Charting the financial odyssey: a literature review on history and evolution of investment strategies in the stock market (1900–2022)

Sharneet Singh Jagirdar
LM Thapar School of Management, Thapar Institute of Engineering and Technology, Patiala, India and
AIT Management, Chandigarh University, Mohali, India, and
Pradeep Kumar Gupta
LM Thapar School of Management, Thapar Institute of Engineering and Technology, Patiala, India

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Abstract

Purpose – The present study reviews the literature on the history and evolution of investment strategies in the stock market for the period from 1900 to 2022. Conflicts and relationships arising from such diverse seminal studies have been identified to address the research gaps.

Design/methodology/approach – The studies for this review were identified and screened from electronic databases to compile a comprehensive list of 200 relevant studies for inclusion in this review and summarized for the cognizance of researchers.

Findings – The study finds a coherence to complex theoretical documentation of more than a century of evolution on investment strategy in stock markets, capturing the characteristics of time with a chronological study of events.

Research limitations/implications – There were complications in locating unpublished studies leading to biases like publication bias, the reluctance of editors to publish studies, which do not reveal statistically significant differences, and English language bias.

Practical implications – Practitioners can refine investment strategies by incorporating behavioral finance insights and recognizing the influence of psychological biases. Strategies span value, growth, contrarian, or momentum indicators. Mitigating overconfidence bias supports effective risk management. Social media sentiment analysis facilitates real-time decision-making. Adapting to evolving market liquidity curbs volatility risks. Identifying biases guides investor education initiatives.

Originality/value – This paper is an original attempt to pictorially depict the seminal works in stock market investment strategies of more than a hundred years.

Keywords Technical analysis, Fundamental analysis, Theory of random walk, Efficient market hypothesis, Overreaction hypothesis

Paper type Literature review

Introduction

This research paper delves into the dynamic evolution of investment strategies over more than a century across three distinct eras: Classical, Neoclassical and Modern. With the Classical era grounded in theories like the Efficient Market Hypothesis (EMH), the Neoclassical era incorporating advancements in portfolio theory and the Modern era marked

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by behavioral finance and social media influences, the study seeks to provide a comprehensive understanding of the shifting paradigms in investment decision-making. Reviewing the literature on investment strategies is imperative at this juncture to establish a foundational context, tracing the evolution of theories from the Classical to the Modern era. Understanding this historical perspective is vital for comprehensively grasping the field, especially as investment strategies have adapted to changing economic, technological and regulatory landscapes over time. The literature review serves as a valuable tool for identifying challenges faced by traditional investment theories, particularly in the Modern era, where behavioral finance and the impact of social media present contemporary obstacles. Integrating insights from different eras through this review allows researchers to uncover potential synergies and refine their understanding of investment strategies, crucial for navigating the complexities of the present financial environment. Moreover, it offers insights into the implications of historical and contemporary theories for current investment practices, providing valuable guidance for investors and financial practitioners. The study is motivated by the imperative to bridge historical perspectives with contemporary insights, guided by pivotal questions that examine the fundamental principles and theories defining investment strategies in each era, analyze transitions and explore potential synergies. The research seeks to ensure that foundational ideas from pioneer researchers are not overlooked, addressing the growing concern that present studies tend to disregard these contributions. Ultimately, the literature review helps identify gaps in existing knowledge, offering a roadmap for future studies and contributing to the ongoing development of the field.

This study is driven by a set of specific research questions that guide the exploration of investment strategies across three distinct eras. Firstly, the research delves into the Classical era (1900–1979), aiming to uncover the fundamental principles and theories that defined investment strategies during this period and examine their role in shaping early financial markets, particularly in the absence of regulations on full financial disclosure. Moving to the Neoclassical era (1980–1999), the study investigates the impact of this transition on refining investment theories, focusing on developments in portfolio management and the inception of influential models like the Capital Asset Pricing Model (CAPM), Size Effect and the Three-Factor Model. Subsequently, the research turns its attention to the Modern era (2000 – Present Day), scrutinizing the challenges posed to traditional theories by behavioral finance and the influence of social media, and identifying new insights and patterns in contemporary investment decision-making. Finally, the study explores the potential synergies that arise from integrating classical, neoclassical and modern insights, aiming to deepen our understanding of the ongoing evolution of investment strategies and provide implications for contemporary investors and financial practitioners.

This literature review critically examines theoretical and seminal papers to trace the evolution of investment strategies across the Classical, Neoclassical and Modern eras. This study summarizes the previous literature of more than 100 years and identifies the conflicts and the relationships that arise from such a wide variety of existing studies (Lang & Secic, 1997; Meade & Richardson, 1997; Aromataris & Pearson, 2014). With over a century of research in the field of investment strategy, the bridge between the past and present studies seems to have been lost. The present studies being published tend to ignore the pioneer researchers in the literature reviews. This may be due to the constraint of the word limit for publication where elaboration on past studies is very limited. This is a drawback for budding scholars who are new to investment strategy research and are confused about where to start. Also, when one goes through this study that summarizes the past literature of more than 100 years, one realizes that the foundations of the most popular theories and seminal research papers were set decades before by different researchers.

The selection of papers is based on their foundational contributions to shaping the theoretical landscape of investment decision-making. This review aims to provide a focused

analysis of key theories and frameworks. The rationale for choosing theoretical and seminal papers lies in their pivotal role in shaping the intellectual discourse surrounding investment strategies. These papers have, over time, become fundamental references that laid the groundwork for subsequent research and practical applications. By focusing on theoretical contributions, the aim is to distil the essence of each era's predominant ideas, allowing for a more in-depth exploration of the underlying principles.

As with history, to bring coherence and capture the characteristics of time with a chronological study of events, we have divided the review period into three periods: Classical, Neo-Classical and Modern. The classical era (1900–1979) began with Dow Theory (Nelson, 1912) based on the Wall Street Journal editorials written by Charles Dow. In the absence of any regulation on full disclosure of financial information by companies, technical analysis strategies were dominant. Once the full disclosure of financial information became mandatory, financial statement analysis or fundamental analysis was promoted by Graham, Dodd, and Cottle (1934). The CAPM was developed on the works of Markowitz's (1959) portfolio analysis and further studies by Treynor (1961, 1962), Sharpe (1964), Lintner (1965) and Mossin (1966). Another field that developed during this era was Behavioral Finance with Keynes (1936) suggesting general market belief at play and Friedman (1953) differentiating between speculators and rational speculators. Market Efficiency was first discussed by Modigliani and Miller (1958), popularized by Fama, Fisher, Jensen, and Roll (1969) and Fama (1970) proposing the EMH. The Neoclassical Era (1980–1999) brought out the role of information, its cost, information imperfection and noise (Black, 1986) and the role of Analysts. Analysis of CAPM led to the formulation of the Size Effect (Banz, 1981) and the Three-Factor Model (Fama & French, 1993). Further exploration in Behavioral Finance sheds greater light on market psychology and resulted in seminal works like the Overreaction Hypothesis (De Bondt & Thaler, 1985), Disposition Effect (Shefrin & Statman, 1985) and Herding (Scharfstein & Stein, 1990). In a boost to technical analysis, mean reverting earnings were identified by De Bondt and Thaler (1987), Poterba and Summers (1988) and Barberis, Shleifer, and Vishny (1998), evidence of predictability of individual stock returns (Jegadeesh, 1990) and momentum investment (Jegadeesh & Titman, 1993). Interest in Technical Analysis continues in the Modern Era (2000 – Present Day) with trading value (Lee & Swaminathan, 2000) and liquidity (Amihud, 2002; Pástor & Stambaugh, 2003; Baker & Stein, 2004). Fundamental Analysis progressed a step further with Piotroski's (2000) score based on nine criteria and quality investing (Novy-Marx, 2013; Asness, Frazzini, & Pedersen, 2019). The Fundamental Analysis and the Technical Analysis were somewhat combined when Fama and French (2015) updated their Fama and French (1993) Three-Factor Model with two new factors to propose the Five-Factor Model. Huge advances were made in Behavioral Finance with the increase in the number of proxies for examining investor sentiments with the advent of the information highway—the Internet. The predictive power of news media content (Tetlock, 2007), social networks (Cohen, Frazzini, & Malloy, 2008), Twitter Feeds (Bollen, Mao, & Zeng, 2011), online ticker searches (Joseph, Wintoki, & Zhang, 2011), peer-based advice through social media on the Internet (Chen, De, Hu, & Hwang, 2014) and Google Trends data (Bijl, Kringhaug, Molnár, & Sandvik, 2016), crowdsourced earnings forecasts (Jame, Johnston, Markov, & Wolfe, 2016) is tested throughout the Modern Era.

Furthermore, researchers of today should also be able to identify the ideas of previous researchers and create their new theories in investment strategy. The contribution of this study is the coherent picture of the seminal works on investment strategy in the stock market along with the current state. This study offers a cohesive and insightful overview of seminal works shaping investment strategy across the Classical, Neoclassical and Modern eras. It engages in a theoretical synthesis, distilling key frameworks to provide a comprehensive understanding of the evolution of investment strategies and their foundational principles. By integrating theories from different eras, the research fosters a

cohesive understanding of how investment strategies have evolved. It provides a structured framework allowing readers to trace the development of thought, exploring fundamental concepts like the EMH and behavioral finance. The study emphasizes historical contextualization, shedding light on the influence of economic, technological and regulatory changes on prevailing investment theories within their specific historical contexts. It establishes a foundation for future studies, identifying gaps and areas for further exploration to contribute to the ongoing development of the field. Acting as a launchpad, this research encourages future studies to bridge theoretical foundations with empirical investigations, ultimately fostering a more holistic understanding of contemporary investment strategies. In essence, this study seeks to offer more than a chronological account of seminal works; it aims to provide a nuanced and interconnected narrative that enriches the understanding of investment strategies in the stock market.

