



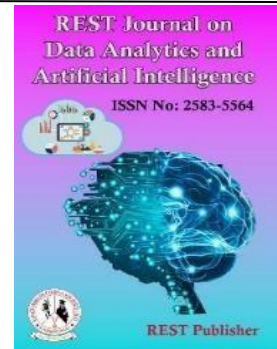
REST Journal on Data Analytics and Artificial Intelligence

Vol: 3(1), March 2024

REST Publisher; ISSN: 2583-5564

Website: <http://restpublisher.com/journals/jdaai/>

DOI: <https://doi.org/10.46632/jdaai/3/1/5>



The Efficiency of Investment in Indian Stock Market using GRA Method

Madhuchhanda Lahiri

P. N. Das College Santinagar, Palta, West Bengal, India.

*Corresponding author Email: madhuchhandalahiri@pndascollege.in

Abstract: *The Indian Stock Exchange, holds significant sway in the country's economy. They serve as pivotal platforms where a plethora of companies from diverse sectors converge, contributing to fastest growing in the world of one of the economies, a growth story. Growing up engaged in development stories for those interested, the Indian Stock Exchange offers many opportunities: government policies, economic indicators, Global market trends. It is affected by various factors like corporate earnings, all of which significantly impact stock prices. Indian stock market for the economic well-being of the country acts as a measure and reflecting global trends its dynamic shows character it is stocks, derivatives various financial like Includes tools. commodities, and currencies, with distinct sections, prominently represented by housing numerous listed companies across diverse sectors. Both domestic and international investors engage in the market, aiming for wealth creation while navigating associated risks according to their objectives. Over the years, spurred by economic reforms, technological advancements, and increased investor participation, India's stock market has experienced significant expansion and evolution. It has transitioned to electronic trading platforms, enhancing efficiency, transparency, and accessibility. Regulatory reforms have bolstered investor confidence and market integrity. Indian stock market for the economic well-being of the country acts as a measure and reflecting global trends its dynamic shows character it is stocks, derivatives various financial like Includes tools. commodities, and currencies, with distinct sections, prominently represented by housing numerous listed companies across diverse sectors. Both domestic and international investors engage in the market, aiming for wealth creation while navigating associated risks according to their objectives. Over the years, spurred by economic reforms, technological advancements, and increased investor participation, India's stock market has experienced significant expansion and evolution. The primary purpose of GRA is to elucidate the comparative ranking of alternatives based on their performance. In this method, known as Gray Relative Analysis, a super target sequence is established in accordance with specific scenarios. Subsequently, each alternative in the rows undergoes evaluation using the Carey correlation coefficient against the satisfying target collection. Finally, the gray correlation is computed by applying coefficients, revealing the correct target sequence and determining the size of gray contact for each variant sequence Infosys Limited, Reliance Industries Limited, HDFC Bank Limited, Tata Consultancy Services Limited and Housing Development Finance Corporation Limited. Earnings Per Share (EPS), Price-to-Earnings Ratio (P/E Ratio), Return on Equity (ROE), Debt-to-Equity Ratio (D/E Ratio) and Market Capitalization. The rank of GRA indicates the efficiency of investment in the Indian stock market. Housing Development Finance Corporation Limited has the highest GRG rank value, while HDFC Bank Limited has the lowest value.*

Keywords: *Earnings Per Share (EPS), Price-to-Earnings Ratio (P/E Ratio), Return on Equity (ROE), Debt-to-Equity Ratio (D/E Ratio) and Market Capitalization.*

1. INTRODUCTION

The Indian stock market Since 1991 has witnessed remarkable growth, largely due to changes in policies towards liberalization and globalization. This shift has led to a growing emphasis on the stock market from a collective economic standpoint. Nowadays, discussions about the economy often revolve around the stock market, recognizing it as a major driver and primary source of resource mobilization for Indian companies, thereby facilitating financial and economic

