

Alternatives to the efficient market hypothesis: an overview

Market
efficiency

Kingstone Nyakurukwa and Yudhvir Seetharam

*School of Economics and Finance, University of the Witwatersrand,
Johannesburg, South Africa*

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Abstract

Purpose – The authors' goal is to provide an overview and historical context for the various alternatives to the efficient market hypothesis (EMH) that have emerged over time. The authors found eight current alternatives that have emerged to address the EMH's flaws. Each of the proposed alternatives improves some of the assumptions made by the EMH, such as investor homogeneity, the immediate incorporation of information into asset values and the inadequacy of rationality to explain asset prices.

Design/methodology/approach – To come up with the list of studies relevant to this review article, the authors used three databases, namely Scopus, Web of Science and Google Scholar. The first two were mostly used to get peer-reviewed articles while Google Scholar was used to extract articles that are still work in progress. The following words were used as the search queries; "efficient market hypothesis" and "alternatives to the efficient market hypothesis".

Findings – The alternatives to the EMH presented in this article demonstrate that market efficiency is a dynamic concept that can be best understood with a multidisciplinary approach. To better comprehend how financial markets work, it is crucial to draw on concepts, theories and ideas from a variety of disciplines, including physics, economics, anthropology, sociology and others.

Originality/value – The authors comprehensively summarise the current state of the behavioural finance literature on alternatives to the EMH.

Keywords Efficient market hypothesis, Behavioural finance, Econophysics, Asset pricing

Paper type General review

1. Introduction

Classical finance, which can be traced back to the 1950s, survived close to three decades without being formally challenged. Some of the pioneering work in classical finance includes the introduction of the mean-variance portfolio theory (Markowitz, 1952), the life cycle theory (Modigliani and Brumberg, 1954) and the permanent income hypothesis (Friedman, 1957). Miller and Modigliani (1961) would define rational investors and, a few years later, the Capital Asset Pricing Model, as well as the efficient market hypothesis (EMH), were introduced by Sharpe (1964) and Fama (1965) respectively. According to Statman (2019), the pioneering work of the researchers above provides the building blocks upon which classical finance is built namely:

- (1) The rationality of investors;
- (2) The construction of portfolios using the mean-variance portfolio theory;
- (3) Saving and spending as determined by the life cycle theory;
- (4) The determination of differences in expected returns by differences in risk – *i.e.* expected returns are solely accounted for by the traditional asset pricing theory;

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- (5) The efficiency of markets – new information is instantaneously incorporated into stock prices making it difficult to predict the markets.

At the corner of classical finance is the EMH. This view presents participants in financial markets as rational optimisers and therefore assumes that everyone can solve complex stochastic optimisation models. The EMH postulates that the arrival of new information into capital markets is presumed to be random and therefore the effect on prices cannot be predicted with ease. Malkiel (2003) posits that new information that arrives in financial markets is instantaneously incorporated into the prices of financial assets and in the process drives the prices of the financial assets to their “*correct prices*”. The EMH postulates that the actions of irrational optimists or irrational pessimists are offset by “*smart money*” investors who buy or sell appropriately to eliminate irrational traders. Deviations from the fundamental prices of stocks are therefore short-lived as the markets are quickly corrected by the actions of intelligent investors. Thus, in an efficient market, it is impossible to predict the direction of the market using technical analysis or trying to predict the emotions of retail investors. The EMH is the basis on which the idea of “passive investing” rests, where investors tend to invest through index funds with the belief that because it is impossible to consistently beat the market, there is no need to spend more on active portfolio management. According to this line of thought, it is prudent and more rewarding to invest in the entire market at considerably lower costs compared to the costs likely to be incurred by active investors.

The EMH dominated discourses in finance until the 1980s when researchers started reporting anomalies that could not be explained by the EMH. Several alternatives to the EMH have since emerged to complement it. In this study, we seek to give an overview of the various alternatives to the EMH that have developed over the years. We then evaluate the implications of the alternatives for empirical finance. We proceed as follows; in Section 2, we outline the methodology we used to come up with the alternatives identified for this study, in Section 3 we present the results, in Section 4 we give an evaluation and implications of the alternatives while Section 5 concludes.