Methodology

The studies for this review were identified from electronic databases, primarily Google Scholar, using keywords (like investment strategy, stock market, value, growth, contrarian, momentum, analysts) and from Google Search Engine for seminal works in the investment strategy domain in stock markets. The bibliographies of the identified articles were reviewed to recognize additional relevant studies (Wright, Brand, Dunn, & Spindler, 2007) and further keywords, subject headings and indexing terms (Aromataris & Pearson, 2014). Then, a comprehensive list of 200 relevant studies was compiled for potential inclusion in this review (Torgerson, 2003). To reduce bias, a first-stage screening of titles and abstracts was performed by two reviewers based on the research on investment strategies in the stock market. All studies identified by either reviewer are included in this review. The second-stage screening is performed the same way again but with full text by two reviewers for the reasons mentioned above. Selected studies were subjected to a more refined quality assessment by use of a checklist (Khan, Kunz, Kleijnen, & Antes, 2003). The evidence is then summarized and an interpretation of the findings is presented. However, due to the difficulties in locating unpublished studies, this review is susceptible to various biases like publication bias (Altman *et al.*, 2001; Egger, Smith, Schneider, & Minder, 1997; Felson, 1992; Jadad *et al.*, 1996; Jüni *et al.*, 2002; Moher *et al.*, 2000; Sterne, Gavaghan, & Egger, 2000), the reluctance of editors to publish studies, which do not reveal statistically significant differences (Wright *et al.*, 2007), and English language bias (Egger *et al.*, 1997).

Google Scholar was selected as the primary database for its extensive coverage of scholarly articles, including peer-reviewed journals, conference papers, theses and books. Its multidisciplinary nature aligns well with the interdisciplinary nature of the research, encompassing finance, economics and related fields. The chosen keywords—investment strategy, stock market, value, growth, contrarian, momentum and analysts—were carefully selected to encapsulate the core themes of the research. These keywords are broad enough to encompass a wide range of theoretical and seminal works spanning Classical, Neoclassical and Modern eras. The inclusion of terms like value, growth, contrarian and momentum ensures coverage of key investment strategies. The initial search using the selected keywords was expansive. The inclusion criteria focused on relevance to investment strategy in the stock market. Only documents demonstrating theoretical and seminal significance in the context of investment strategy were included. Empirical studies were excluded due to the focus on foundational theories. Irrelevant literature, including studies not directly related to the core themes or those lacking theoretical significance, was excluded. This process was guided by the research questions and objectives. Each document was assessed for its relevance to the research questions, ensuring alignment with the objectives of synthesizing the evolution of investment strategies. Initial screening involved reviewing titles and abstracts to assess the alignment of each potential study with the research objectives. Papers that did not contribute substantially to the theoretical framework or were purely empirical in

nature were excluded. The remaining papers underwent a thorough full-text examination to ensure that they met the criteria for theoretical and seminal relevance. This involved assessing the depth of theoretical contribution and the historical significance of each work. The research aimed for a balance between depth and breadth. The focus was on seminal works and foundational theories, and the final selection represents a comprehensive yet manageable set of literature for synthesis. The literature selection process was iterative, with continuous refinement based on the emerging themes, theoretical importance and historical significance. This iterative approach allowed for a more nuanced inclusion of the literature.

Documents were categorized based on the era they represent—Classical, Neoclassical or Modern. This categorization allows for a chronological exploration of the evolution of investment strategies. A thematic coding approach was employed to identify common themes and patterns across different documents, facilitating the synthesis of key theoretical contributions. The document analysis is guided by a conceptual framework that outlines the key dimensions of investment strategy evolution. This framework assists in organizing and synthesizing information coherently. Given the multidisciplinary nature of the topic, the analysis considers insights from finance, economics and related fields to provide a holistic understanding of investment strategy evolution. Preference was given to peer-reviewed sources to ensure the quality and rigor of the included documents. High-impact journals and reputable publishers were prioritized.

In summary, the literature selection process employed a systematic approach, utilizing Google Scholar as a comprehensive database and justifying the relevance and comprehensiveness of chosen keywords. The exclusion criteria, screening and iterative refinement ensured a focused selection of literature aligned with the research's theoretical and seminal objectives. The document analysis method allows for a detailed exploration of the theoretical underpinnings and seminal contributions to investment strategy in the stock market. This approach ensures a robust and systematic examination of the selected literature, providing a foundation for synthesizing key insights across different eras.

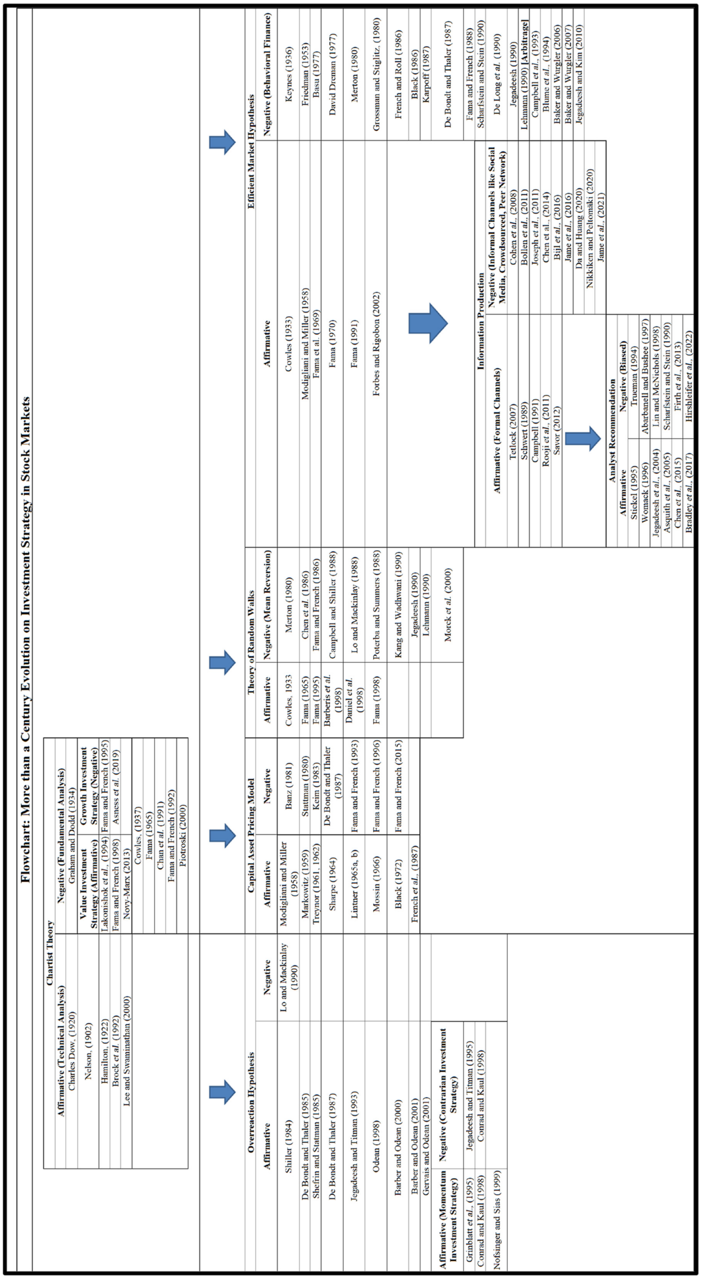
A flowchart depicting more than a century of evolution in investment strategies in stock markets is presented in Figure 1. It enhances the clarity of the research trajectory in the field of investment strategy in the stock market; the reviewed literature is categorized based on publication year and theoretical focus. This categorization aims to provide readers with insights into the chronological development and distribution of seminal works across different theoretical dimensions. Further, Table 1 delineates the predominant thematic categories extracted from the scrutinized literature, organized by primary disciplinary perspectives. This presentation aims to furnish readers with a discernible elucidation of the prevailing research trajectory within a literature review.

Literature review

The earliest trading in financial instruments occurred in Venice in the 1300s (Mueller, 2019). The Amsterdam Stock Exchange is considered the first location where corporate stock trading took place (Braudel & Reynolds, 1983). Stock exchanges have now become a primary indicator of a country's economic strength and development (Singh, 2011).

Classical era (1900–1979)

The pursuit of abnormal returns has driven research and innovative investment strategies. The earliest investment strategy was "Technical Analysis", dating back to the 1800s when analysts forecasted prices based on various historical values related to stock trading like past prices (Dow, 1920). They attempted to determine buyer and seller expectations to detect shifts in supply and demand. During this duration, it was not mandatory for full disclosure of financial information.



Source(s): Figure by authors

Figure 1.
More than a century evolution of investment strategies in stock markets

S No.	Categorization	Journal
1	*Accounting and Finance Journals*	*Journal of Accounting Research*
		Review of Accounting Studies
		The Accounting Review
		Journal of Financial Economics
2	*Economics and Finance Journals*	*Journal of Economic Perspectives*
		Journal of Finance
		The Quarterly Journal of Economics
		Financial Analysts Journal
		The Economic Journal
		The American Economic Review
		Brookings Papers on Economic Activity
3	*Investment and Market Research Journals*	*Journal of Financial Markets*
		International Review of Financial Analysis
		Journal of Behavioral Finance
		Journal of Financial and Quantitative Analysis
		The Review of Financial Studies
4	*Business and Management Journals*	*The Journal of Business*
		The Journal of Political Economy
		The Journal of Business, 46(3)
		The Journal of Business, 45(2)
		The Chicago MBA: A Journal of Selected Papers
5	*Statistics and Methodology Journals*	*Econometrica*
		The American Journal of Nursing
		AJN The American Journal of Nursing
		The Nurse Practitioner
		Journal of Clinical Epidemiology
		Annals of Internal Medicine
		The Journal of the American Statistical Association
6	*Behavioral Science Journals*	*Journal of Economic Behavior and Organization*
		Journal of Behavioral Decision Making

Source(s): Table by authors

Table 1. Interdisciplinary classification of reviewed research papers based on primary disciplinary perspectives

Dow Theory (Nelson, 1912), a chartist theory (Fama, 1965), developed on Dow's Wall Street Journal editorials, was studied, and accepted as a viable investment strategy (Hamilton, 1922) until statistical testing of market-timing found that the returns lagged the market (Cowles & Jones, 1937). Even the recommendations of most analysts did not produce abnormal returns (Cowles 3rd, 1933). Thus, the foundation of the Random Walk Hypothesis and the EMH was laid (Kirkpatrick & Dahlquist, 2021).

