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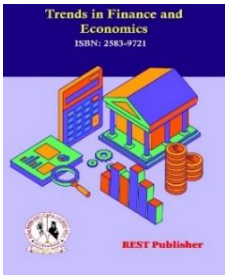

Role of Macroeconomic Variables in Stock Market Index in China and India Using MOORA Methodology

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Abstract: *This study examines the persistence memory characteristics and trading volume in the Indian stock market. By analyzing Data sets, we investigated the trade volume aspect. To compensate for the lack of index data, we have developed a series of trading blocs tailored to the Indian stock market. Augmented Dickey-Fuller (ATF) unit root test assesses whether time series data exhibit a unit root, indicating no stationarity. It assesses whether the series is not constant at its level but becomes constant after differencing it once. This test is commonly applied in analyzing non-linear time series data, such as stock market data. Predicting such data accurately is challenging due to its inherent volatility and complexity Researchers in this study focused on enhancing Accuracy of Machine Learning Algorithms in the Context of Indian Stock Market. They employed various methodologies to identify effective approaches for improvement. Emphasizing the significance of volatility in investment outcomes, they noted its pivotal role in market dynamics. Unexpected information in the market incentivizes abnormal trading behaviors, thereby influencing market volatility. In advanced economies like the United States, speculation in the stock market is a widespread activity. Traders often encounter various characteristics of inequality and correlation when engaging in stock market operations. The research findings indicate that there are resemblances present within the Indian stock market. These investigations propose that there is a consistent trend in stock returns across both markets. This study specifically examines Performance of Indian Stock Market. Drawing from weak-form empirical evidence, Information efficiency can be seen to vary in the Indian stock market, particularly in certain sub-periods. The primary focus of this study lies in dissecting the Indian stock market and evaluating its mechanisms for price discovery. Throughout the entire period under consideration, the research suggests that price discovery is primarily driven by the spot market. Utilizing the MOORA method, contractors can objectively conduct ranking tasks, achieving non-subjective assessments through ratio analysis and dimensionless measurements. As demonstrated by the test case developed for validation, this method is useful in evaluating the performance of machines. Furthermore, integrating the fuzzy MOORA method with a weighted computation approach improves its applicability and accuracy in decision-making processes. Currency diversification is at the top, while diversification is low.*

Keywords: *Diversification, Emerging Market Exposure, Growth Opportunities, Regulatory Framework and Currency Diversification*.

1. INTRODUCTION

While there exists an extensive body of research examining trading volumes in US stock markets, relatively less focus has been given to the trading volume in Indian stock markets. Our study aims to address this gap by contributing to the burgeoning literature in this area. Specifically, we present a fresh dataset containing trading volume information for both Bombay Stock Exchange and National Stock Exchange aims to explain the intricacies of trading within the Indian stock market [1]. The aforementioned factors, alongside various others research on The performance of the Indian stock market was the driving force behind the initiative. Nevertheless, the empirical results presented in this paper confirm the view Indian stock market exhibits inefficiency. This underscores the significance of monetary