growth [1]. Internationally, the Indian stock market in emerging markets recognized together offering diverse investment opportunities. Its robust performance is fuelled by both domestic and foreign capital, contributing to the capital market overall development. Combined performance traded stock prices serve as a visible indicator of the market's movement, easily accessible through symbols. The stability of the Indian economy can be measured by various macroeconomic variables, economic conditions and exposure of companies, impacting their functioning throughout different stages of their life cycle. Managing these macroeconomic variables becomes crucial for companies, as they directly affect share price volatility and market dynamics [2]. Their uncertainty can lead to significant fluctuations in commodity markets, which, in turn, affect the stability of the stock market. Thus, understanding and managing these macroeconomic variables are essential for maintaining a stable and thriving financial system, where surplus sectors play a vital role in supplementing deficit sectors through savings. Making investment decisions about the market requires a comprehensive need understanding, Inside and two including factors outside one's control. The rapid fluctuations in stock prices are influenced by various elements political instability, global economic downturn, on oil prices ups and downs and Domestically and internationally the economy health etc. in recent stock markets decline, exacerbated by the COVID-19 pandemic, has witnessed significant sell-offs by investors and financial institutions [3]. During bullish phases in the Indian stock market, characterized by upward trends, there is typically an increase in Foreign Portfolio Investment (FPI), leading to appreciation in the domestic currency. This trend often coincides with rising crude oil prices, as there exists an implicit connection oil prices and stock market performance between exchange. affected by rate dynamics. Consequently, fluctuations in oil prices directly impact market volatility and currency valuation [4]. The Indian economy is currently experiencing a remarkable transformation, with its GDP growth reaching unprecedented levels, most of the world's fast growing converts economically. This growth has spurred significant advancements, particularly in the trading of Single Stock Futures (SSFs) on rendering the Indian SSF market exceptionally vibrant on a global scale. As part of this economic surge, there's a compelling need to delve into the dynamics of price discovery using extensive data analysis. To address this, our study focuses on exploring Since January 2012 as of December 2016 in Indian stock market price discovery, high frequency using the data from the Indian Stock Exchange. Unlike previous studies, we employ a unique combination of methodologies, including Gonzalo's component partitioning (CS) method, Price finder to examine the process comprehensively [5]. Furthermore, our investigation extends beyond conventional approaches by considering both long-term and recent periods, as well as incorporating popular techniques in high-frequency data analysis. We aim to shed light on how market and individual stock characteristics influence the duration and evolution Price finder the process is complete time. In addition to providing a novel perspective on price discovery, our study is notable for literature contributions. First, we narrow the gap by introducing new methodologies and economic approaches previously unexplored in the Indian context. Secondly, we offer insights into price discovery market size and impact of sector classification, a dimension largely overlooked in prior research [6]. Indian stock market for the economic well-being of the country acts as a measure and reflecting global trends its dynamic shows character it is stocks, derivatives various financial like Includes tools. commodities, and currencies, with distinct sections, prominently represented by housing numerous listed companies across diverse sectors. Both domestic and international investors engage in the market, aiming for wealth creation while navigating associated risks according to their objectives. Over the years, spurred by economic reforms, technological advancements, and increased investor participation, India's stock market has experienced significant expansion and evolution. It has transitioned to electronic trading platforms, enhancing efficiency, transparency, and accessibility. Regulatory reforms have bolstered investor confidence and market integrity [7]. A considerable amount of research has been conducted on the Efficient Market Hypothesis (EMH). However, the findings are often contentious and subject to debate. Some argue that there's little merit in attempting to uncover undervalued stocks or predict market trends through either fundamental or technical analysis. Over the past two decades, Stock Markets of India have undergone significant reforms, driven by liberalization efforts. These reforms have not only enhanced market functionality but have also introduced regulations to monitor cash flows effectively. One would expect these developments to guide Indian stock markets towards greater efficiency, limiting the ability of individuals to consistently outperform the market [8]. Indian stock markets, foreign company investors (FIIs) play an important role by enhancing liquidity and diversifying investment portfolios. Their involvement introduces foreign capital, Fluctuations in foreign financial flows and market sentiment can impact property prices, making the market susceptible to external shocks. The trading of derivatives on the Indian Stock Exchange has gained significance, allowing investors to hedge risks and capitalize on price movements. However, trading derivatives comes with challenges such as volatility, margin requirements, and regulatory oversight [9]. Market indices like Nifty 50 and Sensex serve as benchmarks, reflecting the stock market in various sectors. Investors Market Monitor trends, portfolio Evaluate performance, informed investment decisions Use these codes to pick up. Indian stock market and including institutional investors It covers different types of investors. Retail investor participation in recent years' financial literacy, technology and increased due to development of online trading platforms, they often face challenges such as lack of expertise and susceptibility to herd mentality and emotional biases. Market integrity and investor protection are maintained through stringent regulation and monitoring by

entities like brokers, and listed companies [10]. The Indian stock market, valued at 2.02 USD, stands as the ninth largest globally, with a market capitalization reaching a trillion as of December 2019. Forecasts predict a significant surge by 2027, projecting a market capitalization of 6 trillion USD, presenting investors with promising opportunities. Investing in the stock market holds crucial significance for two primary reasons: firstly, as a hedge against inflation, thereby maintaining the value of assets, and secondly, for the potential of swift profits. Engaging in systematic research aids in maximizing profitability while simultaneously mitigating risks [11]. Indian stock markets have a rich history. Established in 1875, the BSE holds the distinction of being Asia's oldest stock market, listing approximately 5400 companies. However, despite this vast number, merely 500 companies contribute to 90% of the market capitalization, indicating a significant concentration. The BSE's key index, SENSEX, comprising 30 prominent companies, drives market sentiment, though trading activity varies [12]. Its flagship equity benchmark, NIFTY 50, symbolized by the code NIFTY, represents the performance of 50 leading Indian companies across diverse sectors. This code is cumulative market sentiment and to measure performance acts as a barometer. Indian financial markets, nearly 150 with years of history, are respectable as such companies proud, they are the oldest in Asia. The evolution of these markets gained momentum with shifting their governance towards a more private sector-oriented approach and embracing an open economy model. The establishment of the SEBI Act in 1992 marked a significant milestone, entrusting SEBI with regulatory authority over Indian capital markets, emphasizing its pivotal role [13]. SEBI undertook various initiatives to bolster investor confidence and participation in the market. These measures included allocating 35 percent of share issues to individual investors, offering shares at a 5 percent discount to market price, with lot sizes ranging from INR 10,000–15,000, thereby catering to a broad spectrum of investors with different financial capacities (Pundit and Yow, 2014; Mehta and Sonthi, 2016). Moreover, SEBI actively promotes investor awareness through events and educational programs, aiming to enhance investors' understanding of market dynamics and their personal financial status [14].

2. MATERIALS AND METHOD

Infosys Limited: Infosys Limited is business advice, Information Technology and provides outsourcing services. It is a multinational company. It is in Bangalore, India the headquarters are and it's one of the IT companies in the world.

Reliance Industries Limited: Reliance Industries Limited, Mumbai, India headquartered in Petrochemicals, Refining, Oil and with wide interests diversified is an Indian conglomerate. natural gas exploration, telecommunications, retail sales, and various other sectors. It stands as one of India's largest companies by market capitalization.

