — yet, he sold his shares shortly thereafter.

In the absence of mandatory rules, firms may withhold or distort financial information, leading to adverse selection and a decline in investor confidence. The management of financial statements is an inherent practice in accounting, as accounting standards allow for a certain degree of judgement, resulting in accounting choices that can influence the presentation of financial results (Melo, 2015). Managers often disclose positive information more promptly than negative information, a practice known as "earnings management." Incentive structures frequently reinforce this behaviour: corporate executives whose compensation includes bonuses or performance-based pay may be inclined to adopt accounting methods that inflate reported earnings in the short term. Sweeney (1994) points out that increasing financial fragility leads managers to adopt accounting practices aimed at artificially boosting profits. Delays in financial reporting often indicate deficiencies in information quality and may be interpreted as adverse signals by investors, affecting both market valuation and access to capital (Eccles et al., 2001).

To address these distortions, regulatory mechanisms such as standardised reporting frameworks, independent audits and legal disclosure requirements aim to reduce information asymmetry and, as noted by Niyama et al. (2005), improve the comparability of financial statements. Reliable reports are demanded by investors seeking market gains, as these allow for comparisons even between companies operating in different countries. To serve this purpose, a single regulatory framework extends across a group of countries. It is in the major global markets, spread across different continents, that such agents seek to invest. These interventions are therefore designed to equip investors with the means to verify corporate profitability. In this context, regulation is justified insofar as it addresses an imperfect market — one that requires state intervention due to the insufficient functioning of market mechanisms alone.

2.4 Heterodox Perspectives and Informational Constraints

Hirshleifer (1971) develops a theoretical model in which markets operate under conditions of perfect information. The particular feature of this model lies in the fact that, although all agents have full knowledge of prevailing prices, preferences and available technologies, they remain unaware of their own potential. In other words, the knowledge each agent holds about specific aspects of their own situation, such as the productivity of their resources or the expected returns on their investments, is limited or entirely absent. This conception confines informational problems to the individual level, overlooking the possibility of systemic failures. Such a view contrasts with approaches that regard informational asymmetries as structural features of real markets, as in the Grossman-Stiglitz paradox (1980), and casts doubt on the explanatory power of models that continue to assume ideal conditions of transparency and full rationality.

Beyond informational issues, heterodox critiques argue that asset prices are also influenced by institutional and historical factors. Countries differ in terms of institutional maturity, which directly affects the predictability and security of their markets. In some economies, laws are widely enforced; in others, such as Brazil, many legal norms exist only formally, without practical effect — a phenomenon captured by the local expression "laws that didn't catch on." In contrast, in countries like Germany, excessive regulation is sometimes cited as a barrier to business activity. In the Brazilian case, however, the so-called "Brazil cost" is frequently identified as a major obstacle to investment and is closely linked to high levels of perceived corruption and institutional instability. Schools of thought such as historical institutionalism and neo-Marxism argue that the EMH overlooks precisely these elements — including unequal power relations, institutional legacies and legal distortions — that shape the real functioning of financial markets. These perspectives maintain that markets are not neutral or autonomous systems; rather, they are embedded in broader political, legal and historical contexts that decisively influence both price formation and resource allocation. Share prices may exhibit chaotic movements due to investors' expectations. Fluctuations tend to occur around fundamental values. This critique, recurrent among heterodox economists, underscores that each country presents a specific configuration of constraints and opportunities, requiring context-sensitive analysis. More broadly, it is argued that developing economies demand theoretical frameworks tailored to their institutional and historical realities, since mainstream economic models were originally designed with developed countries in mind.

Parallel to these institutional and historical critiques, behavioural finance has emerged as a competing theory to the EMH. The main criticism of the EMH is the assumption of fully rational agents. With such reservations, behavioural theory seeks scientific supremacy in the field, as predicted by Bourdieu (1983). This alternative theoretical framework is based on cognitive psychology and decision theory. According to these authors, investors are influenced by overconfidence and loss aversion. Furthermore, these agents are subject to emotional responses, such as fear during market downturns or euphoria during bubbles, which lead them to adopt irrational behaviours in pursuit of profit or during times of market instability.

This irrational behaviour, exemplified by herd behaviour (Keynes, 1982; Shiller, 2015; Balawi and Ayoub, 2022), helps explain the occurrence of speculative bubbles, excessive volatility, and market crashes, phenomena that classical models struggle to explain. As Keynes (1982) observed, herd behaviour arises when analysts cease to form independent judgements and instead follow the majority, assuming that others possess privileged information. Significant fluctuations in asset prices are caused by the collective actions of investors, which can lead to a deviation from fundamental values. In this way, behavioural theory seems to suggest that if the assumptions are wrong, the conclusion will also be

In view of the contestation of the EMH, Shiller (2015) presents the 'irrational markets' hypothesis. This model explains the formation of asset prices based on investor characteristics, which are classified as risk-loving, neutral, and conservative. These individuals would be susceptible to herd behaviour at times of publication or dissemination of news regarding the economic situation. The news could create enthusiasm or concern among investors, potentially triggering herd behaviour. This dynamic of investor behaviour and the environment is distinct from that described in the EMH. Thus, the proposed model rejects the idealised principle of EMH efficiency and instead focuses on the irrationality of investors and the role of collective sentiment in shaping market dynamics.

These critiques, taken together, indicate that market efficiency is neither universal nor stable. Cognitive limitations and institutional asymmetries make the prediction of asset prices possible. In other words, the fact that agents expect asset prices to rise or fall often comes to pass. The contrast between its theoretical elegance and the complexity of real-world financial behaviour reveals that the hypothesis, while analytically useful, rests on idealised assumptions and is therefore criticised with claims that they rarely hold empirically (Malkiel, 2003). Acknowledging these limitations does not diminish its value, but calls for a more plural and contextualised understanding of how markets operate. After all, the value of a theory lies in its explanatory power.