growth and highlights that diligent investors who prioritize information can leverage this inefficiency to formulate profitable trading strategies [2]. This resource finds itself ensnared within diverse financial instruments, witnessing a burgeoning demand for progress. As financial inclusion expands alongside burgeoning markets, a call for action resonates. Among the vast array of approximately 78,000 scripts listed on Indian Stock Exchanges, only a fraction, around 3,000, are subject to active trading. Furthermore, within Indian financial markets, bonds and interest-rate futures stand prominently, with a notable absence of other financial assets [3]. Long-term fluctuations in crude oil prices yield contrasting effects in China and India. While China benefits from price rises, India experiences adverse effects. Regarding money supply, the Indian stock market suffers, whereas China sees positive outcomes. In China, industrial production bears a singular negative consequence. Furthermore, inflation upticks in stock indices result in favorable outcomes for both nations [4]. In December 2019, the Indian stock market had a market capitalization of $2.02 trillion, ranking ninth globally. It mainly focuses on Two primary stock exchanges: Bombay Stock Exchange (BSE) and National Stock Exchange (NSE). Many studies and researches have been carried out to analyze various aspects and patterns in Indian stock market [5]. In the last decade, foreign investors have been attracted to with the Indian Stock Exchange expectation of achieving higher risk-adjusted returns, making it an appealing destination for investment. This study aims to analyze its impact foreign portfolio investment (FPI) Volatility of Indian Stock Markets and Share of Domestic Institutional Investors (DII). Mujumdar (2004) highlights the enhanced cash flow resulting from Foreign Portfolio Investments (FPIs) in the Indian Stock Exchange. However, the influx of FPIs into property income has contributed to volatility, a point not strongly supported by Rudukola's evidence. Nonetheless, to fortify the Indian stock market and assist policymakers, this study underscores several key observations [6]. This paper highlights the importance of assessing perceived volatility in Indian stock market, particularly in terms Perceived volatility and correlation. We highlight the importance of such assessment in a market that is burgeoning and holds considerable promise. Additionally, to the best of our understanding, there has been limited exploration in the literature regarding the links to the Indian Stock Exchange. These discoveries not only illuminate the workings of the Indian stock market but also set the stage for deeper explorations into risk management, spanning beyond just the Indian market to encompass other emerging financial markets as well [7]. The results from the autocorrelation and run tests imply that the Indian stock market does not exhibit randomness, pointing towards volatility throughout the analyzed period. This lack of stochastic behavior implies inefficiency in its structure, particularly evident when attempting to utilize past stock prices to predict future movements. Consequently, the prospect of achieving significant profits through forecasting price fluctuations appears limited [8]. As anticipated, there appears to be a correlation with company size, similarly observed in Indian stock market returns. A significant inverse association between them is evident; hence, there seems to be a weakness in the Indian stock market. This weakness is possibly attributed to a value effect, as the value premiums are considerably lower compared to other premiums in quantitative terms [9]. Since the early 1990s, India's financial sector has undergone significant reforms, which have strengthened the Indian stock market. Through a step-by-step process, these reforms have led to notable progress. Consequently, over time, one can observe the Indian stock market becoming more efficient. Keeping this evolution in mind, various studies in recent years have focused on exploring Growth potential of Indian stock market [10]. Several studies have examined Seasonal patterns of stock returns in Indian stock markets. The present research specifically examines the monthly returns Bombay Stock Exchange (BSE) in India, concentrating on methodological approaches [11]. This study investigates how volatility affects earnings and spillover effects, emphasizing notable disparities in results. It finds that the Indian stock market reacts differently to positive and negative shocks, showing superior performance compared to the US market during positive shocks while displaying a distinct reaction to negative shocks [12]. The implementation of call bidding in Indian stock markets typically leads to initial market openings at higher levels, with fluctuation stabilization taking up to thirty minutes. This phenomenon is exemplified by the introduction of call auctions for 50 shares on October 18, 2010, Within the components of the large cap NSE Nifty index [13]. This study focuses on examining the price discovery mechanics within the Indian stock market, aiming to fill the existing gap in research by exploring this aspect in detail. Specifically, it aims to investigate whether the size of firms has an impact on price discovery within the market. This study holds importance due to its ability to shed light on the workings of the Indian stock market, which is greatly shaped by regulatory frameworks. Unlike prior research, this study focuses on utilizing data exclusively from the Indian stock market, offering a distinctive viewpoint. It emphasizes the pivotal role of regulatory elements in guiding the Indian stock market, thereby impacting auction procedures and mechanisms for determining prices [14]. The flow of information within stock markets affects trading dynamics, leading to informed trading and ultimately reducing information imbalances while enhancing market liquidity. Recent evidence supporting these outcomes can be found in governance literature [15]. Strict regulations provide a benefit within