HDFC Bank Limited: HDFC Bank Limited, headquartered in Mumbai, stands as India's premier private sector bank, renowned for its comprehensive retail banking, wholesale banking, and treasury operations. It is of different types of bank and provides financial services, with a strong emphasis on digital banking and customer-centric approaches.

Tata Consultancy Services Limited: Tata Consultancy Services Limited (TCS) also based in Mumbai, India, is a multinational information technology and consulting firm, operating in 46 countries as a subsidiary of the Tata Group. TCS holds the position as the largest global Information Technology Service provider, offering software development, consulting, and business solutions.

Housing Development Finance Corporation Limited: Housing Development Finance Corporation Limited (HDFC), another Mumbai-based entity, leads India's foremost financial services company. Specializing in home loans, insurance, asset management, and various financial services, HDFC boasts a significant presence in India's housing finance sector and the broader financial market.

Earnings per share: Earnings per share (EPS) is each of a company also for outstanding share of the alleged profit represents area, total revenue by total number of shares the division is calculated.

Price-to-Earnings Ratio: The price-earnings ratio (P/E ratio) is current per share market price per share divided by revenue to value the shares of the company is the relative measure used.

Return on Equity: Return on Equity (ROE) is a company's profit, that is how efficient it is using shareholder equity indicates that it is profitable.

Debt-to-Equity Ratio: Debt-to-Equity Ratio (T/E Ratio) a company's financial structure its debt with its equity evaluates by comparison, total liabilities of the partner dividing by equity calculated.

Market capitalization: Market capitalization reflects a company in the market of outstanding shares total value, per share Current market price total outstanding by number of shares calculated by multiplying. a firm's size in the market and to assess significance it serves as an important metric.

Method: The primary purpose of GRA is to elucidate the comparative ranking of alternatives based on their performance. In this method, known as Gray Relative Analysis, a super target sequence is established in accordance with specific scenarios. Subsequently, each alternative in the rows undergoes evaluation using the Carey correlation coefficient against the satisfying target collection. Finally, the gray correlation is computed by applying coefficients, revealing the correct target sequence and determining the size of gray contact for each variant sequence [15]. the GRA (Grey Relational Analysis) approach at its inception, focusing on the concept of the gray gadget. This technique is particularly effective for selection problems involving multiple attributes within a component. The current literature highlights its applicability in addressing problems associated with multiple factors and variables, especially when dealing with complex relationships. The GRA approach is well-suited for resolving issues related to fixing problems, and various types of GRA techniques have been proposed in the field. The introduction of the GRA approach is both straightforward and environmentally friendly, making it a practical choice for addressing complex problems involving multiple variables [16]. Gray Relational Analysis (GRA) serves as a valuable tool for addressing problems in Multi-Criteria Decision Making (MCTM). Originally introduced by Deng, GRA has proven effective in troubleshooting various MCTM issues. It functions as an evaluative model, employing a method for analysing records that indicates relationships through a geometric approach. Categorized as a gray communication evaluation technique, GRA aims to study communication between the collection and variation series, making it a versatile method for understanding and evaluating complex relationships [17]. Derived from the concept of gray systems, GRA represents a quantitative method for detecting correlations among different levels of information utilization. The fundamental idea behind GRA lies in evaluating the intimacy of communication through the analysis of series curves. It places significant importance on the combination of series magnitudes, which are inversely determined. GRA is particularly well-suited for assessing problems in communication that involve two factors and varying levels of complexity between variables. It proves effective in addressing a range of issues, including adjudication in various Multi-Criteria Decision Making (MCTM) scenarios and labor selection [18]. Gray Correlation Analysis (GRA) and simulation offer a suitable approach for determining optimal regulatory alternatives. Both methods serve as the gold standard in yielding parameters at various levels, such as a 139.48N, cross-feed force of 63.92N, thrust force of 42.6N, temperature of 68.96oC, and ground hardness of 0.198 μ m. Significance is attributed to the effects of these parameters on response parameters, as each variable's impact is assessed throughout the entire process [19]. Gray Correlation Analysis (GRA) version, each unit is assessed by comparing indicators related to one-dimensional vibrational statistics with those of neighboring entities. Upon signals, statistical solutions are computed based on these indicators. These processes, well-documented in the literature, are classified using programs designed for GRA. Notably, the 1D-LBP technique has undergone recent modifications in response to vibration alerts, marking its first application in various types of vibrational signals within the GRA framework [20]. The GRA method is employed by decision-makers as it incorporates a fuzzy set approach, taking into account information for addressing decision-making problems. Multiple standards play a crucial role in achieving success in decision-making tasks but can be challenging due to their inherent uncertainty. Consequently, the GRA method is a common tool for where numerous criteria are decisive amidst uncertainty [21]. The Distribution Network Integrated GRA (DNI-GRA) for the planning of hydropower technology are proposed for reconstruction. A novel method utilizing Particle Reinforced Cord Electric GRA is introduced for discharge tooling, providing a prototype fabric for enhancement. The assessment of the impact of various factors such as Fuel Charges, Gross Domestic Product, motor types, and travel distance in vehicle kilometers is suggested through the implementation of GRA with box lines. Taiwan utilizes the Fuzzy-GRA technique for estimating economic performance, while an integrated GRA approach is proposed for evaluating management capabilities in environmental knowledge [22]. Gray Correlation Analysis (GRA) is frequently utilized in Asia and serves as a version for outcome evaluation, particularly on an absolute basis. It focuses on determining the similarity among rows or the degree of difference in dating measurements. GRA primarily aims to examine influencing factors through its purpose and frameworks [23]. Gray Relational Analysis (GRA) is The Facts Appraisal technique, also known as the geometric method, assesses the relationship between arrays of a specific type, as proposed in the GRA technique. The primary objective of GRA is to gauge the level of similarity among interelement based on the degree of their relationship. Studies have applied GRA to evaluate the impact of environmental factors, such as the erosion of used oil pipes in gas wells. Policy implications have been identified through the application of GRA factors, considering overall performance characteristics. In the United States, the Electro Discharge Machining Method has utilized GRA, and GRA has been employed for assessing expatriate assignments, including scenarios involving added water in Beijing [24]. A composite approach for resource security assessment involves the use of GRA and related techniques. Jodi has mentioned the use of GRA in phrases for a given product image, determining the optimal settings for sweetness based on the corresponding components. Furthermore, GRA has been introduced in the context of Brand-New Faith Activities, proposing a system