2.5 The Efficient Market Hypothesis as a Methodological Construct and Analytical Tool

While the EMH provides a coherent theoretical framework, its assumptions—such as perfect rationality and frictionless markets—limit its empirical applicability. Within this framework, a rational individual is expected to exhibit predictable behaviour, since decisions are assumed to follow consistent preferences and maximise utility given available information. Indeed, the EMH is easier to assert than to test, as its empirical validation depends on idealised premises rarely observed in real markets.

Authors such as Blaug (1980) criticise the tendency of economic theory to prioritise mathematical elegance over empirical relevance. In this sense, the EMH serves as a conceptual model to understand theoretical pricing mechanisms, despite its limited descriptive applicability.

3. Theoretical Foundations

3.1 The Efficient Market Hypothesis (EMH)

As previously established in Section 2.2, the Efficient Market Hypothesis (EMH), formalised by Eugene Fama in 1970, extends neoclassical principles to financial markets by assuming that asset prices incorporate all available information. Rather than repeating its tripartite classification, this section focuses on the behavioural mechanisms through which market forces, especially arbitrage and decentralised competition, are theorised to maintain informational efficiency.

Arbitrage functions as a price correction mechanism that supports the EMH. According to Fama's classic formulation (1970), rational agents operate in the market by exploiting discrepancies between prices and fundamental values, which gradually leads to the elimination of inefficiencies. In this sense, arbitrage does not contradict the EMH — it sustains it. It is through the actions of such agents that prices tend to reflect the available information. However, the literature also recognises limits to this process. The paradox identified by Grossman and Stiglitz (1980) suggests that if prices were perfectly efficient, there would be no incentive to seek new information, thereby undermining the very mechanism of arbitrage. This argument gives rise to the idea of limited efficiency and reinforces the importance of incorporating institutional, behavioural, and informational elements into the analysis of financial markets.

Although the EMH relies on rationality, Fama (1970) acknowledged that the presence of irrational investors does not necessarily undermine price efficiency. According to him, if irrational agents behave randomly or in an uncoordinated manner, their effects would tend to cancel out in the aggregate, causing no systematic price distortions. Moreover, rational agents who actively seek arbitrage opportunities would correct any deviations caused by irrational behaviour. This assumption reinforces the notion that prices would still reflect all available information, provided that irrationality is neither persistent nor coordinated.

Thus, the EMH aligns with the neoclassical belief that, under conditions such as perfect information and the absence of institutional frictions, financial markets operate as self-regulating systems that ensure equilibrium and the efficient allocation of resources.

3.2 The Heterodox Critique of the EMH

The concept of informational efficiency clashes with the Keynesian notion of radical uncertainty, which holds that the future is fundamentally unknowable and cannot be represented through probabilistic reasoning (Keynes, 1982). Davidson (1991) and Chick (1983) expand on this view, arguing that expectations are unstable and the assumptions of rationality are inapplicable. In this vein, Carvalho (2009) argues that conventions and socially embedded heuristics more influence decisions in financial markets than by objective calculations based on complete information.

As mentioned earlier, Hayek (2009) and Stiglitz (2002) point out that information in markets is inherently decentralised and asymmetrically distributed. As Hayek argues, investment decisions are decentralised, and he expressed concern about the sheer volume of information that must be processed in market decision-making. This informational fragmentation complicates asset valuation and contributes to coordination failures. Similarly, Stiglitz highlights that these informational frictions expose limitations in the EMH's assumption that information is processed universally and without distortions. This dynamic implies that total informational efficiency would eliminate the incentive to gather information, thereby reinforcing the logical impossibility of the strong form of the EMH. If all investors attempt to outperform the market, the cost becomes prohibitively high; if none do, prices will fail to be informative.

Moreover, under conditions of uncertainty and information constraints, agents often lack the cognitive capacity to process all relevant variables or anticipate all possible scenarios—a phenomenon known as bounded rationality, as proposed by Simon (1957). Consequently, contracts in such markets are often incomplete, meaning they fail to specify all future contingencies or provide effective mechanisms for monitoring. This contractual incompleteness opens the door to opportunistic behaviour, aggravating problems such as moral hazard and adverse selection and making financial markets more prone to persistent coordination failures and the formation of bubbles or crises.

The critique of the EMH also involves understanding the role of conventions and speculation in asset price formation. For Keynes (1982), in an environment of radical uncertainty, decisions are not based on rational fundamentals or statistical forecasts but rather on social conventions that guide expectations—such as the belief that the future will resemble the past. In such settings, markets become arenas of speculative behaviour, where agents attempt to anticipate not the fundamental values of assets but the prevailing expectations of other participants, as captured by the famous Keynesian "beauty contest" metaphor.

Behavioural economics reinforces the critique of individual rationality. According to this line of thought, individuals behave irrationally and make decisions based on emotive judgements. This view undermines the assumption of rationality embedded in

the EMH, as highlighted in the foundational work of Simon (1955), who introduced the notion of bounded rationality. Kahneman and Tversky (1979) further demonstrated, through prospect theory, that decision-making under risk systematically deviates from rational expectations. Shiller (2003) and Thaler (1993) provide additional evidence that asset prices are influenced by cognitive biases, emotional responses and herding behaviour. These factors contribute to decisions that result in bubbles and financial crises. Market dynamics, therefore, are not governed by informational adjustments but by mechanisms of perception, belief and collective reaction, which prevent information from being incorporated into prices in a way that leads to efficiency.

This distinction reveals a fundamental incompatibility between the EMH and the Keynesian notion of radical uncertainty. While the EMH assumes that agents form rational expectations based on a probabilistically estimable future, post-Keynesian theory maintains that the future is essentially unknowable. Therefore, asset prices cannot consistently reflect 'correct' expectations, as informational efficiency requires. Within a purely post-Keynesian framework, there is no possibility of producing forward-looking estimates grounded in objective probability. This implication, that estimation is impossible, is explicitly rejected by Friedman, who argues that the usefulness of a model lies in its predictive capacity, regardless of the realism of its assumptions. Rather, expectations are constructed, fluid, and socially embedded — making market outcomes inherently unstable and unpredictable. The accuracy of such estimates ultimately depends on the degree to which the assumptions of the EMH are accepted — a consideration the researcher must always take into account.