As financial information became organized and available to ordinary investors, financial statement analysis emerged as the dominant investment strategy. This analysis of financial statements came to be known as "Fundamental Analysis". Fundamental analysis equipped the investors to compare the actual valuation of a firm computed from financial statement analysis and the value of the firm placed by the stock market trading activities. Graham *et al.* (1934) advocated using financial statement analysis to identify firms with the potential for high future earnings. Graham recommended seven criteria to capture the quality and quantity that a firm should match for incorporation into an investor's portfolio. These criteria are (1) enterprise size, which should be "adequate" to insulate against the unpredictable fluctuations in the economy, (2) strong financial condition, indicated by current ratios exceeding two and net current assets exceeding the long-term debt, (3) earnings stability, gauged by positive earnings of 10 consecutive years, (4) an uninterrupted dividend payments record for a minimum of 20 years, (5) not less than one-third of the last ten years of earnings-

per-share growth, (6) moderate price-to-earnings ratios, which typically should not exceed 15 and (7) price-to-book ratios not exceeding 1½. According to Graham, the first five criteria ensure high-quality firms, while the last two criteria ensure reasonable prices for investors to buy stocks. Based on the composite of the first five quality criteria, the G-score (Graham score) is measured to indicate a stock's quality signal. A firm's G-score gets one point each if its current ratio exceeds two, the net current asset exceeds the long-term debt, has a ten-year history of positive earnings, ten-year history of dividend payout and earnings-per-share growth of a minimum of a third from 10 years ago. This gives a score ranging from zero to five, with higher scores pointing to higher-quality firms. The rank of a firm's G-score is the quality signal for the stock selection among all stocks. However, Keynes (1936) suggested that the information extracted by long-term investors is seldom put into practice to ensure efficient investment and would go with the general belief and fail. Friedman (1953) differentiated between rational speculators, who stabilize the asset prices by bucking the trend to bet against price deviations from fundamentals, and just speculators, who destabilize the asset prices for lack of information by selling when prices are low and buying when prices are high. Modigliani and Miller (1958) claimed that in perfectly efficient markets, a company's value is the present value of future cash flows, and capital structure does not impact its value (Proposition 1). Also, the cost of equity is directly proportional to the company's leverage level, as a higher leverage level increases the default probability or risk for which the investors demand a higher return (cost of equity) for undertaking that risk (Proposition 2). Markowitz (1959) also suggested that the portfolio must be selected by having probabilistic estimates of the securities' future performances, analyzing these estimates to ascertain an efficient set of portfolios (portfolio analysis) and selecting the best-suited portfolios for investors from this set. Further studies on modern portfolio theory and diversification (Treynor, 1961, 1962; Sharpe, 1964; Lintner, 1965; Mossin, 1966) led to the CAPM for pricing an individual security or portfolio. Treynor (1961) made four observations regarding the market value and risk (1) a project with the same cash flows as another project will have more value if it has lower risk, (2) the market value of a company will increase by the market value of a project undertaken (including initial investment), (3) market value of the project will not change if the money borrowed at the risk-free interest rate for the project is offset by cash flows generated by the project and (4) the risk is defined as "the increase in the sensitivity of the market value of the investing company to the relevant variables which results if the project is under-taken". Treynor (1962) showed that with additional assumptions of a perfect lending market and investors having perfect knowledge of the market, Modigliani and Miller's (1958) proposition 1 holds insurable risks are independent of fluctuations in the market not affecting the cost of capital and the expected yield to the investor is the sum of risk-free lending rate return on capital, which is independent of how it is invested, and the expected return for taking a risk, which is independent of capital and dependent only on the risk taken. Sharpe (1963) initially worked on Markowitz's portfolio analysis, and Sharpe (1964) extended it to construct a "market equilibrium theory of asset prices under conditions of risk" and implications of the relationship between various components of risk and the price of an asset. The theory states that in equilibrium, the relationship between the expected return and the standard deviation of return is linear for efficient combinations of risky assets. The various components of risk were identified as systematic risk, common to all securities and unsystematic risk, associated with individual assets. Diversification allows the investor to minimize all but the risk from swings in economic activity (systematic risk). However, Lintner (1965) showed that the risk premium of a security does not vary linearly with its risk measured by standard deviation, and the relevant measure of the risk of an individual security is the variance of its return and covariance with other securities in the portfolio. Black (1972) found that the expected return on any risky asset is a linear function of its market sensitivity, with or without borrowing (short positions in riskless assets). When there

are restrictions on borrowing, the slope of the line relating the expected return on a risky asset to its market sensitivity is less than when there are no restrictions on borrowing.

After Cowles and Jones (1937) contradicted the Dow Theory (1902), Fama (1965) tried to knock the bottom out of the chartist theories by claiming it to be "an interesting pastime, is of no real value to the stock market investor" and discussed in detail the theory underlying the random-walk model with data that are consistently and strongly supporting the model. The theory of random walks in stock prices consists of two hypotheses: (1) independent successive price changes and (2) some probability distribution can be observed in the price changes. Two types of sophisticated traders were identified as (1) superior intrinsic value analysts and (2) superior chart readers whose actions to be profitable tend to make price changes independently, even if there is noise and dependence in the information-generating process and the series of successive price changes. Once independence is achieved, chart reading becomes unprofitable. "Bubbles" in the price series, which is an accumulation of the same type of noise causing the stock prices to run above or below the intrinsic value for some time, are burst by actions of sophisticated stock traders, neutralizing the dependence in the noise-generating process. However, it is accepted that new information in a dynamic economy will always change the intrinsic value, giving opportunities for profit-making. Also, as traders capitalize on this opportunity, prices adjust and return to their intrinsic value. Fama *et al.* (1969) confirmed that "stock prices adjust very rapidly to new information" and concluded that the stock market is efficient. Information about the stock split is most probably reflected immediately in the stock price after the announcement date and fully reflected by the end of the split month.

Fama (1970) reviewed the past theoretical and empirical literature on the efficient markets (where prices fully reflect all available information) model and came up with three relevant information subsets: (1) weak-form tests where the information is only historical prices, (2) semi-strong-form tests where the information set is publicly available like annual earnings announcements and stock splits and (3) strong-form tests where monopolistic access to price forming information is available. For weak-form tests, there is consistent evidence for dependence in successive price changes, allowing for marginally profitable trading. Semi-strong tests find that the information stock splits, the firm's future dividend payments, annual earnings announcements, new issues and large block secondary issues of common stock are fully reflected in the price of a stock. A strong, efficient market model is viewed as a benchmark. It is noted that specialists on security exchanges (Niederhoffer & Osborne, 1966) and corporate insiders (Scholes, 1972) have monopolistic access to information. Basu (1977) tested the EMH and found that stocks with low price-earnings (P/E) ratios gave returns larger than the underlying risks, additional search and transaction costs and differential taxes combined, while stocks with high P/E ratios gave lower returns. In other words, the P/E ratio information is not immediately absorbed in the prices of stocks as postulated in the semi-strong test of EMH and stocks trading at different multiples of earnings were found to have been differently priced vis-a-vis one another, giving rise to opportunities to make profit in the future. Another critic of the EMH was contrarian investor Dreman (1977), who argued that a manager should beat or consistently underperform the market by chance only if the markets were quickly adjusting to new information. Instead, the stock's long-term performance is a better indicator of new information than the short term.

The evolution of trading and investment strategies, spanning from historical periods to the Classical Era (1900–1979), reveals a transformative journey in financial practices. Within the Classical Era, diverse strategies emerged, including the 1800s-founded Technical Analysis, which scrutinized historical values for stock trading. The Dow Theory, rooted in Dow's Wall Street Journal editorials, gained acceptance until statistical testing revealed lagging returns. The era witnessed the conceptualization of the Random Walk Hypothesis and EMH, suggesting randomness in stock prices and market efficiency. Fundamental

Analysis became prominent, allowing investors to compare a firm's actual valuation with its stock market value. Graham and Dodd's introduction of seven criteria for identifying high-quality firms became a cornerstone. Discussions by Keynes and Friedman explored the efficiency of information use by long-term investors. Modigliani and Miller (1958) put forth propositions on capital structure in perfectly efficient markets. Markowitz (1959) extended modern portfolio theory, leading to the development of the CAPM. Fama's efforts in 1965 and 1970 challenged chartist theories, supported the EMH and identified information subsets for market efficiency testing. Notably, Fama *et al.* (1969) concluded that stock prices rapidly adjust to new information, aligning with market efficiency. Basu's 1977 test found evidence against the EMH, suggesting opportunities based on P/E ratios. Contrarian investor David Dreman (1977) argued against the EMH, asserting that long-term stock performance better indicates new information than short-term fluctuations. The Classical Era's contributions laid the groundwork for the ongoing debate on market efficiency and the continuous evolution of modern finance.