for struggle reform. In the field of Electrocardiogram (ECG) analysis, GRA is applied as a Heart Rate Discriminator, utilizing different ECGs and proposing. Additionally, a GRA prediction-integrated approach has been proposed for round releases [25].

3. RESULTS AND DISCUSSION

TABLE 1. Efficiency of investment in Indian Stock Market

	Earnings Per Share (EPS)	Price-to-Earnings Ratio (P/E Ratio)	Return on Equity (ROE)	Debt-to-Equity Ratio (D/E Ratio)	Market Capitalization
Infosys Limited	31.08	139.53	29.15	22.05	36.05
Reliance Industries Limited	29.12	142.97	33.69	27.30	6.00
HDFC Bank Limited	24.08	122.58	29.18	23.10	45.36
Tata Consultancy Services Limited	23.17	128.28	24.60	17.59	34.00
Housing Development Finance Corporation Limited	33.33	186.41	27.96	18.89	45.00

Table 1 shows the Efficiency of investment in Indian Stock Market for Grey relational analysis Infosys Limited, Reliance Industries Limited, HDFC Bank Limited, Tata Consultancy Services Limited and Housing Development Finance Corporation Limited. Earnings Per Share (EPS), Price-to-Earnings Ratio (P/E Ratio), Return on Equity (ROE), Debt-to-Equity Ratio (D/E Ratio) and Market Capitalization. Housing Development Finance Corporation Limited with EPS of 33.33 is showing the Highest Value for Earnings Per Share (EPS) and HDFC Bank Limited with EPS of 24.08 is showing the lowest value. Reliance Industries Limited with P/E Ratio of 142.97 is showing the Highest Value for Price-to-Earnings Ratio (P/E Ratio) and HDFC Bank Limited with P/E Ratio of 122.58 is showing the lowest value. Highest: Reliance Industries Limited with ROE of 33.69 is showing the Highest Value for Return on Equity (ROE) and Tata Consultancy Services Limited with ROE of 17.59 is showing the lowest value. HDFC Bank Limited with D/E Ratio of 45.36 is showing the Highest Value for Debt-to-Equity Ratio (D/E Ratio) and Reliance Industries Limited with D/E Ratio of 6.00 is showing the lowest value. HDFC Bank Limited with Market Capitalization of 45.00 is showing the Highest Value for Market Capitalization and Tata Consultancy Services Limited with Market Capitalization of 34.00 is showing the lowest value.