2. Methodology

To come up with the list of studies relevant to this review article, we used three databases, Scopus, Web of Science and Google Scholar. The first two were mostly used to get peer-reviewed articles while Google Scholar was used to extract articles that are still at the working paper stage. The following words were used as the search queries; “Efficient Markets Hypothesis” and “Alternatives to the Efficient Markets Hypothesis”.

3. Alternatives to the EMH

Behavioural finance emerged in the 1990s in response to the failure of existing theories and models to explain the anomalies that researchers grappled with in the 1980s. Shiller (2003) defines behavioural finance as “finance from a broader social science perspective” that incorporates insights from theories and concepts from diverse fields such as psychology, sociology and finance. According to Statman (2019), for each building block of classical finance (identified in the introduction), behavioural finance has alternative building blocks which are:

- (1) People are normal;
- (2) People construct portfolios as outlined by the behavioural portfolio theory;
- (3) People save and spend as described by behavioural life cycle theory;

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- (4) Expected returns of investments are accounted for by the behavioural asset pricing theory;
 - (5) Markets are efficient in the sense that they are hard to beat but not impossible to beat.

In the behavioural finance domain, several alternatives to the EMH have been proposed, which mainly deviate from the assumptions of investor rationality and homogeneity. We outline some selected alternatives to the EMH which are mostly based on the building blocks of behavioural finance outlined above.

3.1 Noise trader approach to finance

[Shleifer and Summers's \(1990\)](#) noise trader approach (NTA) rests on two assumptions: first, some investors are not fully rational and their demand for risky assets is affected by their beliefs or sentiments that are not fully justified by fundamental news; and second, that arbitrage—defined as trading by fully rational investors not subject to such sentiment—is risky and therefore limited. These two assumptions together imply that changes in investor sentiment are not fully countered by arbitrageurs and so affect security returns. [Shleifer and Summers \(1990\)](#) argue that this approach to financial markets is in many ways superior to the EMH. [Shleifer and Summers \(1990\)](#) make a threefold case for the NTA: first, theoretical models with limited arbitrage are both tractable and more plausible than models with perfect arbitrage; second, the investor sentiment/limited arbitrage approach yields a more accurate description of financial markets than the EMH; and third, the NTA can explain many empirical phenomena that the EMH cannot.

The NTA suggests that changes in investor sentiment can have a real impact on security returns, even if those changes are not based on fundamental news. This means that market movements can be driven by factors other than changes in underlying economic conditions. The NTA also suggests that arbitrageurs may not always be able to fully counteract these movements, as their actions are limited by risk. This has important implications for investors, who need to be aware of the potential impact of noise traders on market movements and take this into account when making investment decisions. Various empirical studies have given evidence of the ability of investor sentiment to explain stock returns using investor sentiment from market variables (e.g. [Baker and Wurgler, 2007](#)), surveys (e.g. [Solanki and Seetharam, 2014](#)) and sentiment extracted from online texts (e.g. [Nyakurukwa and Seetharam, 2022a, b](#)).

3.2 Coherent market hypothesis

An attempt to advance the EMH through a model of how markets operate led to the coherent market hypothesis (CMH) ([Vaga, 1990](#)). The CMH suggests that subject to some general guidelines and taking into account a combination of investor sentiment and fundamental bias, market movements can be forecast. Random walk, unstable transition, chaos and coherence are the phases that the market goes through subject to a combination of group sentiment and fundamental bias. The random walk theory and the efficient markets theory are thought to have overstated their claims, hence the CMH seeks to limit these claims. The stock return distribution is not required to be normally distributed in the context of the CMH. Instead, it depends on how fresh information is valued by investors to shape their predictions about future prices. The conclusions drawn from the CMH are identical to those drawn from the traditional models only if all investors behave rationally (suggesting that there is no group behaviour) and if the fundamental environment is neutral, as, under those circumstances, the assumed stock return distribution is a standard normal distribution. If not, the CMH assumes various distributions, such as those with differing skewness, kurtosis, or even bimodality ([Steiner and Wittkemper, 1997](#)).