Neoclassical era (1980–1999)

This era marked the adaptation of ideas conceptualized in the classical era. This era marks the renaissance of technical analysis. Merton (1980) contended that the convention for calculating the expected return on the market by adding the average of historical realized excess returns on the market and the current observed interest rate is insufficient without incorporating the changes in risk associated with the market and using additional non-market data like surveys of investor holdings, investor expectations and other corporate earnings and accounting data (Myers & Pogue, 1979), to minimize the effects of noise in the realized return data. Grossman and Stiglitz (1980) attempted to redefine the notion of an efficient market by arguing that the traditional theory becomes implausible when information imperfection and cost of information are accounted for. Prices cannot reflect the costly information as those who spend resources to attain it need compensation. The incentive to procure information is at odds with the efficiency of markets in spreading the information. This conclusion brought the role of analysts under scanner in future studies.

Banz (1981) came up with the "size effect", which shows higher risk-adjusted returns of common stocks of small firms than those of large firms, indicating that CAPM is misspecified. By way of explanation, the size effect is nonlinear in the market proportion and unstable through time. It was noted that Stattman (1980) found a proxy for the size effect in the significant negative relationship between the ratio of the book to the market value of equity and its return. Keim (1983) found a negative relationship between abnormal returns and size, with a pronounced size effect in January.

Shiller, Fischer, and Friedman (1984) pointed out the lack of academic research on market psychology, as broached by Keynes (1936), and observed that market participants are humans influencing stock prices, such as the overreaction of stock prices to dividends. De Bondt and Thaler (1985) stated that dramatic and unexpected news events cause most people to overreact. This overreaction is displayed in the expectations of economic forecasters and professional security analysts. The overreaction hypothesis is a combination of two: (1) the direction of initial stock price movements, and subsequent price movements are opposite and (2) the greater the initial price movement, the more extreme the subsequent adjustment. The overreaction hypothesis suggests a breach in weak-form market efficiency. Portfolios of prior winners were found to underperform portfolios of prior losers, in line with the overreaction hypothesis predictions, particularly loser portfolios giving large positive excess returns every month of January. Shefrin and Statman (1985) identified the disposition effect as a tendency of investors to hold on to losers for far too long and sell winners too early following the prospect theory (Kahneman & Tversky, 1979) and due to other elements like tax

considerations, mental accounting, self-control and regret aversion. In contrast to the expected utility theory based on perfectly rational agents, prospect theory claims to be based on the actual behavior of loss aversion, which is the tendency of people to avoid losses even if they bring equivalent gains. Black (1986) introduced the concept of noise, the opposite of information and necessary for liquid markets. It was pronounced that noise makes trading possible, causes inefficiency in markets, business cycles, inflation, changes flow in investment and makes it problematic to test theories on the working of financial or economic markets. Noise is uncertainty about future supply and demand conditions. People who are misled to believe that noise is information and trade accordingly, aptly called the noise traders, benefit those with information to trade. As noise is seen to influence some macroeconomic variables, Chen, Roll, and Ross (1986) found that a set of macroeconomic variables, in particular industrial production, twists in the yield curve, changes in the risk premium, and, to some extent, changes in expected inflation and unanticipated inflation during high volatility of these variables are significant in describing expected stock returns, measured by the covariance. French and Roll (1986) observed that asset returns are most volatile during exchange trading hours because of the flow of public and private information during trading hours. Approximately 4–12% of the daily variance is due to the process of trading leading to mispricing.

Fama and French (1986) observed that stock returns are negatively serially correlated for horizons beyond a year, implying that long-horizon returns can be predicted from past returns. This is an endorsement for technical analysis and rejection of the random walk model. French, Schwert, and Stambaugh (1987) noticed a positive relationship between the expected risk premium, calculated by subtracting the Treasury bill yield from the expected return on a stock portfolio, and the predictable volatility of stock returns. Also, there is a negative relationship between the unexpected stock market returns and the unexpected change in the stock returns volatility, resulting in expected risk premiums being positively related to volatility.

De Bondt and Thaler (1987), extending their previous work on the overreaction hypothesis, detect reversal patterns in the earnings of losing and winning firms in consistency with overreaction, and the size effect or changes in risk measured by CAPM betas cannot explain this winner–loser effect. Excess returns of portfolios of prior losers, especially in January (similar to Keim's, (1983) January effect), are negatively related to performance in the formation period, and excess returns of portfolios of prior winners are negatively related to prior December's excess returns. Karpoff (1987) surveyed the relationship between price changes and trading volume. The observations made were (1) the price volume relation is asymmetric, which may be in the same or opposite direction, (2) further research is required for the reason for the asymmetric price volume relation, (3) two effects of market size suggested being highly traded stocks have more likelihood to be optionable in organized exchanges and the covariance of volume and the squared price change increases at a decreasing rate with the number of investors, (4) the price volume relation is strongest either when the information flow is most volatile or when more trading occurs without informational reasons, (5) empirical correlation of volume and change in price is stronger over fixed time periods than over a fixed number of transactions, (6) with volume as a proxy for information flow, price volume relation can be used to improve event study statistics by adjusting sample variance of price for the rate of information flow and (7) a conflict in information arrival as being sequential or simultaneous.

Campbell and Shiller (1988) indicate that a long moving average of real earnings measured over several years (Fama and French, 1988a, b) to the current stock price can predict the return on a stock or, in other words, the present value of future real dividends. Thus, the simple present value models, which ignore the stock prices due to their volatility in calculations of the present value of future real dividends, were rejected. Adding to Fama and

French's (1986) finding of negative serial correlation for longer horizon returns, Lo and MacKinlay (1988) find a significant positive serial correlation for shorter holding period returns like weekly and monthly. Poterba and Summers (1988) discover consistent evidence with Fama and French (1986) and Lo and MacKinlay (1988) while attributing noise trading for this mean reversion. Schwert (1989) sheds light on the reasons for changes in stock market volatility over time. To date, these changes were accredited to the volatility of macroeconomic variables (Officer, 1973), financial leverage (Black, 1976; Christie, 1982), changes in expected returns to stocks (Merton, 1980; Poterba & Summers, 1986; French *et al.*, 1987; Bollerslev, Engle, & Wooldridge, 1988), and volatility changes in either discount rates or future cash flows (Shiller, 1981). Advancing the literature on changes in stock market volatility over time, Schwert (1989) submit that during a recession, particularly the Great Depression (1929–1940), (1) there is a positive relation between stock volatility and measures of corporate profitability like payout ratio or the corporate bonds' quality yield spread, (2) many aggregate economic series like financial asset returns and measure of real economic activity is more volatile which may be due to the increased operating leverage, (3) macroeconomic volatility lack prediction of volatility in stock and bond returns, (4) increase in financial leverage increases stock volatility and (5) there is a positive relation of stock volatility with the number of trading days (French & Roll, 1986) and share trading volume growth. King and Wadhwani (1990) propose a contagion model between stock markets where the correlation between stock markets rises after an increase in volatility in a stock market, like the October 1987 stock market crash in New York Stock Exchange led to a fall in almost all stock markets having different economic circumstances, attributed to rational agents' endeavor to deduce price changes information in other markets. Jegadeesh (1990) reported new evidence of the predictability of individual stock returns in significant negative first-order serial correlation in monthly stock returns and significant positive higher-order serial correlation at longer lags like 12 months, undermining Fama's (1970) EMH and random walk model for stock prices while supporting French and Roll (1986), Fama and French (1988a, b) and Lo and MacKinlay (1988). There is seasonality in serial correlation with a significant difference in January pattern from other months.

De Long, Shleifer, Summers, and Waldmann (1990) dispute Friedman's (1953) rational speculators' argument and contend that instead of stabilizing, they are destabilizing, and investors selling securities when their prices fall and buying when their prices rise are the positive feedback investors who lend stability. Stop loss orders triggering selling on price drops, liquidating the positions in response to margin calls, buying of portfolio insurance, and extrapolative expectations about trend-chasing or prices might guide these investors' behavior. It also pays rational speculators to bet on the short-term future direction of the market even if the prices move away from fundamentals. Positive feedback traders follow the rational speculators, moving prices further away from fundamentals and leading to price destabilization, or it can be argued that in the absence of rational speculators, positive feedback investors would not be able to move prices further away from fundamentals than they would in their presence. Scharfstein and Stein (1990) invoke Keynes (1936) to explain the inefficiency in the stock market through the herd behavior of managers in investment to enhance their reputation, even if it means making errors with the crowd than to be making a profit or errors alone. Other factors impacting herding are correlated prediction errors, unattractive outside opportunities for managers and compensation based on absolute rather than relative ability assessment.

Lehmann (1990) summarized the resurgence of the explanations for testing the EMH by the scrutiny of the predictability of equity returns as (1) speculative "fads" causing stock price overreaction and market inefficiency and (2) changes in forecasted fundamentals in an individual security or market predicting changes in expected security returns. Providing an alternative approach to finding evidence of market inefficiency by examining unexploited

arbitrage opportunities after corrections for transaction costs, bid-ask spreads and thin trading. Consistent with the studies of the period, there were arbitrage profits to make with current losers and winners in one week experiencing sizeable return reversals over the next week. Lo and MacKinlay (1990) opposed stock market overreaction (negative serial correlation for a single security) as the reason for the profitability of contrarian investment strategies but owing to the cross-autocovariance's effects of many securities to choose from. There is a lead-lag structure where returns of stocks having large capitalization lead returns of stocks with small capitalization. Campbell (1991) breaks stock market movements into (1) news about future returns related to changes in rational expectations and (2) news about future dividends. The estimates due to the variance of news about future cash flows were a third to half of the unexpected stock returns variance and news about future expected returns accounted for the remaining variance of unexpected stock returns. Also, there is a negative relationship between the future expected cash flows and the future expected returns. Chan, Hamao and Lakonishok (1991) exhibited a significant relationship between expected returns and four fundamental variables, namely, the book-to-market ratio, cash flow yield, size and earnings yield, with the first two having a more significant impact on expected returns than the latter two, which have been the center of attention for academicians till now. Benjamin Graham included these or related fundamental variables in the G-score for selecting high-quality firms at reasonable prices for investors to buy.