markets by discouraging risky behaviors, yet excessive laissez-faire principles within the market can facilitate exploitation. Even within well-established markets, maintaining a balance between regulation and freedom is crucial to prevent illegal activities from gaining traction, as regulatory bodies often struggle to enforce compliance. Factors such as insider dominance and reliance on personal relationships for lending further complicate matters, particularly in emerging market economies where the rule of law may be less robust [16]. Studies show Changes in global oil prices impact Indian stock market returns. However, it is undeniable that domestic oil prices in India play a crucial role in shaping stock market dynamics, studies also show that they do not solely determine the monthly returns of BSE Sensex. Instead, the volatility perceived in BSE Sensex, along with other indicators, considered as important factors in understanding the dynamics of Indian stock market [17].

2. MATERIALS AND METHOD

Diversification: Diversification involves investing in different industries, regions, countries, and financial instruments to decrease the risk of simultaneous depreciation of all investments.
Emerging Market Exposure: "Emerging markets" is a term used to describe economies that exhibit notable economic expansion, akin to some developed economies, yet not all possess such attributes. These markets are in a phase of growth, representing countries transitioning from developing to developed stages.
Growth Opportunities: Opportunities for advancement refer to circumstances where one can progress in their personal or professional life. The primary avenue for professional development involves enhancing one's skills and knowledge, actively seeking avenues for improvement. This can be achieved through undertaking new responsibilities and gaining diverse experiences. One can explore these opportunities by actively searching for them.
Regulatory Framework: The regulatory structure encompasses legal statutes, regulations, local ordinances, professional codes of conduct, and the guiding principles set forth by the Society.
Currency Diversification: Investing in assets denominated in foreign currencies protects your portfolio against potential depreciation of your local currency. Diversifying your investments to include foreign shares or other assets outside of your domestic market ensures that a portion of your wealth is not solely dependent on the performance of your local currency.
Corporate Earnings: The revenue of a company signifies its net earnings and serves as an indicator of both the company's financial well-being and the potential future performance of its stock. It offers a gauge for assessing earnings expectations, which, being predominantly comprehensive, play a significant role in influencing market trends.
Global Factors: SBI GLOBAL FACTORS LTD (SBIGFL), a branch of the State Bank of India, operates under the oversight of the Reserve Bank of India, regulating non-banking financial institutions. SBIGFL offers comprehensive domestic and export factoring services, all centralized in Mumbai, with 11 branches located throughout India, making it a convenient one-stop solution for clients.
Sectoral Analysis: Industry analysts evaluate industry trends, construct segment taxonomies, generate quantitative market data, develop forecasts, and design business models. Typically employed by consulting firms, these analysts conduct thorough research and provide advisory services, offering insights and recommendations to clients. Additionally, they may engage in various consulting services as part of their roles.
Risk Factors: Your individual health vulnerability is determined by various elements like your age, sex, familial medical background, lifestyle choices, and more. Some factors, such as genetic predispositions or certain demographics like race, are immutable. However, aspects like diet, exercise routine, and safety practices such as wearing a seat belt are within your influence, allowing you to mitigate risks and maintain control over your health.

MOORA Method: Secondly, ratio analysis is devoid of dimensionality and serves as a response to quantitative analysis. This analytical approach is utilized in MOORA, which utilizes dimensionless metrics. MOORA, centered on dimensionless measurements, consists of two interdependent components: the evaluation method and the reference point method, both of which influence each other [18]. The MOORA method, is a systematic decision-making approach, also referred to as multi-criteria or multi-attribute optimization. It employs ratio analysis to assess various alternatives considering multiple objectives or criteria [19]. In this scenario, MOORA technique is utilized for assessing the upkeep of plastic injection molding machines with the aim of attaining peak operational efficiency [20]. The MOORA method, a form of multi-objective optimization that relies on ratio analysis, is employed in intricate decision-making contexts across diverse manufacturing settings. Serving as a systematic approach to evaluating and