Even so, if the future were entirely unknowable, as post-Keynesian theory sometimes suggests, any attempt at modelling expectations or market dynamics would be rendered meaningless. In this respect, the EMH remains analytically relevant — not as a literal representation of empirical reality, which would be impossible in the social sciences, but as an abstract construct that helps theorise how information might shape asset prices in an idealised context. Its continued use reflects not empirical supremacy, but methodological utility. This perspective is explored further in the next section.

3.3 Hypotheses and Instrumentalism in Economic Science

The Efficient Market Hypothesis (EMH) may be interpreted, using Max Weber's concept of the ideal type, as a theoretical construct that does not describe reality as it is, but serves as an analytical model for comparing and interpreting empirical phenomena. For Weber (1994), the ideal type is a tool for logically accentuating certain aspects of reality in order to systematise understanding, even if such representation does not exist in its pure form. Viewed as a Weberian ideal type, the EMH illustrates a simplified model that helps organise theoretical expectations while diverging from complex empirical realities. Lisboa (1997) argues that marginalist theory constitutes an abstract construct intended to explain theoretical mechanisms rather than to provide a literal description of empirical reality. According to this approach, "*every theory is necessarily a distortion and simplification of the real, and a realistic theoretical construction is not possible. In this case, models should be assessed not by their realism, since none is realistic, but rather by their predictive power*" (Lisboa, 1997, p. 10). The author suggests that, due to the complexity of social phenomena, estimates based on theoretical models may exhibit limitations and uncertainty—an expected feature of the social sciences. In this sense, the interpretation is reinforced that the assumptions of the EMH, as with those of the neoclassical model, should be understood as analytical abstractions aimed at elucidating the functioning of markets, rather than as direct representations of the real world.

Nevertheless, various authors, such as Shiller (2003, 2015), have criticised this instrumentalist position. According to Shiller, an excessive detachment between assumptions and reality can undermine the understanding of the underlying causes of economic phenomena, limiting the explanatory and normative power of economic theories. Shiller (2015) also argues that an overemphasis on predictive success may neglect crucial dimensions of monetary dynamics, including institutional, cultural, and historical factors that shape agent behaviour. In this regard, belief itself plays a performative role: if few individuals believe in the EMH, they will engage more actively in information analysis, thereby contributing to greater market efficiency. Paradoxically, a lack of faith in efficiency may promote the very conditions required to sustain it. These arguments are developed in Shiller (2003, 2015), particularly in his analysis of financial markets, where expectations, trust, and collective behaviour play central roles in price formation and in the emergence of crises.

Within the methodological debate in economics, the defence of the EMH finds support in the instrumentalist perspective advanced by Milton Friedman (1953). For Friedman, the realism of a model's assumptions is less important than its capacity to generate accurate predictions. Even if economic agents do not behave exactly as rational maximisers in perfectly efficient markets, the hypothesis remains valid if it produces predictions consistent with observed data. Applied to the EMH, this approach justifies the use of the model despite evidence of irrationality or informational asymmetries as long as asset prices behave, on average, as if agents were rational and fully informed.

4. Empirical Review of the Literature

The empirical literature on the EMH is extensive and characterised by heterogeneous results, which vary according to the market under analysis, the period studied, the methodology adopted, and the specific form of efficiency considered. Since the earliest

tests of return randomness conducted by Fama (1965) and Samuelson (1965), numerous authors have sought to determine whether asset prices follow a random walk and respond immediately to the available information. Studies applied to developed markets, such as those by Malkiel (1973) and Jensen (1978), generally found partial support for the EMH in its weak and semi-strong forms. However, subsequent empirical evidence, particularly after events such as the 1987 crash, the dot-com bubble, and the 2008 financial crisis, began to challenge the stability of market efficiency, revealing anomalies, delayed reactions to announcements, and non-random return patterns. In emerging markets such as Brazil, the literature has produced mixed results concerning the validity of the semi-strong form, with indications of informational asymmetries, low liquidity, and high volatility. This section reviews key national and international empirical studies that have tested the EMH, emphasising the methodological approaches used and the findings obtained for the Brazilian stock market.

Empirical tests applied to the EMH have produced divergent results, particularly concerning the weak and semi-strong forms. Regarding the weak form, various studies have identified that share returns follow patterns consistent with a random walk, implying an absence of autocorrelation and unpredictability based on past prices—as shown by Fama (1965), Malkiel (1973), and, to some extent, Lima and Tabak (2004) in the Brazilian context. However, other studies have found statistical evidence of serial autocorrelation and return predictability, especially in emerging markets, suggesting the presence of inefficiencies that technical analysts or informed traders could exploit through strategic trading. Concerning the semi-strong form, studies examining price reactions to the release of public information, such as earnings announcements, mergers, or changes in monetary policy, have also yielded mixed results. Research such as that by Jensen (1978) and Camargos and Barbosa (2003) indicates that, in specific periods, prices respond rapidly to new information, thereby reinforcing the hypothesis of efficiency. On the other hand, evidence of delayed or excessive reactions—especially in the Brazilian market—raises doubts about the system's ability to fully and instantaneously incorporate public information. These inconsistencies suggest market efficiency may be unstable over time and conditioned by institutional, technological, and behavioural factors.

Empirical verification of the EMH is based on various methodologies, depending on the form of the hypothesis being tested. Traditional random walk tests are commonly used for the weak form, including autocorrelation analyses of returns, unit root tests (such as ADF and PP), and cumulative variance tests (such as the Variance Ratio test). These methods aim to identify temporal price patterns that may suggest predictability and, therefore, a violation of randomness. The semi-strong form is typically tested through event studies, which examine the speed and direction of price reactions to public information releases, such as earnings announcements, mergers, and economic policy decisions. Under the efficiency hypothesis, prices are expected to adjust immediately after the event, with no subsequent abnormal returns. However, various empirical analyses have identified excessive or delayed reactions, characterised by exaggerated initial movements followed by corrections, or slow adjustments over subsequent days. Such evidence casts doubt on the market's ability to process information perfectly efficiently, suggesting the influence of speculative behaviour, informational frictions, or institutional limitations affecting the full adjustment of prices.