3.3 Fractal Market Hypothesis

The fractal market hypothesis (FMH) emerged in the 1990s from the work of Edgar [Peters \(1994\)](#). In simple terms, the FMH asserts that price variations can still be regarded as random walks. However, this time the statistical distribution of the random walks is similar over different scales in time. This means that financial markets consist of multitudes of investors who have distinct investment horizons and whose information set is specific to their investment horizons. If this fractal structure is maintained, there should be stability in the financial markets. The dominance of a specific investment horizon will lead to inefficient clearance of buy and sell orders and this may culminate in extreme events. The FMH ascribes the existence of extreme events in financial markets to dominating investment horizons ([Kristoufek, 2013](#)). During financial turmoil, short-term investors dominate, first, because long-term investors may react to negative news by panic-buying and herding behaviour and this may artificially amplify the activity at shorter horizons. Second, long-term investors may elect to abstain from the market, again amplifying the activity of short-term investors at the expense of long-term investors. It is this domination of a specific investing horizon that leads to extreme returns.

The advances in technology in the past few years have necessitated seamless trading of large volumes of stock by spontaneous matching of buyers and sellers with distinct investing horizons. However, these technological advancements can only go as far as matching buyers and sellers. There is no “*agreed-upon mechanism*” to determine the fair value of a stock. The EMH does not account for liquidity as it simply subscribes to the notion of fair value regardless of whether adequate market liquidity exists or not. Intuitively, the absence of adequate liquidity in the market may force participating agents to take any price, whether it is fair or not. Thus, liquidity plays a very crucial role in the FMH leading to the following propositions:

- P1. When investors from a wide range of investment horizons participate in the market, it is stable and traders have access to plenty of liquidity.
- P2. Longer-term fundamental information predominates when investing horizons expand and price fluctuations may represent information exclusively relevant to a particular investment horizon.
- P3. Market instability results from a market’s entire investing horizon becoming uniformly smaller, for example, when long-term investors who provide short-term investors with liquidity, are not there to help stabilise the market.

3.4 Heterogenous market hypothesis

A year after the FMH was formalised, the heterogenous market hypothesis (HMH) was introduced by [Müller et al. \(1995\)](#) and refuted the homogeneity of investors. According to [Müller et al. \(1995\)](#), financial markets are fractal in the sense that different market participants have differing time horizons with which they process past events and news for trading. The HMH, therefore, hypothesises that investor reaction to news depends on their time horizon and their characteristic dealing frequency. Thus, the same news may be interpreted differently by different investors according to their trading frequency. [Müller et al. \(1995\)](#) also noted that besides being driven by different time horizons, activity by market participants in a heterogeneous market can also be characterised by differences in the degrees of risk aversion, institutional constraints and transaction costs. [Dacorogna et al. \(2001\)](#) argue that the principles of HMH as outlined above and originally applied to the foreign exchange market are also applicable in the stock market. The HMH implies that researchers should use econometric methods that model how different investors from different investing horizons react to financial news or external shocks.

3.5 Adaptive market hypothesis

Lo's (2004) attempt to reconcile the EMH with behavioural finance led to the adaptive market hypothesis (AMH) where the two paradigms were described as state-dependent. Lo (2004) argued that in periods of continuous market developments, investors tend to act rationally based on factual knowledge. At the slightest disruption of the markets, people act irrationally, being guided by instinctive behaviour. Most investors rush into the market *for fear of missing out* or exit the market for *fear of losing value*. According to this view, financial markets are governed more by the laws of evolutionary biology than they are governed by the laws of physics (Lo, 2017). At the centre of the AMH is the belief that individuals are driven by self-interest, make mistakes and learn from the committed mistakes. The process of experimenting to correct the committed mistakes activates the process of natural selection which operates on different stakeholders in the financial markets leading to financial market dynamics. Thus, in summary, the AMH asserts that markets are not always rational or optimal but are sometimes heuristic and emotional. This time-dependent nature of market efficiency has been modelled and tested using different methods. Tran and Leirvik (2019) proposed a measure of efficiency which they termed the adjusted market inefficiency magnitude (AMIM), which increases as market efficiency decreases and decreases as market efficiency increases. The empirical findings by Tran and Leirvik (2019) indicate that market efficiency varies over time, across different assets and in various regions. This observation aligns with the AMH.