ranking alternatives based on multiple criteria or attributes, it functions as a multi-criteria optimization method. Recognized as a pioneering technique in its domain, MOORA furnishes a structured framework for addressing the complexities inherent in decision-making processes within varied manufacturing systems [21]. The utilization of both the MOORA and AHP methods is illustrated in assessing wire cutting output parameters in electric discharge machining. This is done to identify the optimal ratio for selecting the most appropriate option [22]. The implemented system employs the MOORA technique within a decision support framework, aiming to streamline and resolve issues efficiently. Subsequently, employing the MOORA approach for testing proved highly beneficial during the selection process, comprising a distinct phase in the selection procedure [23]. Multi-objective optimization involves addressing multiple objectives simultaneously rather than consolidating them into a single objective function. Instead of using a single objective function, MOORA technique is commonly applied in problem-solving scenarios. Furthermore, an improved iteration of the MOORA method incorporates the Taguchi approach, was utilized for optimization objectives [24]. To address the requirements of decision makers, MOORA reference point and several MOORA methods are selected. These methods offer a straightforward and rational approach for selecting the optimal fleet. By leveraging various MOORA approaches, the process becomes simplified and logical, enabling decision makers to effectively choose the most advantageous alternative while disregarding unnecessary parameters [25]. The MOORA approach is employed to assess and prioritize various options according to their performance across several criteria. In essence, it represents alternatives as classes, each associated with a criterion. The method operates through several steps to effectively rank these alternatives. However, before delving into the original steps of MOORA, it is essential to establish certain assumptions [26]. In the current investigation, the MOORA technique is employed to select the most suitable oil among those considered, aiming to attain superior quality. This method proves to be highly effective in enhancing outcomes, as it allows for the simultaneous consideration of multiple parameters, thereby enabling researchers to swiftly achieve optimal results [27]. However, the thorough examination of the potential of MOORA in relation to advanced machining processes lacks depth when it comes to character exploration. Therefore, this study investigates the effect on laminate thickness using MOORA using an abrasive water jet (AWJ) machine. to evaluate the mechanical performance of jute/polyester blends [28]. The (MOORA) approach is presented in a clear and mathematical manner, rendering it easily comprehensible and approachable. Users have reported it to be friendly and convenient to use, devoid of complexities. This approach has been effectively applied to various non-conventional processes, demonstrating its accuracy and precision. MOORA is not only simple to implement but also efficient, allowing for time savings in decision-making processes [29]. The nine alternatives were ranked according to three distinct criteria. Initially, a combination of entropy and AHP methods was employed to assign weights to the criteria. Subsequently, the criteria were weighted using this method. Finally, the alternatives were effectively assessed using the two aforementioned methods [30].

3. ANALYSIS AND DISCUSSION

TABLE 1. Indian stock market

	Corporate Earnings	Global Factors	Sectoral Analysis	Risk Factors
Diversification	32.10	120.19	56.41	88.22
Emerging Market Exposure	19.25	142.97	44.56	87.91
Growth Opportunities	24.08	111.23	12.10	23.10
Regulatory Framework	23.17	128.28	35.89	19.05
Currency Diversification	69.75	146.32	27.96	18.89

Table 1 shows ratio analysis and multi-objective optimization based on Indian stock market. Diversification, emerging market exposure, growth opportunities, regulatory framework and currency diversification. Corporate Revenue, Global Factors, Sectoral Analysis, Risk Factors Are Valuation Value.