In the Brazilian case, numerous studies have tested the validity of the EMH, with results indicating limited and unstable efficiency, particularly in the weak and semi-strong forms. Regarding the weak form, research such as that by Lima and Tabak (2004) and Matos and Moreira (2008) applied random walk and autocorrelation tests to Ibovespa returns, finding evidence of serial dependence in specific periods, which suggests predictability and thus a violation of randomness. As for the semi-strong form, Camargos and Barbosa (2003) and Silva and Machado (2011) used event studies to examine price reactions to corporate and macroeconomic announcements, often observing delayed, anomalous, or mean-reverting responses. Factors such as low liquidity in certain assets, informational asymmetries, a high concentration of institutional investors, and regulatory instability limit the informational efficiency of prices in Brazil. These findings suggest that the Brazilian stock market exhibits behaviours that diverge from the logic of instantaneous information incorporation, influenced by structural, institutional, and behavioural factors that reduce its adherence to the EMH model.

In summary, although empirical studies, particularly in emerging markets, highlight limitations to the EMH, especially with regard to informational asymmetries and short-term inefficiencies, there is also evidence supporting the hypothesis under certain conditions and periods. In less developed countries, transparency tends to be lower, the data disclosed may be less reliable, and oversight and auditing bodies may be more vulnerable to external interference, which exacerbates information asymmetry, Griffin, Kelly and Nardari (2010). Nevertheless, temporary frictions do not invalidate the broader analytical framework of the EMH, which continues to offer a valuable lens through which to understand market behaviour. These findings indicate that the efficiency of financial markets is sensitive to institutional and behavioural conditions specific to each context.

This is consistent with recent findings, which have identified three empirical patterns in the behaviour of asset prices. Recent evidence has identified consistent empirical patterns in the behaviour of asset prices. Empirical studies on the EMH have shown that prices tend to react quickly to new public information, as demonstrated by Wang (2019) and Murcia and Machado (2013). Another key finding is the unpredictability of future price movements, consistent with the results of Groenewold and Kang (2012).

Finally, short-term inefficiencies have not been clearly identified, making it difficult to achieve systematic abnormal returns in the short run, as observed by Camargos and Barbosa (2003).

5. Tests of the Weak Form of the Efficient Market Hypothesis

5.1 Research Hypotheses

Four null hypotheses (H_0) were formulated, each corresponding to a specific dimension of informational efficiency, to empirically assess the validity of the weak form of the EMH in the Brazilian stock market.

The hypotheses were formulated based on probabilistic models associated with the weak form of market efficiency. These models include fair game, martingale, submartingale and random walk. These frameworks establish different conditions under which asset prices incorporate information, but they share the assumption that prices reflect the information available. Therefore, such models exclude the possibility of systematically exploitable patterns based on historical data.

Under the fair game assumption, returns are unpredictable, as their conditional expected value, given past information, is zero. A martingale process assumes that the best forecast for the next price is simply the current price, implying no expected drift. The submartingale model introduces an expected upward trend in prices, which is consistent with markets in long-term expansion. Lastly, the random walk model implies that price changes are independent and identically distributed, making them entirely unpredictable. These concepts provide the theoretical foundation for the statistical tests applied in this section, such as autocorrelation, variance ratio, and unit root tests.

H_0,1: Absence of Seasonal Effects
The average monthly returns of the Ibovespa are statistically equal throughout the year, indicating the absence of seasonal anomalies. Rejection of this hypothesis would suggest the presence of calendar effects, which are incompatible with the weak form of the EMH.

H_0,2: Random Walk of Returns
Returns follow a random walk, characterised by the absence of serial autocorrelation. The rejection of this hypothesis would indicate return predictability, thereby violating weak-form efficiency.

H_0,3: Normality of the Return Distribution
The distribution of returns is normal, with kurtosis and skewness consistent with a normal distribution. Rejection of this hypothesis would suggest that prices do not follow the probabilistic behaviour assumed by many theoretical pricing models.

H_0,4: Ergodicity of the Stochastic Process
The stochastic process generating the returns is ergodic, meaning that the time average converges to the cross-sectional average. Rejection of this hypothesis would undermine the statistical validity of inferences about market behaviour.

The joint testing of these hypotheses enables a comprehensive assessment of market efficiency, combining statistical perspectives with institutional interpretations drawn from the critical literature.

5.2 Empirical Analysis

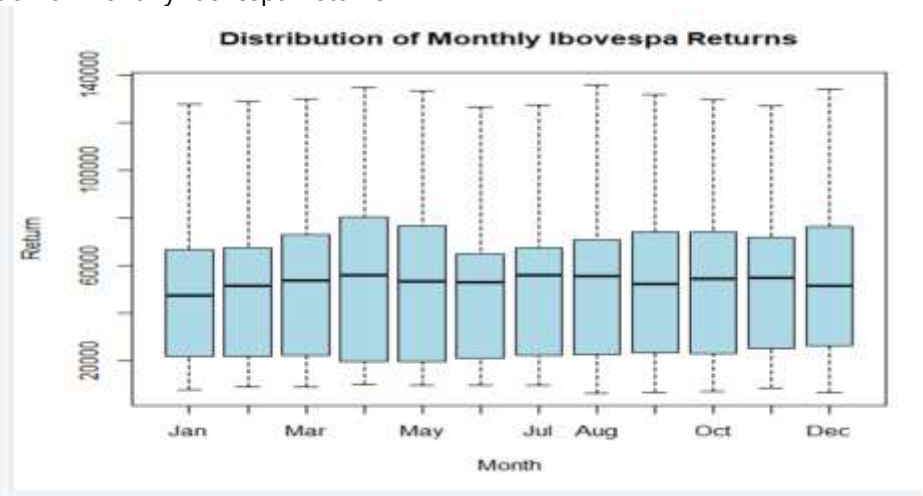
The empirical investigation was conducted based on the monthly logarithmic returns of the Ibovespa. Four complementary statistical approaches were employed to test the previously formulated hypotheses.