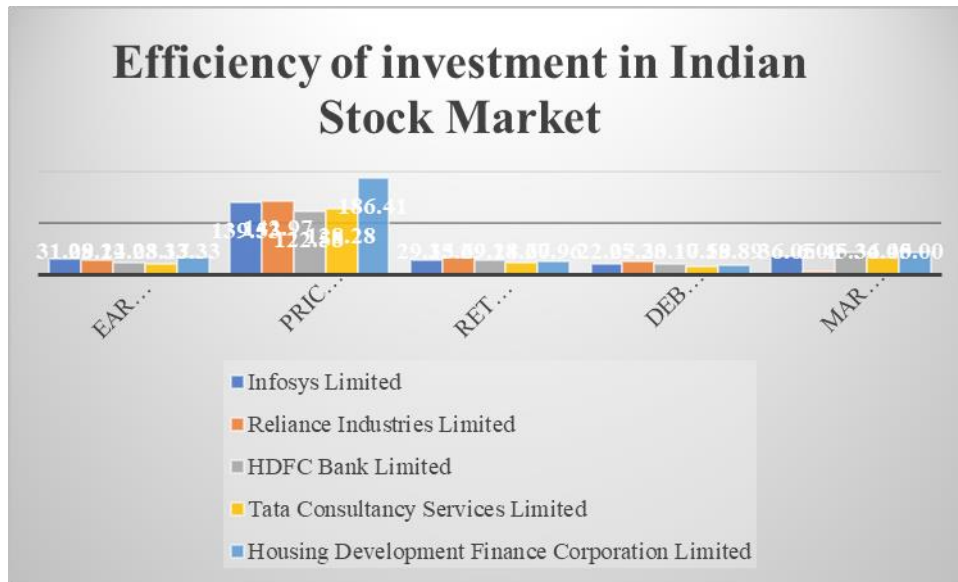


FIGURE 1. Efficiency of investment in Indian Stock Market

Figure 1 shows the Efficiency of investment in Indian Stock Market for Grey relational analysis Infosys Limited, Reliance Industries Limited, HDFC Bank Limited, Tata Consultancy Services Limited and Housing Development Finance Corporation Limited. Earnings Per Share (EPS), Price-to-Earnings Ratio (P/E Ratio), Return on Equity (ROE), Debt-to-Equity Ratio (D/E Ratio) and Market Capitalization. Housing Development Finance Corporation Limited with EPS of 33.33 is showing the Highest Value for Earnings Per Share (EPS) and HDFC Bank Limited with EPS of 24.08 is showing the lowest value. Reliance Industries Limited with P/E Ratio of 142.97 is showing the Highest Value for Price-to-Earnings Ratio (P/E Ratio) and HDFC Bank Limited with P/E Ratio of 122.58 is showing the lowest value. Highest: Reliance Industries Limited with ROE of 33.69 is showing the Highest Value for Return on Equity (ROE) and Tata Consultancy Services Limited with ROE of 17.59 is showing the lowest value. HDFC Bank Limited with D/E Ratio of 45.36 is showing the Highest Value for Debt-to-Equity Ratio (D/E Ratio) and Reliance Industries Limited with D/E Ratio of 6.00 is showing the lowest value. HDFC Bank Limited with Market Capitalization of 45.00 is showing the Highest Value for Market Capitalization and Tata Consultancy Services Limited with Market Capitalization of 34.00 is showing the lowest value.

TABLE 2. Normalized Data

	Earnings Per Share (EPS)	Price-to-Earnings Ratio (P/E Ratio)	Return on Equity (ROE)	Debt-to-Equity Ratio (D/E Ratio)	Market Capitalization
Infosys Limited	0.7785	0.2655	0.2655	0.5407	0.2365
Reliance Industries Limited	0.5856	0.3194	0.3194	0.0000	1.0000
HDFC Bank Limited	0.0896	0.0000	0.0000	0.4325	0.0000
Tata Consultancy Services Limited	0.0000	0.0893	0.0893	1.0000	0.2886
Housing Development Finance Corporation Limited	1.0000	1.0000	1.0000	0.8661	0.0091

Table 2 shows the Normalized data for Efficiency of investment in Indian Stock Market for Grey relational analysis Infosys Limited, Reliance Industries Limited, HDFC Bank Limited, Tata Consultancy Services Limited and Housing Development Finance Corporation Limited. Earnings Per Share (EPS), Price-to-Earnings Ratio (P/E Ratio), Return on Equity (ROE), Debt-to-Equity Ratio (D/E Ratio) and Market Capitalization. it is also the Normalized value.

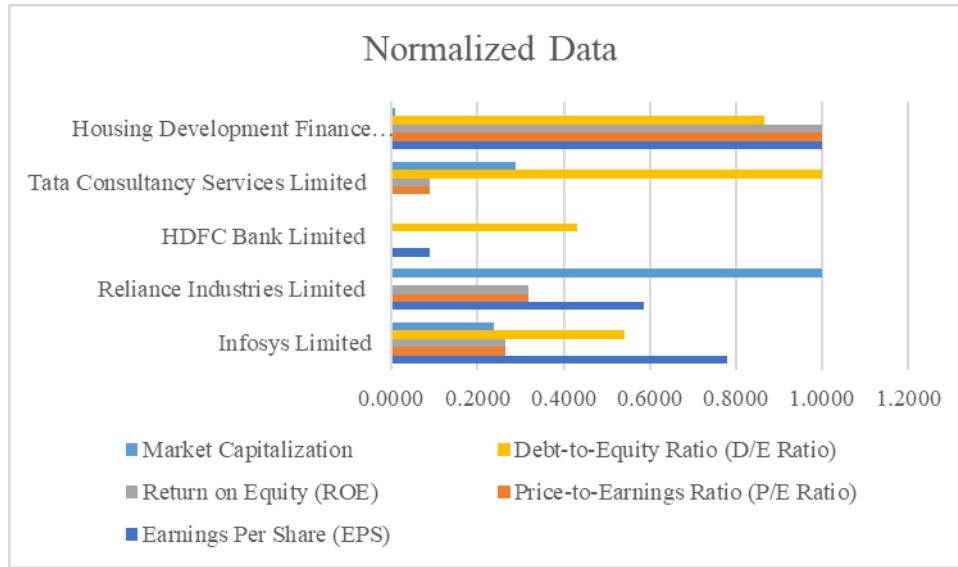


FIGURE 2. Normalized Data

Figure 2 the normalized data for assessing investment efficiency in the Indian Stock Market through Grey Relational Analysis includes key financial indicators for Infosys Limited, Reliance Industries Limited, HDFC Bank Limited, Tata Consultancy Services Limited, and Housing Development Finance Corporation Limited. These indicators consist of Earnings Per Share (EPS), Price-to-Earnings Ratio (P/E Ratio), Return on Equity (ROE), Debt-to-Equity Ratio (D/E Ratio), and Market Capitalization, all presented in normalized values.

TABLE 3. Deviation sequence

	Earnings Per Share (EPS)	Price-to-Earnings Ratio (P/E Ratio)	Return on Equity (ROE)	Debt-to-Equity Ratio (D/E Ratio)	Market Capitalization
Infosys Limited	0.2215	0.7345	0.7345	0.4593	0.7635
Reliance Industries Limited	0.4144	0.6806	0.6806	1.0000	0.0000
HDFC Bank Limited	0.9104	1.0000	1.0000	0.5675	1.0000
Tata Consultancy Services Limited	1.0000	0.9107	0.9107	0.0000	0.7114
Housing Development Finance Corporation Limited	0.0000	0.0000	0.0000	0.1339	0.9909

Table 3 The Grey relational analysis of investment efficiency in the Indian Stock Market reveals the Deviation sequence for key financial indicators of Infosys Limited, Reliance Industries Limited, HDFC Bank Limited, Tata Consultancy Services Limited, and Housing Development Finance Corporation Limited. These indicators include Earnings Per Share (EPS), Price-to-Earnings Ratio (P/E Ratio), Return on Equity (ROE), Debt-to-Equity Ratio (D/E Ratio), and Market Capitalization. The sequence represents the maximum or deviation value for each indicator.