Twenty years after proposing the EMH and numerous research papers debating it, Fama (1991) reviewed the learning on market efficiency. The main areas of research on market research are now updated with new research. Weak-form tests became tests for predictability, which now used variables other than past returns to predict future returns. The semi-strong-form tests were renamed as event studies with the same purpose of gauging the speed of adjustment of security prices to information. Strong-form tests were retitled as tests for private information. Despite insider trading and evaluating pension fund and mutual fund managers' access to private information, private information was found to be rare. Brock, Lakonishok, and LeBaron (1992) found strong support for technical analysis, predicting future returns from summary statistics about security trading. Buy signals consistently generate higher and less volatile returns than returns from the following sell signals, which are negative.

Fama and French (1992) found that beta, the slope of the line through a regression of return of stock on the return of a market, has little explanatory power about average returns when used alone or in combination with other variables, while size (market value of firm's common stock or market equity, ME, equals the number of shares times stock price), earnings/price (E/P), leverage and book-to-market equity (the ratio of a firm's common stock's book value, BE, to its market value, ME) have more explanatory power when used alone. Size and book-to-market equity in combination subsume leverage and E/P and have the highest explanatory power for average returns. Fama and French (1993) proposed a three-factor model to capture the variables that explain the cross-section of average returns like size, earnings/price, leverage, and book-to-market equity, but are not explained by CAPM. These variables are called anomalies. The three-factor model states that "the expected return on a portfolio in excess of the risk-free rate [E(Ri) – Rf] is explained by the sensitivity of its return to three factors: (1) the excess return on a broad market portfolio (RM – Rf); (2) the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (SMB, small minus big); and (3) the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (HML, high minus low). Specifically, the expected excess return on portfolio i is,

$$E(Ri) - Rf = bi[E(RM) - Rf] + siE(SMB) + hiE(HML),$$

where E(RM) – Rf, E(SMB) and E(HML) are expected premiums, and the factor sensitivities or loadings, bi, si, and hi, are the slopes in the time-series regression,

$$Ri - Rf = \alpha i + bi(RM - Rf) + siSMB + hiHML + \varepsilon i.$$

Jegadeesh and Titman (1993) established that significant abnormal returns can be realized over a 3- to 12-month holding period (short-term returns) by buying past winners and selling past losers, which temporarily shifts prices from their long-run values ushering overreaction of prices, in agreement with De Long *et al.* (1990). Part of these abnormal return dissipates in the two successive years. Campbell, Grossman, and Wang (1993) discovered that the daily serial correlation of stock returns tends to decline with increasing trading volume. The explanation given is that risk-averse market makers take in the buying or selling pressure anticipating a higher expected return from liquidity or noninformational traders when the latter trade due to a change in valuation in the stock market from public information or other exogenous reasons, which create shifts in their risk aversion. With the arrival of public information, a high trade volume cannot be expected, whereas noninformational traders putting selling pressure lead to unusual volume. Thus, price changes will be reversed when accompanied by high volume than on days having low volume. Blume, Easley, and O'hara (1994) created a model in which volume captures information in the quality of traders' information signals and the traders' private information captured by price. As imprecise information can equally affect stock prices as precise information, it is recommended that volume may be used as it helps traders supplement the information when operating in volatile markets. Kim and Verrecchia (1994) suggested that at the time of earnings announcements, there is more information asymmetry with increasing bid-ask spread, leading to decreasing market liquidity and an increase in trading volume resulting from informed opinions about public disclosures.

Lakonishok, Shleifer, and Vishny (1994) take the stock market analysts like Graham *et al.* (1934) argument that value strategies outperform the market and provide evidence that the value investment strategies work because they exploit the mistakes of the majority of investors, like overreaction (De Bondt & Thaler, 1985) and extrapolating the past, by going contrarian, and not because the investment strategy is riskier (Fama & French, 1992). They established three propositions: (1) buying value (out of favor) stocks outperform glamour (growth) stocks, (2) actual growth rates of sales, earnings and other variables of glamour stocks are much lower than value stocks and (3) value strategies are less risky than growth (glamour) strategies. Glamour stocks have shown growth in the past, like steady earnings, dividend growth and sales, and seem to investors, both institutional and individual, as prudent investments with extrapolation indicating less likelihood of becoming financially distressed. However, this is contested as an imprudent investment. Even analyst forecasts were found by Trueman (1994) to be closer to past earnings expectations and previous forecasts of other analysts (herding), ignoring any other information in their possession.

Reiterating the theory of random walks in the stock market, Fama (1995) reviewed the challenges it poses to the chartists and fundamental analysis. Chartists (technical analysis) must show that the patterns can consistently make significant future price predictions. Proponents of fundamental analysis need to have new information or better insights that are not implicit in current prices in an efficient market. Jegadeesh and Titman (1995) evaluated the consistent profitability of short-term contrarian (technical analysis) investment strategy (Jegadeesh, 1990; Lehmann, 1990) and indicated that about 95% of the contrarian profit arises due to the overreaction of stock prices to firm-specific information and less than 5% of the short horizon contrarian profits are attributed to the lead-lag structure (some stocks react quickly to new information and tend to lead the

returns of other stocks that lag). However, Grinblatt, Titman, and Wermers (1995) found that most mutual funds invest in "momentum" (technical analysis) and buy stocks that were past winners. These momentum investors realized significant excess performance compared with mutual funds that followed a contrarian investment strategy. Fama and French (1995) provided an insight into fundamental analysis when they revealed that stocks with high book-to-market-equity (value stock—low market stock price relative to its book value) are persistently distressed with low ratios of earnings-to-book equity for around 11 years after portfolio formation and stocks with low book-to-market-equity (glamour or growth stock—high market stock price relative to its book value) give sustained strong profitability. Also, big stocks in book-to-market groups are more profitable than small stocks, refuting the size effect. Stickel (1995) examined the determinants of the stock price performance of buy and sell recommendations of brokerage houses that influence stock prices in the short term. These factors were (1) strength of the recommendation like strong buy or buy, strong sell or sell, (2) magnitude of change in recommendation measured by a skip in rank, (3) reputation of the recommendation issuing analyst gauged by position on the Institutional Investor (II) All-American Research Team, (4) marketing ability of the recommendation issuing brokerage house or size of the brokerage house measured by the number of employed analysts, (5) differences in information environments of recommended companies measured by market capitalization difference of common equity or the size of the recommended firm and (6) earnings forecast revisions that were issued simultaneously. The factors that seem to have permanent information effects were the recommendation's strength, the recommended firm's size and earnings forecast revisions. Factors associated with temporary price pressure effects were the magnitude of change in recommendation, the recommendation issuing analyst's and the brokerage house's size.

Fama and French (1996) revisited their three-factor model and made some observations concerning new research in the area. They found that the model captures the strong patterns in returns when portfolios are formed on variables recommended by Lakonishok *et al.* (1994), namely sales growth, cash flow/price, earnings/price and the reversal of long-term returns (De Bondt & Thaler, 1985). The accepted failure of the three-factor model lies in its inability to explain Jegadeesh and Titman's (1993) documented continuation of short-term returns (momentum strategy). Sloan (1996) showed that the current earnings performance continuance in the future depends on the relative magnitudes of current earning components, cash flow and accrual. Around future earnings announcements, firms with low accruals generate positive future abnormal stock returns, and firms with high accruals experience negative future returns. These results are inconsistent with the EMH. Contrary to evidence presented by Cowles 3rd (1933) and recently, Womack (1996) discovered Analysts' ability to pick stocks and time the market. The results detect a large return at the time of price recommendations by Analysts, whether these recommendations coincide with new public information or not. Sell recommendations are less frequent and more predictive, causing a larger post-event drift (−9.1%) for six months than buy recommendations, bringing about a short-lived post-event drift (+2.4%) for a month. The excess returns post recommendations are not mean reverting. Market response to selling recommendation is greater than buy recommendation, and market reaction to recommendations for smaller capitalization firms is higher than for larger capitalization firms. However, Abarbanell and Bushee (1997) cast doubt on analysts' forecasts, and the errors in forecasts divulge that there is an underreaction by Analysts to accounting-based fundamental signals. Lin and McNichols (1998) examined analysts' earnings forecasts and recommendations and the effect of underwriting relationships on them. These forecasts and recommendations are more favorable for the client firm securities, and investors expect a greater likelihood of a "Hold" recommendation

for the client firm's securities when "Sell" is justified and three-day returns to "Hold" recommendations are significantly more negative than those of unaffiliated analysts.