5.2.1 Seasonal Effects in Monthly Returns

To investigate the existence of seasonal effects, a one-way analysis of variance (ANOVA) was applied using "month" as the independent variable. The ANOVA results yielded an F-statistic of 0.026 and a p-value of 1.000, indicating no statistically significant differences among monthly returns. This outcome supports the null hypothesis of seasonal neutrality, in line with the weak form of the Efficient Market Hypothesis, as shown in Table 1. This result is further supported by the boxplot in Figure 1, titled “Distribution of Monthly Ibovespa Returns”, which reveals no consistent variation in the distribution of monthly returns.

Table 1 – Results of the ANOVA Test for Seasonal Effects in Monthly Ibovespa Returns	Df	Sum Sq	Mean Sq	F value	value Pr(>F)
Mes	11	3.85E+08	3.50E+07	0.026	1
Residuals	339	4.59E+11	1.36E+09		

Figure 1 – Distribution of Monthly Ibovespa Returns



5.2.2 Random Walk of Returns

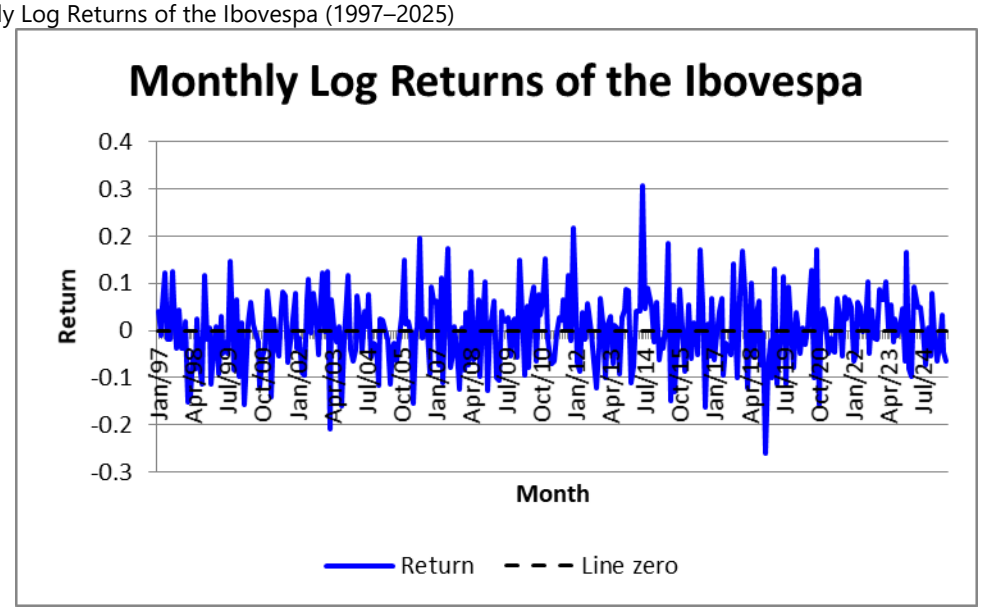
The validity of the random walk hypothesis was examined using two procedures. First, an autoregressive (AR) model was fitted with automatic order selection via the Yule-Walker method, which indicated AR(0), suggesting the absence of serial autocorrelation. Subsequently, the Ljung-Box test was applied with 12 lags, returning a p-value of 0.06676. Although this value is close to the 5% significance threshold, it is not sufficient to reject the null hypothesis of no autocorrelation. These results are broadly consistent with the random walk model proposed by Fama (1970), thereby supporting the weak form of the EMH, as summarised in Table 2.

Table 2 – Tests for the Random Walk of Ibovespa Monthly Returns (1997–2025)

Test/Model	Result	p-value	Null Hypothesis Rejected?
AR Model (Yule-Walker)	AR(0)	—	No serial correlation detected
Ljung-Box (lag = 12)	Q = [not provided]	0.06676	No (at 5% level)

Source: Author's own elaboration based on Ibovespa data.

Figure 2 – Monthly Log Returns of the Ibovespa (1997–2025)



The chart displays the monthly log returns of the Ibovespa. The dashed black line represents the zero-return threshold. Most fluctuations centre around zero, reinforcing the random walk assumption consistent with the weak form of the EMH.

These findings are consistent with the results of Lo and MacKinlay (1988), who emphasise that although deviations from the random walk can be observed in certain samples, their statistical significance depends on the methodology employed and the frequency of the data. Although previous studies using variance ratio tests have found evidence of return persistence in certain contexts, the results presented here do not support such patterns in the Brazilian market during the analysed period. In the present case, based on monthly data from the Ibovespa, no statistical evidence was found to reject the random walk hypothesis. This reinforces the validity of the weak form of the EMH for the period under analysis.

Beyond the formal statistical tests, the empirical literature on the weak form of the Efficient EMH also highlights the recurrence of certain patterns in stock returns. One such pattern is the momentum effect, whereby recent asset performance tends to persist in the short term. However, over longer horizons, studies such as DeBondt and Thaler (1985) have documented the reversal effect, suggesting that underperforming stocks in a base period tend to outperform, on average, those that had previously performed well. These findings indicate the presence of negative serial correlation in the long run and support the so-called fad hypothesis, which posits that markets often overreact to available information, with such distortions subsequently correcting over time. These patterns suggest fluctuations in short-term efficiency, although the results remain broadly consistent with weak-form expectations. If mean reversion is present, the sum of the covariances should be greater than zero.

5.2.3 Normality of the Distribution of Returns

Although not required by the weak form of the EMH, the hypothesis of return normality was tested using the Shapiro-Wilk test ($W = 0.91307$; $p < 0.01$) and the Anderson-Darling test ($A = 3.4393$; $p < 0.01$). Both strongly rejected the null hypothesis. The histogram with a normal curve indicated slight skewness and heavy tails (leptokurtosis), suggesting that Ibovespa returns do not follow a normal distribution, which has implications for theoretical risk models.

Table 3 – Normality Tests of Ibovespa Monthly Returns (1997–2025)

Test	Statistic	p-value	Null Hypothesis Rejected?
Shapiro-Wilk	0.91194	< 0.01	Yes
Anderson-Darling	3.8717	< 0.01	Yes
Skewness	–0.9299	—	Negative skewness
Kurtosis	10.145	—	Leptokurtic (heavy tails)

Source: Author's own elaboration based on Ibovespa data.