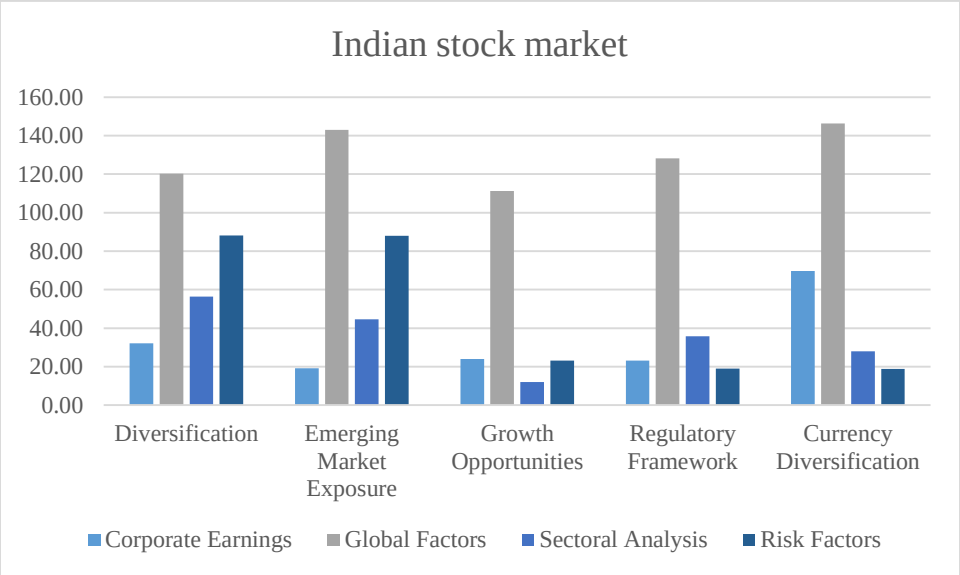

FIGURE 1. Indian stock market

From Figure 1 and Table 1, currency diversification shows the highest value for corporate earnings and emerging market exposure has the lowest value. Currency diversification shows the highest value for global factors and growth opportunities shows the lowest value. Diversification shows high value for sectorial analysis and low value for growth opportunities. Diversification shows high value for risk factors and currency diversification shows low value.

TABLE 2. Normalized Data

	Corporate Earnings	Global Factors	Sectoral Analysis	Risk Factors
Diversification	0.3736	0.4119	0.6565	0.6814
Emerging Market Exposure	0.2240	0.4900	0.5186	0.6790
Growth Opportunities	0.2803	0.3812	0.1408	0.1784
Regulatory Framework	0.2697	0.4397	0.4177	0.1471
Currency Diversification	0.8118	0.5015	0.3254	0.1459

$$X_{n1} = \frac{X1}{\sqrt{((X1)^2+(X2)^2+(X3)^2\ldots)}} \quad (1).$$

Table 2 shows the different normal data high values of diversification, emerging market exposure, growth opportunities, regulatory framework and currency diversification. Corporate Revenue, Global Factors, Sectoral Analysis, Risk Factors. The normalized value is obtained using formula (1). Table 3 shows the weights used for the analysis. We take equal weightage for all parameters for analysis.

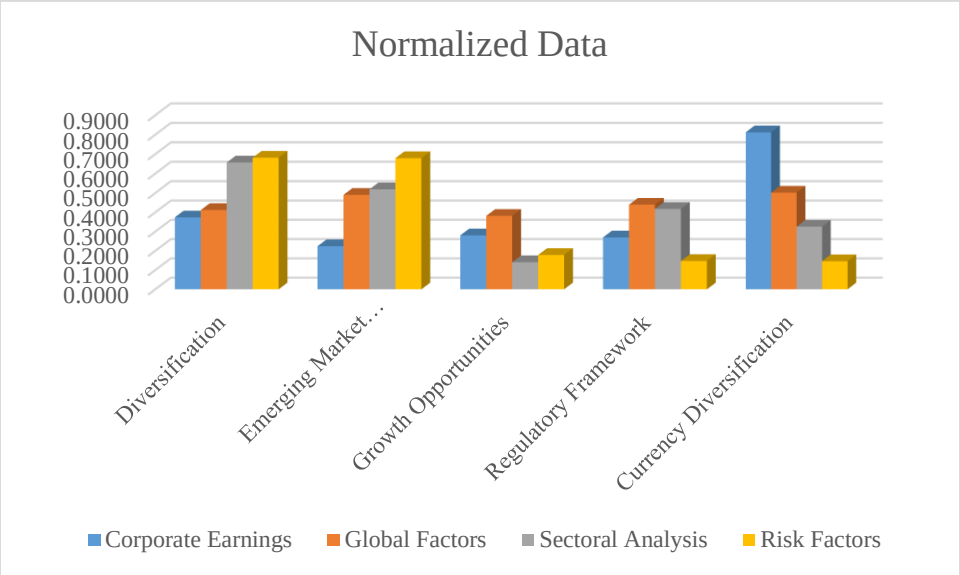

FIGURE 2. Normalized Data

Figure 2 shows the normalized data for the Indian stock market. Diversification, emerging market exposure, growth opportunities, regulatory framework and currency diversification. Corporate Revenue, Global Factors, Sectoral Analysis, Risk Factors.