Barberis *et al.* (1998) build on the two divisions of investor behavior, (1) underreaction of security prices over 1–12 months equipping investors with the power of prediction, and (2) overreaction of security prices to consistent news over more extended periods of 3 – 5 years, reverting to the mean after that. The model proposes that the assets' earnings follow a random walk, but the investor believes that a firm's earnings behavior is between two "regimes" or "states": (1) mean reverting earnings and (2) trends. Investors observe earnings; for instance, if there are continuous positive earnings, the investor believes there is a trending regime, and if there is a negative surprise after a positive earnings surprise, the investor believes there is a mean reverting regime. Daniel, Hirshleifer, and Subrahmanyam (1998) propose a theory of underreaction and overreaction of securities based on psychological biases: (1) investor overconfidence resulting from an overestimation of the precision of own private information signal and not from public information signal leading to overreaction to former and underreaction to the latter and (2) biased-self attribution arising from a subsequent public information signal that confirms the validity of a prior trade of an investor based on a preceding private information signal, raising the confidence of the investor triggering overreaction to the private information signal. Continuous overreaction brings momentum to stock prices. In comparison, disconfirming public information signals cause confidence to drop modestly, and the momentum is reversed to bring the price closer to fundamentals. While acknowledging the models presented by Barberis *et al.* (1998) and Daniel *et al.* (1998), Fama (1998) contends that the EMH is still valid as the frequency of underreaction and overreaction of stock prices to information is equal, momentum in prices is as frequent as price reversals. Odean (1998) asserted that overconfidence is not a characteristic of markets but of people, and that person's overconfidence has a different effect on markets. The overconfidence of different participants in the stock market (1) price takers where information is broadly disseminated, (2) strategic trading insiders with concentrated information and (3) market makers are analyzed. When all three types of traders are overconfident, trading volume increases, causing underreaction in markets, reducing traders' expected utility, increasing the market depth and increasing volatility. However, overconfident market makers dampen the volatility generated by overconfident traders. Overconfident strategic trading insiders improve price quality, whereas overconfident price takers make it worse. Adding to the discussion, Conrad and Gautam (1998) analyzed two diametrically opposite philosophies (Jagirdar & Gupta, 2023) and executed investment strategies and found that (1) contrarian strategy, based on price reversals, gives profit over the short-term (weekly and monthly) and long-term (3 to 5 years or longer) intervals and (2) momentum strategy, relying on price continuations was profitable for the medium term (3 to 12 months) holding period, both investment strategies working simultaneously but for different horizons. Fama and French (1998) give evidence of higher returns of value stocks (high ratios of book-to-market equity, cash flow to price or earning to price) than growth stocks in global stock markets.

Hong and Stein (1999) urge a new theory to overcome the shortcomings of the EMH to explain asset prices empirically. The new theory has to capture the behavioral aspect and do away with the assumptions of investors' strict rationality and unlimited computational capacity. The new theory should satisfy the minimum criteria of (1) the assumption of investor behavior should be consistent with casual observation or a priori plausible, (2) a parsimonious and unified way of explaining the existing evidence and (3) make predictions that can be tested and ultimately validated. The model proposed two types of agents with bounded rationality and can process a subset of public information available. These agents are news watchers who make forecasts based only on private observation of news

about future fundamentals and momentum traders who only condition on simple measures of past price changes. There is underreaction when news watchers are active (short-term positively correlated returns). The underreaction left behind by the news-watchers will be arbitraged away by the momentum traders because they condition only on past prices and guide the market toward efficiency. Nofsinger and Sias (1999) document changes in institutional ownership having a strong positive correlation over the same period with the measured returns (lag returns). The reasons suggested are that institutional investors' positive feedback trade (seems to be related to stock returns' momentum pattern) and their herding impacts prices more than the herding by individual investors. Also, there is no mean reversion of returns in the subsequent year of changes in institutional ownership, and the stocks that institutional investors purchase outperform the stocks they sell.

In summary, there was a renaissance of technical analysis (1980s). Merton (1980) argued for the inadequacy of traditional market return calculations. Grossman and Stiglitz (1980) challenged the EMH, highlighting the impact of information imperfections and the cost of information. Banz (1981) introduced the "size effect," indicating higher risk-adjusted returns for small firms, challenging the CAPM. Shiller *et al.* (1984) emphasized the role of market psychology and the influence of human behavior on stock prices.

Overreaction hypothesis and behavioral finance (1980s–1990s) took center stage with De Bondt and Thaler (1985, 1987) exploring the overreaction hypothesis, suggesting that people tend to overreact to dramatic news events. Shefrin and Statman (1985) identified the disposition effect, where investors hold on to losers for too long and sell winners too early. Black (1986) introduced the concept of noise, the opposite of information, influencing market inefficiencies. Investors' behavior, psychological biases and the impact of noise on market dynamics were explored in various studies.

Volatility and trading dynamics were scrutinized (1980s), with Fama and French (1986) observing negative serial correlation in stock returns, supporting technical analysis and challenging the random walk model. French and Roll (1986) noted increased asset return volatility during exchange trading hours. Schwert (1989) examined the reasons for changes in stock market volatility over time, considering factors like macroeconomic variables and financial leverage. This led to the proposition of the influential three-factor model by Fama and French (1992, 1993), which aimed to capture anomalies not addressed by traditional models. They proposed a three-factor model, incorporating size and book-to-market equity as factors influencing average returns. The model aimed to capture anomalies not explained by the CAPM). Researchers revisited and debated the EMH, questioning its validity. Empirical evidence supports both underreaction and overreaction in stock prices, challenging the idea of market efficiency. Investment strategies, anomalies in market dynamics, and the impact of institutional ownership added further layers to the comprehensive exploration of financial phenomena during this dynamic era. Researchers explored contrarian and momentum investment strategies, finding evidence for short-term and long-term profitability. Value stocks were found to outperform growth stocks, challenging traditional risk-based explanations.

Studies investigated psychological biases like overconfidence, underreaction, and overreaction in investor decision-making. Odean (1998) suggested that overconfidence varied among different market participants, influencing trading volume and market dynamics. Nofsinger and Sias (1999) documented a positive correlation between changes in institutional ownership and stock returns. Institutional investors' positive feedback trading and herding behavior were identified as influential factors in market movements.

The neoclassical era reflects the evolution of financial thought, from challenges to traditional models like CAPM and EMH to the exploration of behavioral biases and the development of new models like the three-factor model. The discussion encompasses a

broad range of topics, showcasing the dynamic nature of financial research during this era.

Modern era (2000 – present day)

In the evolution of investment strategy, the EMH and the Random Walk Hypothesis have been cast aside. This era belongs to behavioral finance and social media.

Lee and Swaminathan (2000) showed that past trading volume (a technical indicator) can identify glamour (growth) or value stocks without fundamental analysis. Firms with low past turnover have value characteristics, earn higher returns in the future and consistently have more positive earnings surprises over the next eight quarters. Similarly, firms with high past turnover have growth characteristics, earn lower returns in the future and consistently have more negative earnings surprises over the next eight quarters. Also, faster reversals are experienced by high- and low- volume winners. Morck, Yeung, and Yu (2000) observed that stock prices move together in emerging markets rather than in high-income economies. Stronger shareholder rights and legal protection against corporate insiders, good government, more firm-specific variation and less market-wide variation are the reasons for less synchronous market returns in developed economies than in emerging economies. Piotroski (2000) examined whether a simple accounting-based fundamental analysis strategy can shift the distribution of returns earned by an investor. A score is calculated based on nine criteria divided into three groups Profitability (Return on Assets, Operating Cash Flow, Change in Return of Assets (ROA), Accruals), Leverage, Liquidity and Source of Funds (Change in Leverage (long-term) ratio, Change in Current ratio, change in the number of shares) and Operating Efficiency (Change in Gross Margin, Change in Asset Turnover ratio). The mean return earned by value (high book to market) stocks can be increased by 7.5% annually.

Barber and Odean (2000) quoted Benjamin Graham, "The investor's chief problem—and even his worst enemy—is likely to be himself" and found it true. Households that trade the most earn 11.4% annually, which is very low compared to the 17.9% market returns. The average household turns over 75% of its portfolio annually, invests in high beta and small value sticks, and still earns only 16.4% annually. Thus, actively managed investment strategies do not outperform passive investment strategies. The reason is that private information is rare, and overconfident investors overestimate the value of any private information they have and begin trading too actively, leading to below-average returns. Hence, the conclusion, "Trading is Hazardous to Your Wealth". Taking the analysis further, Barber and Odean (2001) demonstrated that in finance, men are more overconfident, then trade more excessively and lose more than women (2.65 percentage points reduction a year for men compared to 1.72 percentage points reduction for women). Gervais and Odean (2001) present a model in which traders do not know their ability initially and infer this knowledge from successes and failures. Success leads to overconfidence, which increases in the early stages of a career. With progression in career and more experience, traders develop better self-assessments. With success comes wealth, which can increase overconfidence in traders as there is no immediate threat of being run out of the stock market. With age, the ability of traders reduces, and so does wealth and confidence. Eventually, a day arrives when they cease to trade. So, in a market, there will always be inexperienced traders entering, wealthy overconfident traders controlling and old traders leaving. Overconfident traders trade aggressively, increasing expected volume and thereby increasing volatility in past successes.

Forbes and Rigobon (2002) found evidence different from King and Wadhwani's (1990) study of the 1987 US stock market crash when they examined three crises: the 1987 US stock market crash, the 1994 Mexican peso collapse and the 1997 East Asian crises. During these three market crises, the existing cross-market solid linkages were responsible for high market

co-movements, and there was only interdependence and no contagion. Amihud (2002) tried to solve the equity premium puzzle of why the excess stock returns are higher than Treasury securities, and the answer is illiquidity. This "risk premium" reflects a higher risk of stocks than Treasury securities and a premium for illiquidity, as the stocks have lower liquidity than the latter. Pástor and Stambaugh (2003) took market-wide or aggregate liquidity (a cross-sectional average of individual stock liquidity measures) for asset pricing. Stocks have higher expected returns that are more sensitive to aggregate liquidity. Baker and Stein (2004) explained that increases in liquidity (lower bid-ask spreads, higher share turnover, lower price impact of trade) predict lower subsequent returns with a model featuring irrational investors with short sales constraints. These irrational investors underreact to the information contained in equity issues or order flow and will be active only when the stock market is overvalued, and their sentiment is positive. The increased liquidity confirms the presence of irrational investors. Jegadeesh, Kim, Krische, and Lee (2004) found that analysts recommend momentum and growth stocks, and their recommendations have a positive correlation with momentum indicators and a negative correlation with contrarian indicators. The favorably recommended stocks have higher turnover, more positive price momentum, higher growth (past and projected), more aggressive capital expenditures and more positive accounting accruals. When favorably recommended, firms with favorable momentum and contrarian signals outperform less favorably recommended firms with favorable momentum and contrarian signals. In contrast, when favorably recommended, firms with less favorable momentum and contrarian signals underperform less favorably recommended firms with favorable momentum and contrarian signals. Also, changes in recommendations have better information than the absolute level of recommendations. Asquith, Mikhail, and Au (2005) showed that the market also reacts positively and significantly to changes in recommendation levels, price targets and earnings forecasts. Furthermore, the analysts could only accurately predict the price targets around 50% of the time.