5.2.4 Ergodicity of the Stochastic Process

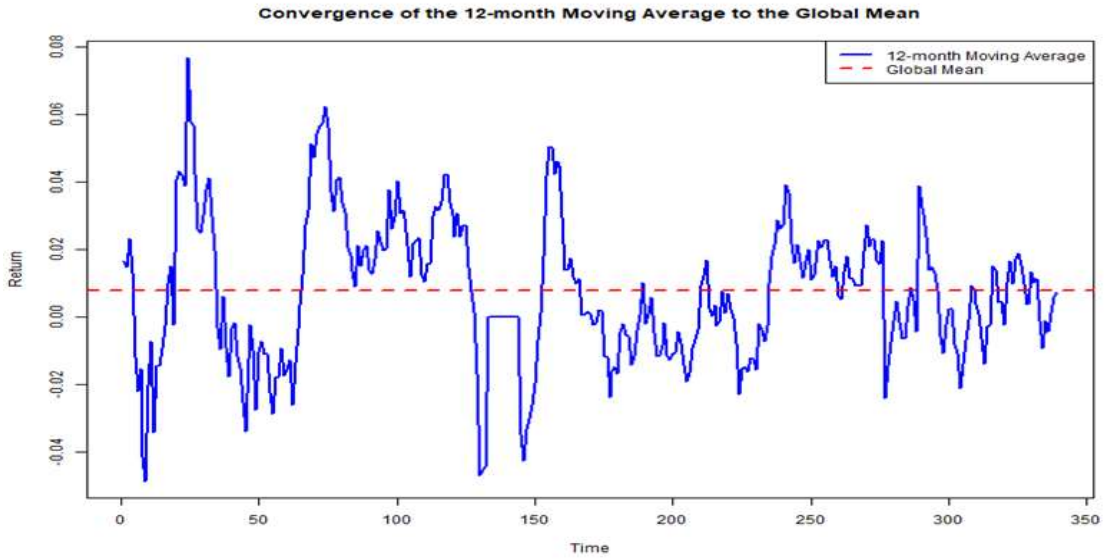
Ergodicity was investigated using the Augmented Dickey-Fuller (ADF) test, the result of which (statistic = –7.1104; $p < 0.01$) allowed for the rejection of the unit root hypothesis, indicating stationarity—a necessary condition for ergodicity. In addition, convergence of the 12-month moving average towards the global mean was observed, reinforcing the hypothesis that the underlying stochastic process is ergodic. This validates the representativeness of the Ibovespa historical series for inferential purposes.

Table 4 – Tests for the Ergodicity of the Ibovespa Return Process (1997–2025)

Test / Procedure	Statistic	p-value	Null Hypothesis Rejected?
Augmented Dickey-Fuller (ADF)	–7.1104	< 0.01	Yes (stationary process)
12-month Moving Average vs Mean	Visual convergence	—	Suggests ergodicity

Source: Author's own elaboration based on Ibovespa data.

Figure 3. Evidence of Ergodicity: 12-Month Moving Average and Global Mean of Ibovespa Retur



6. Conclusion

Based on the theoretical and empirical analysis conducted, it is concluded that the EMH represents an elegant and influential formulation within neoclassical economic theory, by articulating the principles of agent rationality, market self-regulation, and the efficient incorporation of information into asset prices. By asserting that prices fully reflect all available information, the EMH establishes an idealised scenario in which markets operate as perfect mechanisms for resource allocation.

However, the practical application of this hypothesis faces significant limitations. The empirical tests based on monthly returns of the Ibovespa allowed for the assessment of different dimensions of the weak form of the EMH. The results indicated the absence of seasonal effects and serial autocorrelation, as well as adherence to the random walk model. Furthermore, the series exhibited statistical properties consistent with ergodicity. These findings partially support the weak form of the hypothesis in the Brazilian context over the period under review. Nevertheless, the rejection of the normality assumption for returns suggests that financial markets do not behave in a perfectly symmetrical or predictable manner, which implies caution when adopting models that assume a Gaussian distribution of returns.

More than a statistical verification, the critique of the EMH involves a broader reflection on the methodological assumptions underlying its formulation. Heterodox approaches emphasise that markets are shaped by power structures, social norms, historical processes, and institutional dynamics. Bounded rationality, information costs, radical uncertainty, and structural imperfections challenge the notion of a fully efficient market. In other words, by criticising the abstractions embedded in neoclassical hypotheses, heterodox authors sometimes obscure the fundamental elements that explain the process of price formation. This is not merely a critique of the EMH, but of the neoclassical framework as a whole. Some heterodox economists go so far as to argue that the principles guiding developed economies cannot be applied to developing countries, given the specificity of their institutional and historical contexts.

In this context, instrumentalism provides a methodological rationale for the continued use of theoretical models in social sciences, despite their lack of descriptive realism. As Friedman (1953) argued, the value of a model lies not in the realism of its assumptions, but in its capacity to generate useful and testable predictions. Given the complexity, unpredictability, and historical specificity of economic behaviour, abstraction becomes necessary to isolate and understand key mechanisms. From this perspective, the EMH, like other idealised constructs, serves as a conceptual tool that enables the formulation of hypotheses, the structuring of empirical tests, and the organisation of interpretative frameworks, even if its assumptions rarely hold in full in real-world settings.

In sum, although the EMH is grounded in the logic of general equilibrium, it does not imply price or quantity stability in the traditional sense. The concept of equilibrium in the EMH is informational: prices are assumed to fully and immediately reflect all available information, regardless of the volatility or unpredictability that may result. Thus, market fluctuations are not viewed as evidence of disequilibrium, but rather as the natural outcome of continuous information processing. This perspective reveals a fundamental tension between the theoretical notion of equilibrium and the dynamic, often unstable behaviour observed in real financial markets.