3.6 Alternatives driven by narrative economics

The past few years have seen the adoption of a multidisciplinary approach to explaining various economic and financial phenomena. One of these new approaches has been popularised and formalised by Shiller (2019a, b) through his concept of narrative economics. This new approach is placed at the intersection of economics, sociology and epidemic studies and specifically seeks to explore narrative-based enthusiasms peculiar to economic behaviour. The notion of economic narratives emphasises the importance of humans in influencing economic phenomena. The economy is driven by humans who may include consumers, politicians as well as people in business. These different types of people have different beliefs and biases, as well as passions, and the decisions they often make, are influenced by the stories forming around them. Shiller (2019a, b) defines narrative economics as the study of popular narratives that spread through contagion and are often like the spread of diseases. These "economic narratives" have the potential to alter the economic decisions of people. The more a narrative spreads widely, the more people are conversing about it whether physically in-person or using digital means. Like an epidemic, a specific narrative may eventually die as people start forgetting about it, often leading to the emergence of a new narrative. The proliferation of news media and social media has further intensified the importance and relevance of economic narratives as these media have provided a platform where narratives can spread across people epidemic-wise. This important new paradigm of economic narratives has birthed several alternatives to the EMH like the Discovering Market Hypothesis (DMH), the novelty-narrative hypothesis (NNH) and the intersubjective market hypothesis (IMH).

3.6.1 Discovering market hypothesis. Kleinheyer and Mayer (2020) attempt to answer the question of why rational investors suddenly act irrationally in market downturns and why irrational investors suddenly act rationally in normal markets. Though the AMH posits that financial markets alternate between states of continuity and discontinuity which are already given, Kleinheyer and Mayer (2020) in their DMH, reason that the changes in continuity and discontinuity emanate from how knowledge emerges and spreads in narrative form. The heart of the DMH is therefore on the role of narratives in financial markets. According to this

paradigm, individuals do not rush to act on the information they extract from different sources and for different reasons. They tend to compare the information they already possess with the information and knowledge that is in the domain of other agents. However, communication of complex knowledge is cumbersome (Kleinheyer and Mayer, 2020) but when it is expressed in the form of narratives it becomes easier to “get across ideas” (Shiller, 2019a). According to Shiller (2019a, b), economic narratives have the potential to spread like epidemics and in the process affect the behaviour of economic agents, the behaviour which can also feed back into narratives. While Shiller’s (2019a, b) concept of economic narrative was broad and traced the effect of “macro-level” narratives on economic development, Kleinheyer and Mayer (2020) use the narrow concept of economic narratives to trace how the economic behaviour of economic agents is influenced by narratives and the subsequent effect on asset price formation in financial markets.

Kleinheyer and Mayer (2020) use Kuhn’s (1996) theory of scientific revolutions to describe how narratives evolve in financial markets. According to Kuhn (1996), scientific knowledge tends to increase around a commonly acknowledged paradigm. When times are normal, this paradigm is widely accepted and therefore not challenged, but is instead fleshed out by new insights. However, the emergence of a critical mass of new facts that deviates from the original paradigm may trigger a scientific revolution. Those views and beliefs that were widely accepted start being questioned and, in some cases, overturned. This leads to uncertainty coupled with confusion as people wait for a replacement paradigm that is deemed to better explain the new facts. Kleinheyer and Mayer (2020) subscribe to this kind of battle for narratives in their DMH. Using Kuhn’s (1996) theory, the DMH postulates that markets are calm when a widely acknowledged narrative is not challenged and turbulence in financial markets is expected when the previously accepted narratives are replaced by emerging and radical ones. This is akin to Mandelbrot and Hudson’s (2006) view of financial markets alternating between states of smoothness and roughness, where there are long periods where little happens and short periods characterised by high turbulence. The thrust of the DMH is on the focus of how new facts influence narratives which in turn influence prices in a simplified cycle as shown in Figure 1.

As shown in Figure 1, facts that individuals get from different sources (e.g. newspapers or social media platforms) create subjective knowledge peculiar to the recipient of the facts. Financial participants may then decide to act on this subjective knowledge by using it to enter buy and/or sell contracts. However, in most cases, participants in financial markets tend to share this subjective knowledge with peers to identify shared narratives. It is then these