Baker and Wurgler (2006) examined investor sentiment with proxies (1) average closed-end fund discount, (2) trading volume measured by NYSE share turnover, (3) the number and average first-day returns on IPOs, (4) the equity shares in new issues, (5) the dividend premium and (6) a composite index based on the first principal component. When it is low in sentiment, subsequent returns are higher for underpriced stocks that may be smaller, highly volatile, unprofitable, non-dividend paying, extreme growth or distressed. When the sentiment is high, subsequent returns for these stocks, which are attractive to optimists and speculators but unattractive for arbitrage, are low. Baker and Wurgler (2007) further add that sentiment affects those stocks most difficult to value or arbitrage. Tetlock (2007) is the first to report the predictive power of news media content (particularly Wall Street Journal's "Abreast of the Market" column on US stock market returns) and can be used as a proxy for noninformational trading or investor sentiment. A high level of media pessimism can robustly predict a downward pressure on stock market prices, subsequently reverting to the fundamentals. Unexpected low or high levels of media pessimism can predict high market trading volume and low market returns drive high media pessimism. Cohen *et al.* (2008) suggested that information also flows into asset prices from social networks like education networks. Portfolio managers take informational advantage of the shared education network with corporate board members and place larger bets on the firms connected with them through the network, generating higher returns concentrated around corporate news announcements.

Trading requires traders' funding and asset market liquidity. Brunnermeier and Pedersen (2009) provide a model linking the liquidity of the two (1) asset market liquidity and (2) traders' funding liquidity. With their available funds, traders provide market liquidity. Depending on the assets' market liquidity, margins (the difference between the security's

price and the collateral value) are charged, and capital is employed. Low-funding liquidity lowers market liquidity and increases volatility. Several implications follow from this model. Jegadeesh and Kim (2010) reported somewhat similar results to Keynes (1936) and Scharfstein and Stein (1990) in herding behavior of sell-side analysts following smaller dispersion stocks across recommendations or belonging to larger brokerage firms tending to herd more. Also, the market now recognizes analysts' herding behavior and stock price reactions are stronger for recommendation revisions away from the consensus. Bollen *et al.* (2011) used Twitter feeds to measure collective mood states and their impact on economic indicators. The text content of daily Twitter feeds was analyzed by two mood tracking tools, OpinionFinder (which measures positive versus negative mood) and Google-Profile of Mood States (GPOMS, which measures mood in six dimensions, namely Alert, Calm, Happy, Kind, Sure and Vital) to correlate to the value of DJIA (Dow Jones Industrial Average) over time. The results indicate an accuracy of 87.6% in predicting the variations in the closing value of DJIA and a more than 6% reduction in the Mean Average Percentage Error. Twitter feeds provide a free, fast, automatic and large-scale analysis of public mood. Investor emotions are gauged from social media, also known as investor sentiment.

Joseph *et al.* (2011) used online ticker searches as a proxy for investor searches and found that the search intensity can predict trading volume and abnormal returns over a weekly horizon. The sensitivity of these returns to search intensity is related positively to the difficulty in arbitraging a stock. Van Rooij, Lusardi, and Alessie (2011) confirmed that individuals having low financial literacy seldom invest in stocks. Savor (2012) revealed that price events are followed by drift when accompanied by information and reversals when there is no information. The drift also persists when the direction of price change matches the change in analyst recommendations. Information-based price changes are strongly correlated with future earnings surprises, aggregate implied volatility and forecast momentum return. Firth, Lin, Liu, and Xuan (2013) analyzed the influence of business relations between brokerage firms and mutual funds on sell-side analyst recommendations. The commission revenue generated by the mutual fund as a client and the weight of the stock in that particular mutual fund have a positive relationship with the optimism in analyst recommendations. Also, analysts are reluctant to downgrade a stock after receiving bad news if it is held in a mutual fund client's stock portfolio. Likewise, mutual fund clients also do not increase their portfolio stock holdings if they receive a favorable recommendation from analysts under client pressure. Analysts who give recommendations without client pressure generate significantly higher abnormal returns in the announcement period and the long run than analysts who give recommendations under client pressure. Novy-Marx (2013) contends that gross profits-to-assets, where profitability is equal to the firm's total revenues minus the costs of the goods or services it sells, has approximately the same power in predicting the relative performance of various stocks as other measures like the book–to–price ratio and value investing strategies. The performance of value strategies and strategies based on gross profitability are strongly negatively correlated, so profitability strategies provide a valuable hedge to value investors. It is argued that gross profitability is a better measure of predicting future stock returns than the profitability variable most frequently used, ROE. Gross profitability is a better measure of economic profitability and a predictor of future returns because it recognizes firms with competitive advantages.

Similar to Bollen *et al.* (2011), Chen *et al.* (2014) found effectiveness in peer-based advice through social media on the Internet. The opinions expressed by individuals on the site (in this study, it is Seeking Alpha) can predict subsequent stock returns and earnings surprises. Fama and French (2015) updated their Fama and French (1993) three-factor model. They added two more factors to adequately capture asset returns adequately (1) robust minus weak (RMW) profitability factor, which compares the returns of robust firms with weak or low operating profitability firms, and (2) conservative minus aggressive (CMA) investment

factor, which compares firms that invest aggressively with those that invest conservatively. This model's drawback is its inadequacy to capture small stocks' low average returns that behave like firms with low profitability but a high investment. Chen, Harford, and Lin (2015) explored the monitoring hypothesis about financial analysts' roles in the governance of managerial behavior in a firm. When analysts' coverage of a firm reduces, the CEO receives excess compensation with less sensitivity to the firm's performance, and managers tend to be involved in earnings management activities, making value-destroying acquisitions. Shareholders' values for internal cash holdings diminish. Bijl *et al.* (2016) investigated whether stock returns can be forecast using Google Trends data. The Google search volume is an index of the total search volume for a company over time, and high search volumes were found to generate negative returns. A trading strategy, which can be profitable when transaction costs are ignored, is to buy stocks with low Google search volume and sell stocks with high Google search volume. This strategy seems like a contrarian strategy where the stocks are bought if the past returns are low and sold if past returns are high. Jame *et al.* (2016) suggested that crowdsourced earnings forecasts, or in other words, the earnings forecasts given by an extensive network of outsourced people by an open call, are a valuable and additional source of information for forecasting earnings and estimating the earnings expectations of the stock markets. The consensus revisions of the crowdsourced earnings forecast generated significant two-day size-adjusted returns. Bradley, Gokkaya, and Liu (2017) documented that preanalyst industry experience allows the analyst to make better forecasts with higher accuracy for the matching industry. The analysts themselves excel because of their expertise and not social connections. Bartov, Faurel, and Mohanram (2018) tested the peer-based advice through social media and submitted that the aggregate opinion of individuals tweeted predicts its quarterly earnings and announcement returns just before the firm's earnings announcements. These findings are stronger for firms existing in weaker information environments.

Asness *et al.* (2019) empirically found that high-quality stocks with growth, profitability and safety characteristics have higher average prices but low margins. Due to this lower pricing, high-quality stocks can boast of high-risk adjusted returns. The strategy of buying high-quality stocks and selling low-quality stocks is named quality minus junk factor and generates significant risk-adjusted returns in 25 countries. This strategy is a hybrid version of Jegadeesh and Titman's (1993) momentum strategy.

Da and Huang (2020) work on the same crowd-based corporate earnings forecast platform as Jame *et al.* (2016) and find that when a user views a large amount of public information, the less they rely less on their private information for making earnings forecasts. It might increase the accuracy of individual earnings forecasts but reduce the accuracy of public or group consensus as private information needs to be considered. Experiments confirm that independent forecasts increase the accuracy of consensus forecasts, and more public information does not need to lead to improvement in group decision-making. Nikkinen and Peltomäki (2020) compared newspaper articles and web searches and reported that more web searches usher more news, but the vice versa does not hold. Also, web searches immediately affect stock market returns and volatility, while the effect of news article lags and lasts longer for around 11 weeks. Jame, Markov, and Wolfe (2022) found that increased competition from financial technology (FinTech), like crowd-based corporate earnings forecast platforms, improves sell-side research quality by experiencing a substantial and pervasive decrease in consensus bias and a slight increase in consensus accuracy for short-term earnings forecasts. In contrast, the long-term recommendations remain likewise biased. Hirshleifer, Shi, and Wu (2022) suggested that analysts purposefully introduce noise in their recommendations to the public and keep the more valuable and precise information for their private clients. This behavior of analysts, say-buy/whisper-sell, increases information asymmetry.