Therefore, although the EMH remains a relevant theoretical model for analytical purposes, its usefulness as a descriptive tool for real markets is limited. In the real world, markets exhibit a mixture of efficient and inefficient behaviours, as decisions and events are not always immediately reflected in prices. Methodological instrumentalism, as defended by Friedman, may justify its adoption despite unrealistic assumptions, provided that empirical predictions are satisfactory. However, as demonstrated in this study, such empirical validation is, at best, partial and context-dependent, shaped by the specific institutional and historical features of the market under analysis. It is important to note that imperfect markets and informational asymmetries prevail in actual economic settings, where agents — including both public and private managers — may resort to accounting manipulation in order to present an artificial appearance of financial soundness.

In this regard, this study contributes to a critical understanding of the EMH by highlighting both its theoretical coherence and its empirical limitations, while also pointing to the need for more realistic and interdisciplinary approaches that take into account the complexities of contemporary financial markets. The EMH is an idealised model, useful for analytical purposes but not necessarily accurate from an empirical standpoint. Its application requires consideration of factors such as the degree of transparency of available information, the reliability of data relating to the financial and economic condition of firms, the cost of obtaining such information, the political context, and the level of institutional maturity in the market under analysis. The closer reality aligns with the model's assumptions, the more consistent empirical results are likely to be with its theoretical predictions.

Funding: This research received no external funding.
Conflicts of Interest: The authors declare no conflict of interest.
ORCID Id: 0000-0002-0500-630

References

[1] Balawi, A., & Ayoub, A. (2022). Herd behavior and its effect on the stock market: An economic perspective. Quality - Access to Success, 23(188), 285–289. https://doi.org/10.47750/QAS/23.188.38
[2] Ball, R., & Brown, P. (1968). An empirical evaluation of accounting income numbers. Journal of Accounting Research, 6(2), 159–178. https://doi.org/10.2307/2490232
[3] Basu, S. (1997). The conservatism principle and the asymmetric timeliness of earnings. Journal of Accounting and Economics, 24(1), 3–37. https://doi.org/10.1016/S0165-4101(97)00014-1
[4] Beaver, W. H. (1968). The information content of annual earnings announcements. Journal of Accounting Research, 6(Suppl.), 67–92. https://doi.org/10.2307/2490070
[5] Birchler, U., & Bütler, M. (2007). Information Economics. Routledge.
[6] Bourdieu, P. (1983). O campo científico. In R. Ortiz (Org.), Pierre Bourdieu: Sociologia (pp. 122–155). São Paulo: Ática.
[7] Camargos, M. A., & Barbosa, F. V. (2003). Análise da eficiência do mercado acionário brasileiro por meio de estudo de eventos. Revista de Administração Contemporânea, 7(1), 63–82. https://doi.org/10.1590/S1415-65552003000100004
[8] Carvalho, F. J. C. (2009). O retorno de Keynes. Novos Estudos CEBRAP, 83, 91–101.
[9] Caws, P. (1972). R. Harré, The Principles of Scientific Thinking [Review]. Synthese, 25(1/2), 248–253.
[10] Chick, V. (1983). Macroeconomics after Keynes: A Reconsideration of the General Theory. Philip Allan / MIT
[11] Coco, G. (2000). On the use of signalling for credit market regulation. Journal of Financial Intermediation, 9(1), 4–24. https://doi.org/10.1006/jfin.1999.0273
[12] Davidson, P. (1991). Is probability theory relevant for uncertainty? A Post Keynesian perspective. Journal of Economic Perspectives, 5(1), 129–143. https://doi.org/10.1257/jep.5.1.129
[13] DeBondt, W. F. M., & Thaler, R. H. (1985). Does the stock market overreact? The Journal of Finance, 40(3), 793–805. https://doi.org/10.1111/j.1540-6261.1985.tb05004.x
[14] Eccles, R. G., Herz, R. H., Keegan, E. M., & Phillips, D. M. H. (2002). The value reporting revolution: Moving beyond the earnings game. John Wiley & Sons.
[15] Fama, E. F. (1965). The behavior of stock-market prices. The Journal of Business, 38(1), 34–105. https://doi.org/10.1086/294743
[16] Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. Journal of Finance, 25(2), 383–417. https://doi.org/10.2307/2325486
[17] Friedman, M. (1953). Essays in positive economics. Chicago: University of Chicago Press.
[18] Griffin, J. M., Kelly, P. J., & Nardari, F. (2010). Do market efficiency measures yield correct inferences? A comparison of developed and emerging markets. Review of Financial Studies, 23(8), 3225–3277. https://doi.org/10.1093/rfs/hhq052
[19] Groenewold, N., & Kang, K. C. (2012). The semi-strong efficiency of the Australian stock market: A revisit. Economic Modelling, 29(3), 684–691. https://doi.org/10.1016/j.econmod.2011.12.013