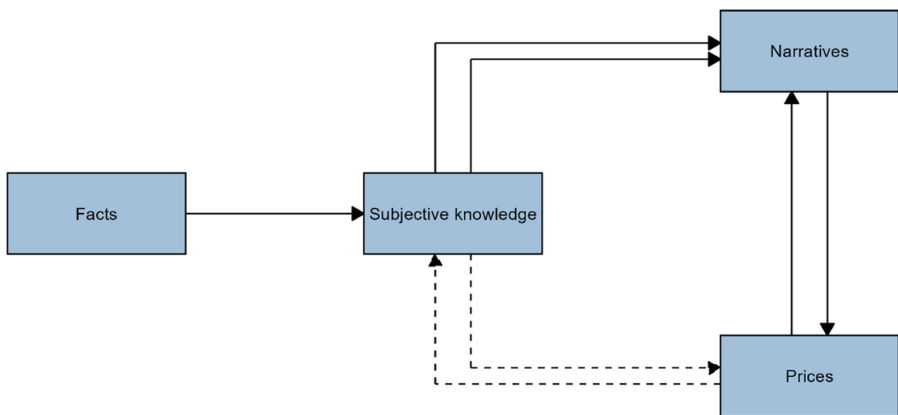


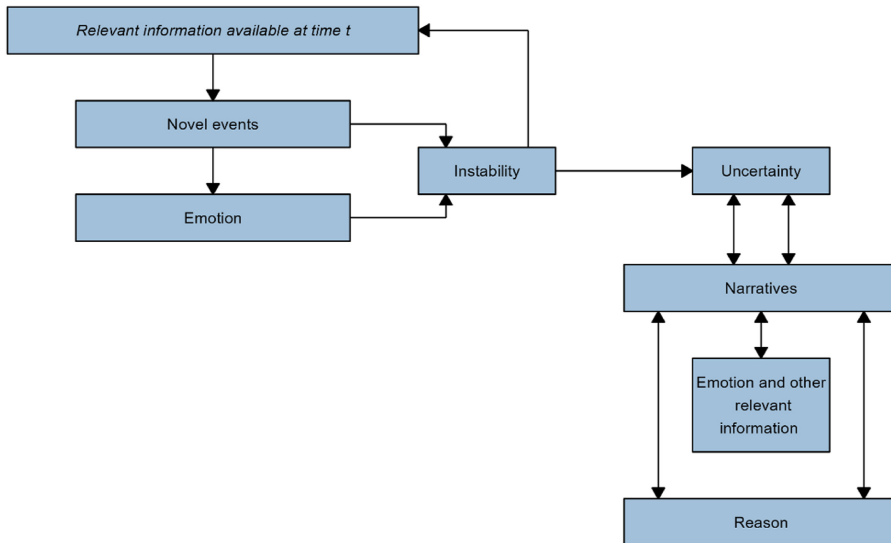
Figure 1.
A visual representation
of the DMH

Source(s): Adapted from Kleinheyer and Mayer (2020)

shared narratives that are more powerful in influencing asset price formation than the action that is based on individual subjective knowledge.

3.6.2 *Novelty-narrative hypothesis.* The events surrounding the COVID-19 pandemic coupled with the rising importance of economic narratives as initially described by Shiller (2019a, b), led to the emergence of yet another alternative to the EMH that seeks to describe the role of information in financial markets, especially in the presence of black swan events. The NNH (Mangee, 2021) seeks to bring to the fore the role of information in an environment that has been exposed to a novel event. Where there is a novelty, there are increased tendencies for instability which tend to increase the levels of uncertainty in turn. Some novel events that have been recorded in history include the 9/11 attacks, the subprime mortgage crisis, Brexit, the oil market crash of 2020 and recently the COVID-19 pandemic among others. The defining characteristic of these novel events is that their timing and the level of uncertainty they are likely to impose on markets cannot be predicted *ex ante*, let alone understood in hindsight. Whenever one of these non-repetitive events takes place, investors deviate from their traditional quantitative models as they battle to establish the model that could give them the greatest confidence in predicting the future.

According to Mangee (2021), faced with a novel non-repetitive event, investor thinking quickly inclines towards storytelling as a defence mechanism and as a survival tactic. During these times, investors also turn to narratives as cognitive satisficing tools “when previous relations driving returns have come unhinged in unforeseen ways” (Mangee, 2021). Investor narratives will play a role in shaping incomplete information and emotion into cognitive guideposts when black-swan events disparage the importance of utilising historical data to predict the future. The NNH is therefore premised on the need to understand how novelty triggers the structural change in the stock market, leading to popular stories. The connection proposed by the NNH between novelty, instability, uncertainty, narratives and emotions is depicted visually in Figure 2:



Note(s): Figure 2 shows a framework for the sequential and interactive relationships between novel events, instability, uncertainty and emotions in financial markets