TABLE 3. Weightages

Weight			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

$$\boldsymbol{X_{wnormal1}} = X_{n1} \times w_1(2).$$

TABLE 4. Weighted Normalized Decision Matrix

Diversification	0.0934	0.1030	0.1641	0.1703
Emerging Market Exposure	0.0560	0.1225	0.1296	0.1697
Growth Opportunities	0.0701	0.0953	0.0352	0.0446
Regulatory Framework	0.0674	0.1099	0.1044	0.0368
Currency Diversification	0.2029	0.1254	0.0813	0.0365

Table 4, 5 shows the final result multi-objective optimization based on rate analysis of Indian stock market. The weighted default decision matrix is calculated using formula (2). In valuation, currency diversification has the highest value and diversification has the lowest value formula (3).

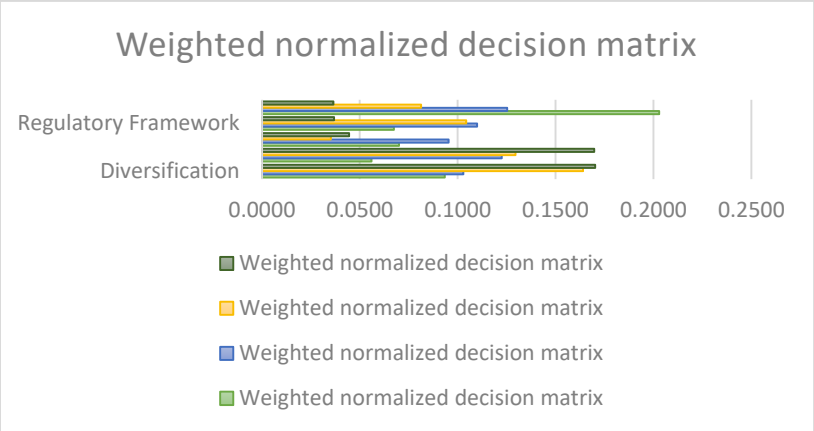

FIGURE 3. Weighted normalized decision matrix

Figure 3 and Table 4, 5 show the final result multi-objective optimization based on ratio analysis of Indian stock market. The weighted default decision matrix is calculated using formula (2). In valuation, currency diversification has the highest value and diversification has the lowest value formula (3).

TABLE 5. MOORA Analysis and Result

	Assessment value	**Rank**
Diversification	-0.1381	**5**
Emerging Market Exposure	-0.1209	**4**
Growth Opportunities	0.0856	**2**
Regulatory Framework	0.0361	**3**
Currency Diversification	0.2105	**1**