[20] Grossman, S. J., & Stiglitz, J. E. (1980). On the impossibility of infrmationally efficient markets. The American Economic Review, 70(3), 393–408.
[21] Hayek, F. A. von. (2009). O uso do conhecimento na sociedade (D. Bertoluci, Trans.). In F. A. von Hayek, O caminho da servidão e outros escritos (pp. 177–192). São Paulo: Instituto Ludwig von Mises Brasil. (Original work published 1945). Retrieved from https://mises.org.br/Ebook.aspx?id=36
[22] Hirshleifer, J. (1971). The private and social value of information and the reward to inventive activity. The American Economic Review, 61(4), 561–574.
[23] Jensen, M. C. (1978). Some anomalous evidence regarding market efficiency. Journal of Financial Economics, 6(2–3), 95–101. https://doi.org/10.1016/0304-405X(78)90025-9
[24] Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. Econometrica, 47(2), 263–291. https://doi.org/10.2307/1914185
[25] Kendall, M. G. (1953). The analysis of economic time-series—Part I: Prices. Journal of the Royal Statistical Society: Series A (General), 116(1), 11–34. https://doi.org/10.2307/2980947
[26] Keynes, J. M. (1982). A teoria geral do emprego, do juro e da moeda (Trad. M. P. Vasconcellos). São Paulo: Atlas. (Obra original publicada em 1936).
[27] Kreps, D. M. (1994). A course in microeconomic theory. Harvester Wheatsheaf.
[28] Lima, E. J. A., & Tabak, B. M. (2004). Testing for a random walk in the Brazilian stock market. Applied Economics Letters, 11(4), 255–258. https://doi.org/10.1080/13504850410001674820
[29] Lisboa, M. B. (1997). A miséria da crítica heterodoxa: Primeira parte: Sobre as críticas. Revista de Economia Contemporânea, 1(2), 5–66. Retrieved from: https://revistas.ufrj.br/index.php/rec/article/download/19592/11357/45547
[30] Lo, A. W., & MacKinlay, A. C. (1988). Stock market prices do not follow random walks: Evidence from a simple specification test. The Review of Financial Studies, 1(1), 41–66. https://doi.org/10.1093/rfs/1.1.41
[31] Macho-Stadler, I., & Pérez-Castrillo, D. (1997). An introduction to the economics of information: Incentives and contracts. Oxford University Press.
[32] Malkiel, Burton, G. 2003. "The Efficient Market Hypothesis and Its Critics ." Journal of Economic Perspectives 17 (1): 59–82. DOI: 10.1257/089533003321164958
[33] Markowitz, H. (1952). Portfolio selection. The Journal of Finance, 7(1), 77–91. https://doi.org/10.2307/2975974
[34] Matos, F. R. N., & Moreira, A. C. (2008). A hipótese do passeio aleatório no mercado acionário brasileiro: Uma análise empírica. Revista de Economia Mackenzie, 6(2), 67–87.
[35] Melo, P. H. F. (2015). Gerenciamento de resultados contábeis e o conservadorismo contábil: Uma análise em empresas brasileiras que realizaram IPO [Earnings management and accounting conservatism: An analysis of Brazilian companies that conducted IPOs] [Master's thesis, Universidade Federal de Minas Gerais].
[36] Molho, I. (1997). The Economics of Information: Lying and Cheating in Markets and Organizations. Blackwell.
[37] Murcia, F. D. R., & Santos, A. dos. (2010). Determinants of Corporate Voluntary Disclosure in Brazil. SSRN. https://doi.org/10.2139/ssrn.1531767
[38] Murcia, F. D.-R., & Machado, M. V. (2013). Impacto do nível de disclosure corporativo na liquidez das ações de companhias abertas no Brasil. Contabilidade Vista & Revista, 24(3), 54–77. Retrieved from https://www.redalyc.org/pdf/1970/197032751004.pdf
[39] Niyama, Jorge Katsumi; de Souza Costa, Patrícia; de Aquino, Ducineli Régis Botelho, (2005). Principais Causas Das Diferenças Internacionais No Financial Reporting: Uma Pesquisa Empírica Em Instituições De Ensino Superior Do Nordeste e Centro-oeste do Brasil. ConTexto, v. 5, n. 8
[40] Oliveira Neto, L. E. de. (2011). O impacto das decisões de investimentos estratégicos sobre o valor de mercado das empresas quando tomadas por gestores otimistas e excessivamente confiantes [Tese de doutorado, Universidade Presbiteriana Mackenzie]. Universidade Presbiteriana Mackenzie.
[41] Popper, K. R. (2009). The logic of scientific discovery (Routledge Classics ed.). Routledge. (Original work published 1959)
[42] Rasmusen, E. (1992). Games and information: An introduction to game theory. Blackwell.
[43] Samuelson, P. A. (1965). Proof that properly anticipated prices fluctuate randomly. Industrial Management Review, 6(2), 41–49.
[44] Shiller, R. J. (2003). From Efficient Markets Theory to Behavioral Finance. Journal of Economic Perspectives, 17(1), 83–104.
[45] Shiller, R. J. (2015). Irrational exuberance (3ª ed.). Princeton University Press.
[46] Silva, W. V., & Machado, M. A. V. (2011). Reação do mercado de capitais brasileiro à divulgação de informações contábeis: Um estudo de eventos. Revista Contabilidade & Finanças, 22(56), 229–248. https://doi.org/10.1590/S1519-70772011000300007
[47] Simon, H. A. (1955). A behavioural model of rational choice. The Quarterly Journal of Economics, 69(1), 99–118. https://doi.org/10.2307/1884852

[48] Simon, H. A. (1957). Models of man: Social and rational. Mathematical essays on rational human behavior in a social setting. New York: Wiley.
[49] Spence, M. (1974). Market signalling: Informational transfer in hiring and related screening processes. Harvard University Press.
[50] Stiglitz, J. E. (2002). Information and the change in the paradigm in economics. American Economic Review, 92(3), 460–501. https://doi.org/10.1257/00028280260136363
[51] Sweeney, A. P. (1994). Debt-covenant violations and managers' accounting responses. Journal of Accounting and Economics, 17(3), 281–308. https://doi.org/10.1016/0165-4101(94)90030-2
[52] Thaler, R. H. (Ed.). (1993). Advances in behavioral finance. Russell Sage Foundation.
[53] Tostes, F. P., & Vasarhelyi, M. A. (2010). A divulgação de informações contábeis e financeiras no mundo virtual. Revista de Contabilidade do Mestrado em Ciências Contábeis da UERJ, 10(2). Retrieved from http://www.atena.org.br/revista/ojs-2.2.3-06/index.php/UERJ/article/viewArticle/672
[54] Varian, H. R. (2010). Intermediate Microeconomics: A Modern Approach (8ª ed.). W. W. Norton & Company.
[55] Verrecchia, R. E. (2001). Essays on disclosure. Journal of Accounting and Economics, 32(1–3), 97–180. https://doi.org/10.1016/S0165-4101(01)00025-8
[56] Wang, S. (2019). Informational environments and the relative information content of analyst recommendations and insider trades. Accounting, Organizations and Society, 72, 61-73.
[57] Weber, M. (1994). Economia e sociedade: Fundamentos da sociologia compreensiva (Vol. 1, G. Roth & C. Wittich, Eds.; D. Soares, Trans.). São Paulo: Editora UNESP. (Original work published 1922)