TABLE 4. Grey Relation Coefficient

Earnings Per Share (EPS)	Price-to-Earnings Ratio (P/E Ratio)	Return on Equity (ROE)	Debt-to-Equity Ratio (D/E Ratio)	Market Capitalization
0.6930	0.4050	0.4050	0.5212	0.3957
0.5468	0.4235	0.4235	0.3333	1.0000
0.3545	0.3333	0.3333	0.4684	0.3333
0.3333	0.3544	0.3544	1.0000	0.4128
1.0000	1.0000	1.0000	0.7888	0.3354

Table 4 Grey relational analysis was conducted to assess the efficiency of investment in the Indian stock market for Infosys Limited, Reliance Industries Limited, HDFC Bank Limited, Tata Consultancy Services Limited, and Housing Development Finance Corporation Limited. Key factors such as Earnings Per Share (EPS), Price-to-Earnings Ratio (P/E Ratio), Return on Equity (ROE), Debt-to-Equity Ratio (D/E Ratio), and Market Capitalization were evaluated, and both maximum and minimum values were determined.

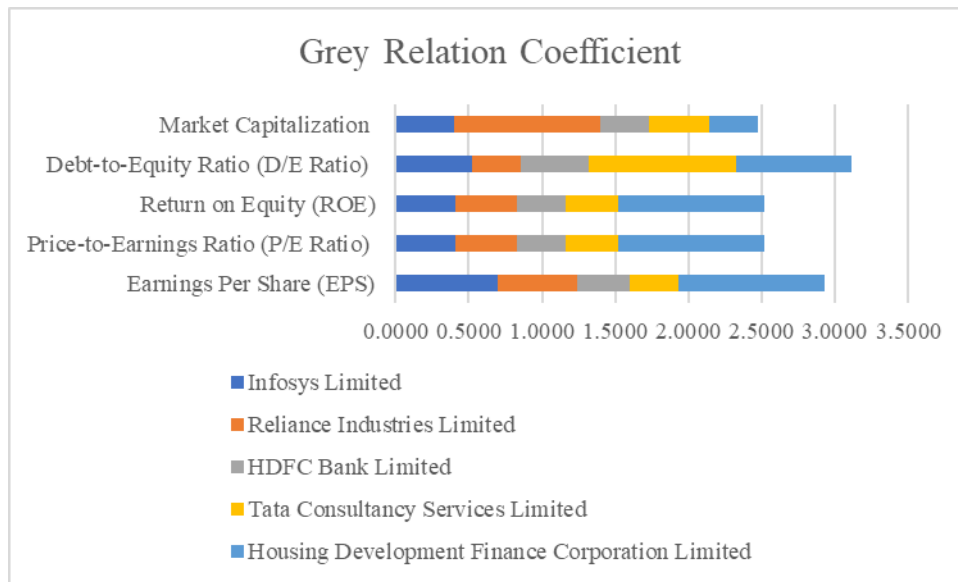


FIGURE 3. Grey Relation Coefficient

Figure 3 Grey relational analysis was conducted to assess the efficiency of investment in the Indian stock market for Infosys Limited, Reliance Industries Limited, HDFC Bank Limited, Tata Consultancy Services Limited, and Housing Development Finance Corporation Limited. Key factors such as Earnings Per Share (EPS), Price-to-Earnings Ratio (P/E Ratio), Return on Equity (ROE), Debt-to-Equity Ratio (D/E Ratio), and Market Capitalization were evaluated, and both maximum and minimum values were determined.

TABLE 5. Result of final GRG Rank

	GRG	Rank
Infosys Limited	0.4840	4
Reliance Industries Limited	0.5454	2
HDFC Bank Limited	0.3646	5
Tata Consultancy Services Limited	0.4910	3
Housing Development Finance Corporation Limited	0.8248	1

Table 5 The final GRG ranking for the efficiency of investment in the Indian stock market indicates that Housing Development Finance Corporation Limited holds the top position, while HDFC Bank Limited ranks at the bottom in terms of GRG ranking.