The modern era marks an evolving landscape in investment strategy, emphasizing the shift away from traditional theories like the EMH. Behavioral finance and social media have gained prominence in shaping investment strategies. Notably, studies by Lee and Swaminathan (2000) highlight the relevance of past trading volume in identifying growth and value stocks without relying on fundamental analysis. Piotroski's (2000) accounting-based strategy proves effective in enhancing the returns of value stocks. Barber and Odean (2000, 2001) examine the pitfalls of active trading, revealing that overconfident investors often underperform passive strategies. Forbes and Rigobon (2002) challenge contagion theories during crises, emphasizing cross-market linkages. Amihud's (2002) explanation of the equity premium puzzle adds a layer of understanding, tying it to stock illiquidity. Additionally, the impact of illiquidity on stock returns, behavioral influences on market liquidity by Baker and Stein (2004), and the predictive power of news media content discussed by Tetlock (2007) underscore the multifaceted nature of market dynamics. Notably, Asness *et al.*'s (2019) identification of high-quality stocks for potential high-risk adjusted returns and Hirshleifer *et al.*'s (2022) suggestion that analysts may introduce noise for information asymmetry collectively showcase the ongoing dynamism and complexity within the realm of finance.

Future research opportunities

This study opens avenues for future research by proposing several key areas of exploration in the domain of investment strategy. To bridge the gap between theory and practice, future endeavors should prioritize empirical validation of the presented theoretical frameworks, offering practical insights into the dynamics of stock markets. Investigating emerging trends and contemporary issues not extensively covered in the existing literature is essential to ensure the relevance and applicability of research findings. Additionally, there is a need to explore the integration of financial technology tools, such as robo-advisors and sentiment analysis from social media, into investment decision-making processes. Ethical considerations surrounding analysts' behavior and the impact of technological disruptions on financial markets warrant further investigation, with an emphasis on developing guidelines to uphold transparency and fairness. The study suggests an exploration of investor education programs addressing biases identified in the literature, promoting a more informed and rational investment community. The interconnectedness of global markets, innovative forecasting techniques, adaptation to changing liquidity conditions and longitudinal analyses of market psychology are highlighted as areas ripe for future investigation. Lastly, a comparative analysis of various investment strategies, considering both traditional and behavioral approaches, promises valuable insights into their performance under diverse market conditions and investor behaviors. These suggested research avenues collectively contribute to advancing our understanding of investment strategy in the evolving landscape of the stock market.

Conclusion

This study reviews more than a century of research on investment strategy in stock markets for the quest of abnormal returns and brings out the evolution of the knowledge we possess now. This study summarizes the previous literature of more than 100 years and identifies the conflicts and the relationships that arise from such a wide variety of existing studies. The period under study is divided into three subperiods to bring coherence and capture the characteristics of time with a chronological study of events: Classical, Neoclassical and Modern. The classical era is dominated by CAPM, Fundamental analysis, EMH and Random Walk Hypothesis. The neoclassical era marked the renaissance of technical analysis with

sustained criticism from proponents of fundamental analysis. The Modern era belongs to behavioral finance and technological advances in social media. The EMH and Random Walk Hypothesis have almost lost relevance in this era.

This paper has presented and critiqued the literature on investment strategies in the stock market through the different views of the main contributors. Technical analysis was widely used (Dow, 1920) and Dow Theory (Nelson, 1912) was accepted as an investment strategy (Hamilton, 1922). However, with mandatory disclosure of financial information, Graham *et al.* (1934) developed a fundamental analysis, which created an opportunity to relegate Technical Analysis by Cowles and Jones (1937) and Fama (1965). EMH (Fama, 1970) was critically challenged by Basu (1977) and contrarian investor David Dreman (1977). Grossman and Stiglitz (1980) amended the efficient market by introducing the concept of information imperfection and cost of information. Fama (1991) updated the EMH and Fama (1998) acknowledged the behavioral models of Barberis *et al.* (1998) and Daniel *et al.* (1998). Hong and Stein (1999) proposed to reject the assumptions of investors' rationality and unlimited computational capacity to ensure the validity of the EMH.

Fama and French (1986) shifted the center of attention of future research by endorsing technical analysis and rejecting the Random Walk Model. Winner–loser effect (De Bondt & Thaler, 1987), Mean Reversion (Poterba & Summers, 1988), evidence of the predictability of individual stock returns (Jegadeesh, 1990), Arbitrage profits (Lehmann, 1990), the Lead-Lag structure (Lo & MacKinlay, 1990), Contrarian Investment (Jegadeesh & Titman, 1995), Momentum Investment (Jegadeesh & Titman, 1993; Grinblatt *et al.*, 1995) and Fama (1995) reinforced technical analysis.

CAPM was also found inadequate by Banz (1981) when it failed to explain the Size Effect and Fama and French (1992), which led to the Three-Factor Model (Fama & French, 1993). The Three-Factor Model was itself found to be deficient in explaining Jegadeesh and Titman's (1993) successful momentum strategy. This deficiency was supposedly removed by Fama and French's (2015) Five-Factor Model.

Even after almost fifty years of introducing the concept of market psychology by Keynes (1936), Shiller *et al.* (1984) calls attention to the lack of research in behavioral finance. This drew a renewed vigor in research in behavioral finance with the Overreaction Hypothesis (De Bondt & Thaler, 1985), De Long *et al.* (1990) disputing Friedman's (1953) rational speculators' argument, and Scharfstein and Stein (1990) invoked Keynes (1936) while revisiting herding behavior. Daniel *et al.* (1998) theory of underreaction and overreaction of securities based on psychological biases was asserted as a characteristic of people by Odean (1998).

Mandatory disclosure of financial information by companies and the role of Analysts have been instrumental in the dissemination of information in the market. There have been conflicting results as to the accuracy and bias of financial forecasts, and the Internet has provided an alternate source of financial information and investor sentiment. The scope of behavior finance has grown significantly with it. The evolution of research in investment strategies in the stock market leads to the conclusion that fundamental analysis is now being used as a source of information for the markets, and behavioral finance has become an indicator in technical analysis.

Implications of the study

The integration of behavioral finance theories with investment strategies, as explored in the reviewed literature, contributes to the advancement of theoretical frameworks. The identification and exploration of psychological biases provide a foundation for refining existing behavioral models and developing new theoretical perspectives. The observed deviations from traditional market efficiency hypotheses, especially in the context of social media and investor behavior, challenge and extend the boundaries of market efficiency

theories. Theoretical implications include re-evaluating the EMH and the Random Walk Hypothesis considering the impact of sentiment analysis and online communication on stock prices. The literature review sheds light on the intricacies of investor decision-making processes, emphasizing the role of emotions, information sources and social networks. Theoretical implications involve a deeper understanding of how cognitive biases and social influences shape individual and collective investment decisions. The intersection of financial theories with technological advancements, such as social media analytics, sentiment analysis and machine learning, establishes a theoretical framework for the evolving landscape of financial technology (FinTech). Theoretical contributions involve conceptualizing the symbiotic relationship between traditional finance theories and innovative technological applications.

Practitioners can leverage insights from behavioral finance to enhance investment strategies by considering the impact of psychological biases on market dynamics. The identification of successful strategies, such as those based on value, growth, contrarian or momentum indicators, provides practical guidance for portfolio management. Understanding the overconfidence bias and its impact on trading activity supports the development of risk management practices to mitigate the adverse effects of irrational exuberance. Practitioners can implement strategies to counteract the hazards of overtrading and align investment decisions with realistic risk-return expectations. The practical implication of social media sentiment analysis involves incorporating real-time information from online platforms into investment decision-making processes. Portfolio managers can develop tools and strategies that consider the sentiment of market participants as a supplementary factor in predicting stock movements. Practical applications include the integration of technological tools, such as artificial intelligence and crowdsourced forecasting platforms, to enhance the accuracy of earnings predictions. Financial analysts and investors can adopt advanced forecasting techniques that leverage technological advancements for more informed decision-making. Investors and financial institutions can adapt their strategies to changing market liquidity dynamics, considering the interconnectedness of asset market liquidity and traders' funding liquidity. Practical implications involve adjusting investment approaches based on prevailing liquidity conditions to minimize volatility-related risks. The identification of biases and behavioral patterns suggests practical interventions for investor education programs. Financial institutions and regulators can design educational initiatives that address specific biases identified in the literature, enhancing investor awareness and decision-making skills. The practical application of FinTech involves the strategic adoption of technological innovations for decision support, risk management and portfolio optimization. Financial professionals can explore FinTech solutions that align with their investment objectives by leveraging advancements such as robo-advisors and algorithmic trading. Practical implications include recognizing and addressing potential ethical concerns related to analyst behavior, information asymmetry and the impact of technological disruptions. Financial advisory firms can develop ethical guidelines and governance structures to ensure transparency and fairness in client interactions.

These theoretical and practical implications underscore the multifaceted impact of the reviewed literature on both academic discourse and real-world investment practices. They provide a foundation for future research and guide practitioners in navigating the evolving landscape of investment strategy in the stock market.

Limitations of the study

The literature review justifies the exclusion of empirical work due to the extensive nature of reviewing over a hundred years of literature. The decision to focus solely on theoretical and seminal papers may influence the overall research findings. The sample selection bias toward

theoretical papers may be perceived as a limitation, as empirical studies provide valuable insights into the practical implications of theoretical concepts. The chronological presentation of literature may result in a focus on historical developments, with limited exploration of emerging trends in recent years. The dynamic nature of financial markets and technological advancements suggests that newer research may offer insights into contemporary issues not covered in the selected literature. The reliance on specific databases, such as Google Scholar, for literature selection, may introduce publication bias, as not all relevant journals and publications may be included. The heterogeneity of the selected literature may limit the applicability of overarching conclusions to specific contexts or subdomains within investment research. Seminal works, while foundational, may carry inherent biases reflective of the historical and cultural contexts in which they were developed. The literature review may not fully capture the rapid changes and innovations occurring in financial markets, especially with the emergence of FinTech and the increasing interconnectedness of global markets.

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Corresponding author
Pradeep Kumar Gupta can be contacted at: pradeep.gupta@thapar.edu