$$\text{Assesment value} = \sum X_{wn1} + X_{wn2} - X_{wn3} \qquad (3).$$

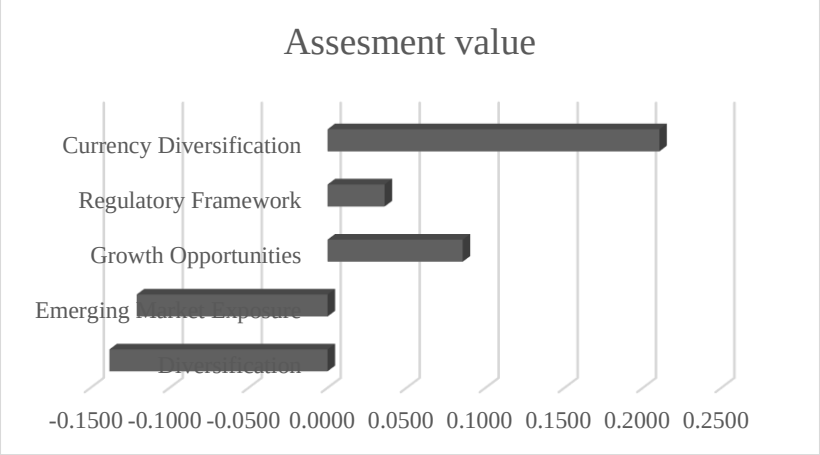

FIGURE 4. Assessment value

Figure 4 Shows the MOORA method using the analysis Assessment value for Currency Diversification is having is Higher Value and Diversification is having Lower value.

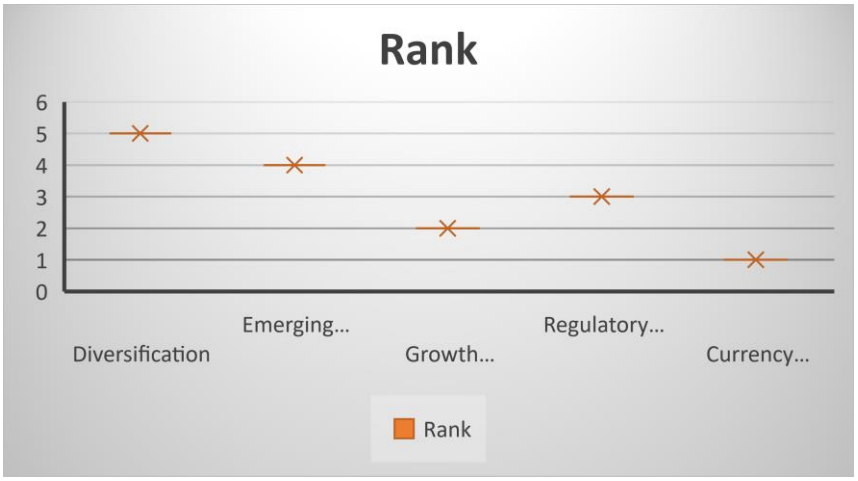

FIGURE 5. Shown the Rank

Figure 5 Shows the Ranking of Indian stock market. Currency Diversification is got the first rank whereas is the Diversification is having the Lowest rank.

4. CONCLUSION

Specifically, we present a novel dataset encompassing trading volume information from Both Bombay Stock Exchange and National Stock Exchange, aimed at elucidating the turnover patterns within the Indian stock market. As financial inclusion expands alongside burgeoning markets, a call for action resonates. Among the vast array of approximately 78,000 scripts listed on Indian Stock Exchanges, only a fraction, around 3,000, are subject to active trading. The purpose of this study is to investigate how foreign portfolio investment (FPI) affects Volatility of Indian Stock Markets. As well as the role of Domestic Institutional Investors (DII). As anticipated, there appears to be a correlation with company size, similarly observed Indian stock market returns. A noticeable negative relationship between the two is apparent, suggesting a vulnerability in Indian stock market. This research aims to address the current research gap by thoroughly investigating price discovery dynamics in the Indian stock market. Specifically, it aims to investigate whether the size of firms has an impact on price discovery within the market. Nevertheless, while oil prices in India are indeed a significant factor influencing the stock market, studies also show that they do not solely determine the monthly returns of BSE Sensex. This analytical approach is utilized within MOORA, a methodology that utilizes dimensionless metrics. MOORA, short for multi-objective optimization based on ratio analysis, serves as a strategy for multi-objective optimization in intricate decision-making scenarios across diverse manufacturing domains. It operates as a systematic approach for assessing and ranking alternatives by considering multiple criteria or attributes, thereby offering a multi-criteria or multi-attribute optimization solution. Widely acknowledged as the first introduced method of its kind, MOORA provides a structured framework for tackling intricate decision problems, particularly prevalent in diverse production settings.

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