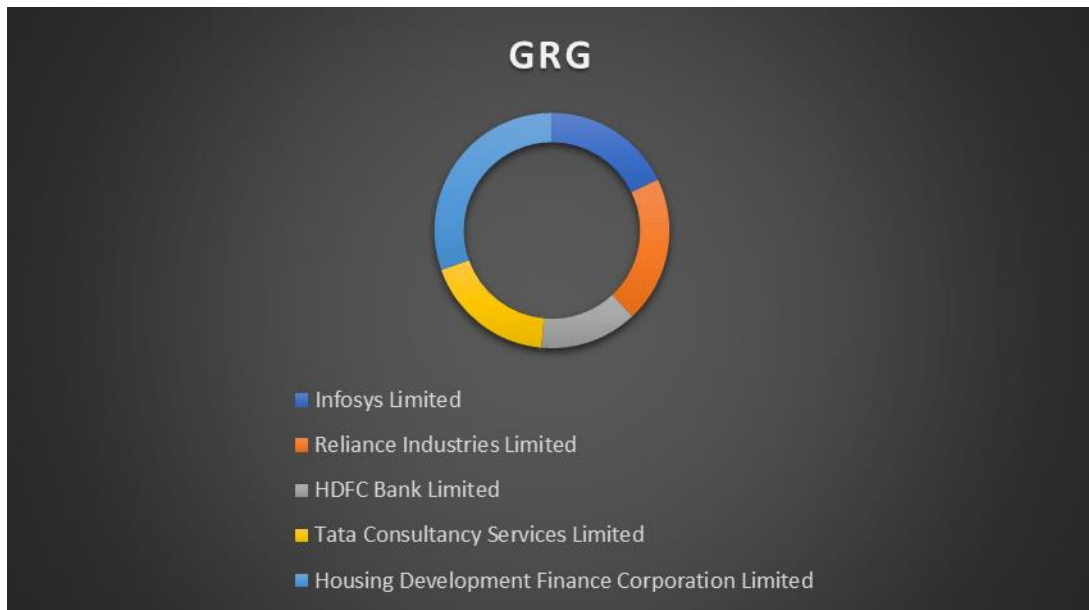


FIGURE 4. GRG

Figure 4 The final result of the GRG Rank for evaluating investment efficiency in the Indian stock market indicates that Housing Development Finance Corporation Limited holds the top position, while HDFC Bank Limited ranks at the bottom in terms of GRG Rank.

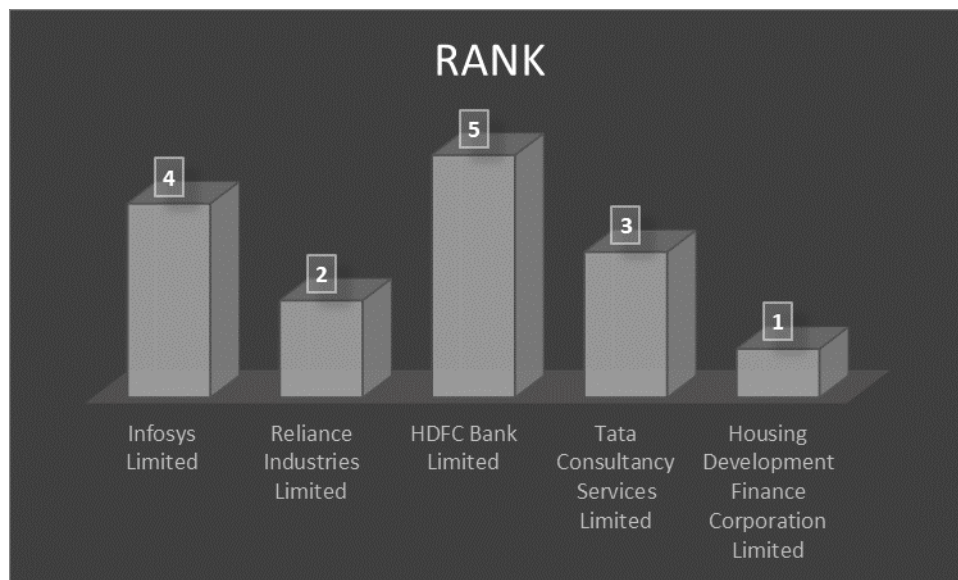


FIGURE 5. Shown the Rank

Figure 5 The rank of GRA indicates the efficiency of investment in the Indian stock market. Housing Development Finance Corporation Limited has the highest GRG rank value, while HDFC Bank Limited has the lowest value.

4. CONCLUSION

The Indian Stock Exchange holds a significant sway in the country's economy. They serve as pivotal platforms where a plethora of companies from diverse sectors converge, contributing to fastest growing in the world of one of the economies, a growth story. Growing up engaged in development stories for those interested, the Indian Stock Exchange offers many opportunities: government policies, economic indicators, Global market trends. It is affected by various factors like corporate earnings, all of which significantly impact stock prices. Indian stock market for the economic well-being of the country acts as a measure and reflecting global trends its dynamic shows character it is stocks, derivatives various financial like Includes tools. commodities, and currencies, with distinct sections, prominently represented by housing numerous listed companies across diverse sectors. Both domestic and international investors engage in the market, aiming for wealth creation while navigating associated risks according to their objectives. Over the years, spurred by economic reforms, technological advancements, and increased investor participation, India's stock market has experienced significant expansion and evolution. It has transitioned to electronic trading platforms, enhancing efficiency, transparency, and accessibility. Regulatory reforms have bolstered investor confidence and market integrity. The Indian stock market Since 1991 has witnessed remarkable growth, largely due to changes in policies towards liberalization and globalization. This shift has led to a growing emphasis on the stock market from a collective economic standpoint. Nowadays, discussions about the economy often revolve around the stock market, recognizing it as a major driver and primary source of resource mobilization for Indian companies, thereby facilitating financial and economic growth The primary purpose of GRA is to elucidate the comparative ranking of alternatives based on their performance. In this method, known as Gray Relative Analysis, a super target sequence is established in accordance with specific scenarios. Subsequently, each alternative in the rows undergoes evaluation using the Carey correlation coefficient against the satisfying target collection. The primary purpose of GRA is to elucidate the comparative ranking of alternatives based on their performance. In this method, known as Gray Relative Analysis, a super target sequence is established in accordance with specific scenarios. Subsequently, each alternative in the rows undergoes evaluation using the Carey correlation coefficient against the satisfying target collection. Finally, the gray correlation is computed by applying coefficients, revealing the correct target sequence and determining the size of gray contact for each variant sequence Infosys Limited, Reliance Industries Limited, HDFC Bank Limited, Tata Consultancy Services Limited and Housing Development Finance Corporation Limited. Earnings Per Share (EPS), Price-to-Earnings Ratio (P/E Ratio), Return on Equity (ROE), Debt-to-Equity Ratio (D/E Ratio) and Market Capitalization. The rank of GRA indicates the efficiency of investment in the Indian stock market. Housing Development Finance Corporation Limited has the highest GRG rank value, while HDFC Bank Limited has the lowest value.