Source(s): Adapted from Mangee (2021)

Figure 2.
A visual representation of the NNH in asset markets

Figure 2 shows various relational statements based on the NNH which can be described as follows:

- (1) First, a black-swan event constitutes a part of the available relevant information at time t . A black swan event generates emotion and these two interact to trigger instability in the financial market and in the process influence market outcomes.
- (2) When instability becomes part of the information set, it leads to high levels of uncertainty that can also feed back into instability at a given point in time.
- (3) Faced with uncertainty, financial markets engender the generation of narratives that contain emotion and other types of information like macroeconomic data at time t . The narrative threads so generated interact with each other as well as with investors' interpretations of information which may feed back into market uncertainty.
- (4) It is the narratives that then lead to reasoning or rationality for thinking about the most suitable prediction strategy driving the processes influencing future outcomes.

The NNH elevates the role of sentiment surrounding non-repetitive events' effects on stock returns. Within the NNH, sentiment plays a central role in the narrative dynamics, helping to flesh out the model that investors could consider to be able to forecast the future with confidence. This line of thinking is based on recent theoretical advancements which are more inclined towards a "fundamentals-based role for psychology in driving aggregate returns in financial markets" (Frydman and Goldberg, 2015). Manglee (2021) argues that theorists from such diverse fields as neuroscience, psychology and sociology produced experimental evidence that back a sentiment-based view of decision making which is basically in sync with rational behaviour as defined in other behavioural sciences. This deviates from most of the existing literature in economics and finance that attributes the effects of sentiment to forecasting errors, random perturbations, irrational behaviour and other factors considered orthogonal to fundamental considerations and reasoning at large.

3.6.3 Intersubjectivity market hypothesis. The IMH of Bocher (2022) seeks to use a multidisciplinary approach to explain asset price formation in financial markets. Bocher (2022) credits the AMH in its attempt to bring together three scientific fields (economics, psychology and biology) to understand asset pricing in financial markets but states that there is a need for a broader array of disciplines beyond the three used by Lo (2004). This broader array of scientific fields could include not only biology, sociology and psychology but also physics, network science, anthropology history and philosophy (Bocher, 2022).

The IMH is based on the concept of intersubjectivity. According to Harari (2015), intersubjectivity can be defined as a "shared agreement of meanings between multiple people". Intersubjectivity explains why humans can form very large social groups where individuals share common beliefs. Financial markets could therefore be described as possessing intersubjectivity properties as they provide a shared framework that allows the sale and purchase of financial securities (Beckert, 2020). With the assumption of financial markets being characterised by an intersubjective framework, a market narrative can therefore be defined as an ideology that is commonly shared by multiple investors on how financial markets work as well as the process of asset price formation (Bocher, 2022). In essence, a narrative is a paradigm that shapes how investors analyse company fundamentals *ex-post* as well as their reaction to price changes or new information. The pronouncement of a market as efficient therefore depends on a specific narrative that is dominant at a particular time.

Narratives by nature are not static as they change and evolve because of various reasons like endogenous dynamics or external shocks. The dynamism of narratives also emanates from the fact that the emergence of a particular narrative is a complex and highly interactive process. According to Bocher (2022), a narrative can cover a wide spectrum of events and agents like a

single stock, a specific sector or a particular region while sometimes a narrative can affect a whole universe of asset classes and in the process become a macro-framework. [Bocher \(2023\)](#) explains that market narratives are at the centre of interactions that take place in financial markets and that such a framework closely mirrors econophysical properties like self-organisation and criticality. [Bocher \(2022\)](#) gives the following characteristics of an intersubjective market:

- (1) Self-organisation – The concept of self-organisation is a characteristic of natural systems with spontaneous order. In essence, self-organisation is a property that emanates from a process where order arises from local interactions between parts often triggered by random fluctuations and intensified by positive feedback ([von Foerster, 1960](#)). Literature shows that economic systems can also be explained by these self-organised properties ([Krugman, 1996](#)) where they can be modelled as decentralised networks connecting individuals. If markets can be assumed to possess self-organised properties, the causes and consequences of individuals' participants can therefore be attributed to narratives.
- (2) Speculation – Speculation involves attempts by individuals to purchase financial assets with the hope that they increase in value in the foreseeable future irrespective of the economic fundamentals. According to [Shiller \(2014\)](#), market narratives might culminate in the formation of a conventional value of an asset that is premised on the “*collective consciousness*” of individuals and will remain for considerable periods even if the returns of the underlying asset fail to live up to expectations at some point in time. [Bocher \(2022\)](#) asserts that this creation of conventional value *via* narratives is realised through positive feedback loops and this translates into statistical autocorrelation patterns.
- (3) Dependency - A tenet of modern portfolio theory is the independence of financial variables. However, empirical research shows that financial returns exhibit some dependency properties, for example, autocorrelation patterns ([Hommes, 2001](#)). The concept of narratives can be used to explain the dependency properties inherent in financial returns. A narrative that is directed towards a specific counter or group of counters can translate into a positive feedback loop on those counters and this culminates into a self-reinforcing upward trend and the bias amplifies as the narratives spread.
- (4) Unboundedness - Among the various properties of asset prices is that they are unbounded. The implication is that a specific narrative can translate into extremely high prices compared to prices obtained historically. The reverse is also true; a specific narrative can also translate into extremely low prices. This deviates from one of the main assumptions in classical finance, the assumption that financial returns follow a Gaussian distribution.
- (5) Non-linearity – is one of the reported stylised facts about financial variables. Most traditional econometric models like the ordinary least squares assume that the relationships among financial variables are linear. However, the empirical literature has mostly revealed non-linear dynamics in financial variables. [Bocher \(2022\)](#) gives an analogy of a nonlinear dependence by imagining a similar event taking place in two separate macroeconomic periods but resulting in different outcomes, which can sometimes be opposite. Econometric models that capture nonlinearities are therefore preferred over traditional linear models.
- (6) Dialogic – In the financial markets, there are multiple market narratives coexisting and competing for dominance. Each narrative also tends to compete with its own anti-narrative [1] leading to a continuous state of fluctuations between narratives and anti-

narratives. This continuous competition between alternative narratives makes it reasonable to postulate that it is difficult to reach an equilibrium in financial markets. The overdominance of a particular narrative however results in the markets approaching a state of criticality.

- (7) Criticality – If the competition among alternative narratives as described above leads to narrative dominance, this leads to this dominant narrative being spread among many individuals sharing the same intersubjective framework to price new information. According to [Bocher \(2023\)](#), such a state of affairs is critical and unstable leading to vulnerability to exogenous and/or endogenous events that would cause a reversal (avalanche). Avalanches can be a result of black-swan events, but they can also arise from purely endogenous causes. The proximity of a market to the critical state where there is a specific narrative that dominates alternative narratives translates into a macro-behaviour often leading to bubble periods. Thus, bubble periods in financial markets can be best modelled by the concept of swarm intelligence arising from a dominant narrative. Swarm intelligence can be defined as the coordinated behaviour of decentralised and self-organised systems ([Bonabeau et al., 1999](#)) and using this definition, it is rational to conjecture that markets asymptotically tend towards swarm intelligence.

The events surrounding GameStop Inc., a troubled video game store with headquarters in Texas, in January 2021 highlight the significance of narratives spread on social media platforms. The consequences of the COVID-19 pandemic on the brick-and-mortar corporation led Wall Street hedge funds to make significant wagers on the decline of the GameStop stock. Several small-time investors banded together to purchase the GameStop stock after forming a topic on the online discussion board, Reddit. Since most of these retail investors grew up utilising the company’s video stores, they were not purchasing the stock because of its fundamentals but rather because of the sentiment associated with it. As a result, the value of the GameStop stock increased by more than 1700%, leading to a short squeeze on numerous hedge firms that had shorted the stock.

The goal of the collective retail investors’ global purchase of GameStop was primarily to reduce the free float required to cover short positions by the end of January 2021, and as a result, the stock’s price was effectively driven above its fair intrinsic value. Several *meme* stocks, such as AMC, were also created during this time, which caused hedge funds to realise significant loss positions. Since then, several economists and practitioners have pointed to the “small guys vs Wall Street” narrative as being dominant in the retail investor stories driving the short squeeze in these *meme* stocks. The above-mentioned events demonstrate the significance of understanding the narrative-economics-based alternatives to the EMH.

4. Different hypotheses: mutually exclusive or complementary

The alternative hypotheses to the EMH expounded above relate to the same financial markets. The question remains whether these are mutually exclusive or they are complementary. The EMH was ground-breaking as it provided a benchmark definition of market efficiency. It would not be possible to have these alternatives if there was no benchmark with which to compare. However, ground-breaking as it was, there were some fundamental weaknesses in the hypothesis, mainly emanating from the assumptions made. These assumptions include the rationality and homogeneity of investors. The alternatives to the EMH developed over the years, rather than replacing the EMH, have managed to plug some of the weaknesses in the EMH. We, therefore, believe that taken together, these alternatives are complementary and provide a platform to holistically understand stock market dynamics. In [Table 1](#), we present all the alternative hypotheses outlined and their implications.

Table 1.
Alternatives to
the EMH

Hypothesis	Implication
Noise Trader Approach	It highlights the importance of understanding investor sentiment, cognitive biases and emotional reactions in financial markets
Coherent Market Hypothesis	The need to understand and model nonlinear dynamics in finance
Fractal Market Hypothesis	The need to understand that investors are not homogeneous but are heterogeneous depending on their investing horizon
Heterogenous Market Hypothesis	The HMH suggests that diversity in market participants' preferences, beliefs and behaviours plays a significant role in shaping financial markets. This diversity has implications for market dynamics, price discovery, risk and return, investor behaviour and regulatory considerations
Adaptive Market Hypothesis	The need to understand that market efficiency is not static but is dynamic depending on the interaction and competition among different stakeholders at any given time
Discovering Market Hypothesis	The hypothesis emphasises the role of narratives in asset price formation
Novelty-Narrative Hypothesis	The need to comprehend the role of information in an environment that has been exposed to a novel event
Intersubjectivity Market Hypothesis	The need to use a multidisciplinary approach to empirical finance, particularly the application of methods from econophysics

Source(s): Table created by authors

The alternatives to the EMH outlined in [Table 1](#) provide a compelling perspective on the ongoing debate surrounding the efficiency of stock markets. Rather than fixating on the binary question of whether stock markets are efficient or not, these alternative viewpoints encourage a more nuanced discussion. They invite us to shift our focus towards a critical inquiry into the frequency with which these crashes reach a magnitude significant enough to trigger substantial divergences in stock prices and their intrinsic values ([Cornell, 2018](#)). These alternative viewpoints also bring to light the diverse range of opinions regarding investor behaviour and irrationality. Some proponents of these alternatives contend that investor irrationality is contingent upon certain states or conditions. This means that asset prices may experience periodic mispricing because of these irrational tendencies, both over time and across different investors. Consequently, the notion emerges that mispricing is an inherent and enduring characteristic of financial markets.

Considering these alternative perspectives, it becomes evident that attempting to predict the behaviour of financial markets at specific moments in time is indeed plausible. By acknowledging the presence of recurring mispricing caused by investor irrationality, we open the door to the possibility of developing strategies and models that can help anticipate market movements and seize opportunities when deviations between stock prices and their true values become apparent. In essence, these alternative theories challenge us to embrace a more dynamic and adaptable approach to understanding and navigating the complexities of financial markets.

5. Conclusion

We aimed to summarise and put into perspective the alternatives to the EMH that have emerged over the years. From the literature search, we identified eight alternatives to the EMH that have been developed to plug the weakness of the EMH. Each of the alternatives developed ameliorates some of the assumptions of the EMH like investor homogeneity, information being instantaneously incorporated into asset prices as well as the weakness of investor rationality in explaining asset prices. The alternatives to the EMH outlined herein show that market efficiency is a dynamic concept that can be understood better in a multidisciplinary framework. It is important to incorporate ideas, theories and concepts from

diverse fields like psychology, anthropology, sociology, economics, finance, physics and others to better understand how asset prices are formed in financial markets. The quest to improve the EMH is still ongoing, with new alternatives emerging, for example, the sentiment EMH that directly incorporates textual sentiment to provide a more practical and reasonable interpretation for the anomalies that are inconsistent with the EMH (Sun and Zeng, 2022). Future studies could test some of the recently developed alternatives to examine the extent to which they help in explaining the cross-section of asset returns.

Note

1. This is defined as a symmetrical narrative that deviates from the intersubjective validity of the associated narrative.

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Corresponding author

Kingstone Nyakurukwa can be contacted at: knyakurukwa@gmail.com