REFERENCES

- [1]. Mukherjee, Debjiban. "Comparative analysis of Indian stock market with international markets." *Great lakes herald* 1, no. 1 (2007): 39-71.
- [2]. Patel, Samveg. "The effect of macroeconomic determinants on the performance of the Indian stock market." *NMIMS Management Review* 22, no. 1-11 (2012).
- [3]. Naka, Atsuyuki, Tarun Mukherjee, and David Tufte. "Macroeconomic variables and the performance of the Indian Stock Market." (1998).
- [4]. Tripathi, Vanita, and Shruti Sethi. "Integration of Indian stock market with World stock markets." *Asian journal of Business and accounting* 3, no. 1 (2010): 117-134.
- [5]. Chaudhary, Rashmi, Priti Bakhshi, and Hemendra Gupta. "The performance of the Indian stock market during COVID-19." *Investment Management and Financial Innovations* 17, no. 3 (2020): 133-147.
- [6]. Pal, Santanu, and Ajay K. Garg. "Macroeconomic surprises and stock market responses—A study on the Indian stock market." *Cogent Economics & Finance* 7, no. 1 (2019): 1598248.
- [7]. Raj, Mahendra, and Damini Kumari. "Day-of-the-week and other market anomalies in the Indian stock market." *International journal of emerging markets* 1, no. 3 (2006): 235-246.
- [8]. Chavannavar, B., and Poonam V. Patel. "Efficiency of the Indian stock market: A study from the national stock exchange." *International Journal of Latest Technology in Engineering, Management & Applied Science* 5, no. 11 (2016): 48-52.
- [9]. Kumar, Suresh, Ankit Kumar, and Gurcharan Singh. "Causal relationship among international crude oil, gold, exchange rate, and stock market: Fresh evidence from NARDL testing approach." *International Journal of Finance & Economics* 28, no. 1 (2023): 47-57.
- [10]. Karmakar, Madhusudan, and Sarveshwar Inani. "Information share and its predictability in the Indian stock market." *Journal of Futures Markets* 39, no. 10 (2019): 1322-1343.
- [11]. Anand, Babu, and Sunil Paul. "Oil shocks and stock market: Revisiting the dynamics." *Energy Economics* 96 (2021): 105111.

- [12].Saini, Neha, and Anil Kumar Mittal. "Forecasting volatility in the Indian stock market using State Space models." *Journal of Statistical and Econometric Methods* 3, no. 1 (2014): 115-136.
- [13].Keswani, Sarika, and Bharti Wadhwa. "Effect of macroeconomic variables on stock market: a conceptual study." *International Journal of Management, IT and Engineering* 7, no. 10 (2019): 85-106.
- [14].Tiwari, Aviral Kumar, Mihai Ioan Mutascu, Claudiu Tiberiu Albuлесcu, and Phouphet Kyophilavong. "Frequency domain causality analysis of stock market and economic activity in India." *International Review of Economics & Finance* 39 (2015): 224-238.
- [15].Bali, Ozkan, Erkan Kose, and Serkan Gumus. "Green supplier selection based on IFS and GRA." *Grey Systems: Theory and Application* (2013).
- [16].Gopal, P. M., and K. Soorya Prakash. "Minimization of cutting force, temperature and surface roughness through GRA, TOPSIS and Taguchi techniques in end milling of Mg hybrid MMC." *Measurement* 116 (2018): 178-192.
- [17].Kuncan, Melih. "An intelligent approach for bearing fault diagnosis: combination of 1D-LBP and GRA." *Ieee Access* 8 (2020): 137517-137529.
- [18].C. Venkateswaran, M. Ramachandran, Kurinjimalar Ramu, Chandrasekar Raja "Analysis of Market Segment Evaluation Using Gray Relational Analysis Method" *REST Journal on Banking, Accounting and Business*, 1(1), 52-60 (2020).
- [19].Zhang, Shi-fang, and San-yang Liu. "A GRA-based intuitionistic fuzzy multi-criteria group decision making method for personnel selection." *Expert Systems with Applications* 38, no. 9 (2011): 11401-11405.
- [20].Wei, Gui-Wu. "GRA method for multiple attribute decision making with incomplete weight information in an intuitionistic fuzzy setting." *Knowledge-Based Systems* 23, no. 3 (2010): 243-247.
- [21].Gumus, Alev Taskin, A. Yesim Yayla, Erkan Çelik, and Aytac Yildiz. "A combined fuzzy-AHP and fuzzy-GRA methodology for hydrogen energy storage method selection in Turkey." *Energies* 6, no. 6 (2013): 3017-3032.
- [22].Chen, Yen-Ting, and Tsung-Yu Chou. "Applying GRA and QFD to improve library service quality." *The Journal of Academic Librarianship* 37, no. 3 (2011): 237-245.
- [23].Kirubakaran, B., and M. Ilangkumaran. "Selection of optimum maintenance strategy based on FAHP integrated with GRA–TOPSIS." *Annals of Operations Research* 245, no. 1 (2016): 285-313.
- [24].Kuo, Ming-Shin, and Gin-Shuh Liang. "Combining VIKOR with GRA techniques to evaluate service quality of airports under a fuzzy environment." *Expert systems with applications* 38, no. 3 (2011): 1304-1312.
- [25].Pradhan, M. K. "Estimating the effect of process parameters on MRR, TWR and radial overcut of EDMed AISI D2 tool steel by RSM and GRA coupled with PCA." *The International Journal of Advanced Manufacturing Technology* 68, no. 1 (2013): 591-605.
- [26].Memišević, Vesna, and Nataša Pržulj. "C-GRAAL: Common-neighbors-based global Graphical Alignment of biological networks." *Integrative Biology* 4, no. 7 (2012): 734-743.