An Overview of Technical Analysis as a Trading tool

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ABSTRACT
Our objective in this report is to examine the evidence surrounding technical analysis' profitability. In writing this report, we aim to provide an in-depth assessment of technical trading strategies, both theoretically and empirically. In this article, we examine surveys that have directly explored the experiences and opinions of market participants regarding technical analysis. Approximately 30 to 40 percent of market participants in futures markets and foreign exchange markets believe technical analysis is an important factor in predicting price movement within the next six months, according to a survey. This next section is designed to give an introduction to theoretical models, which includes implications about how technical analysis can be profitable. Technical trading strategies may be profitable because of noise in the market or investors' irrational behaviour, yet conventional efficient market theories, such as the martingale model and random walk models, exclude technical trading profits in speculative markets. The last section surveys empirical studies. By analyzing the testing procedures used in the studies, we categorize "early" and "modern" studies. Of the 58 studies that produced positive results, 24 produced negative results. The remainder produced mixed findings. Despite the fact that several empirical studies have shown that technical trading strategies can be profitable over a long period of time, the majority of test procedures have significant limitations, such as data snooping, the ex-post choice of trading rules or search engines, and the inability to estimate transaction costs and risks. To prove that technical trading strategies are profitable, researchers will need to correct these shortcomings in testing.

Keywords: Analysis of technical indicators, Moving average strategies, automated trade systems, Portfolio analysis.

I. INTRODUCTION

The primary idea of technical analysis (TA) is that by evaluating patterns of historical prices of assets traded on capital markets, the direction of future prices may be anticipated. It is possible to improve the investment portfolio return by examining the interplay of the price indicators in a specific time period of a portfolio. Alexander SS in 2021, defines TA as a strategy for the trends detection of the asset price that is mostly depends upon the price series change in accordance with investor expectations [1]. According to research, if an investor follows these principles for a long time, they may make above-average returns regardless of transactions. Using TA-based trading methods, the profitability of BRICS nations' stock markets was evaluated [2].

According to our research, technical analysis on a country-by-country basis is a more lucrative trading technique than buy and the hold for a traded assets [1, 3]. Technical analysis may be used to identify the top-performing stocks based on the results of fundamental research, according to the conclusions of this study. Trade analysis may be used to identify trends in previous trading prices and market movements. The information gathered may then be utilized to produce forecasts with unusually high yields [2].

According to Almujamed et al., the use of graphs is the most essential element of TA. Using numerous indicators in the chart, such as moving oscillatorsand averages, analysts may detect particular price moves and inflection points. It's also possible to track the quantity of money coming in and out of the nation. TA may offer an index in addition to resistance and support [3]. The Relative Strength Index (RSI), which measures the strength of the link between moving averages and convergence and divergence, is one such indicator. By looking at prior price information for an item, it is feasible to forecast future behavior patterns as well as identify prospective buying and selling opportunities based on the previous data [2, 5].

Moving averages are described by António Silva NH and Neves R in the simplest and most basic terms [4]. Moving averages, according to them, are altered price series that may be used to show patterns when smoothing big datasets. The Efficient Market Hypothesis [5], which claims that asset prices follow previous patterns, clashes with technical analysis-based trading guidelines. When searching for above-average returns, a price series in the EMH weak form has a unit root has been found [7].

As a result, TA requires the rejection of EMH. Essentially, Bessembinder defined an efficient market as one in which there were no economic gains, which is to say that the marginal benefit of acting equaled the marginal expense of acting, assuming that the public was always aware of everything that was going on [6].

In addition to technical analysis, there is also fundamental analysis. Chart analysts, algorithmic pattern recognition, seasonality, cycle estimation, and algorithmic pattern recognition are among the types of technical analysis [7]. Most research on technical analysis focuses on the mathematical formulation. In addition to testing pattern recognition algorithms on visual charts, most of the work has focused on technical trading systems. With respect to this point, it is important to note that there are many different types of technical trading systems, but each one uses parameterized trading rules to determine whether to go long, short or out of the market. There are several modern trading methods that are applied today in order to make money, including moving averages, channels, momentum oscillators, and others [7]. Since Charles H. Dow introduced technical analysis in the late 1800s, many market participants have used it extensively. Several studies have shown that practitioners credit technical analysis with playing an important role in decision-making. Computer-guided technical trading systems are used heavily by futures fund managers [5][8], technical analysis is considered to be the primary determinant of exchange rates up to six months ahead [7].

OBJECTIVES

1. A review of relevant literatures with an importance on various factors that leads to the stock price movement.
2. The significant factor acknowledgement in the existing literatures and analysis of the used methods applied in the models.
3. To prove that technical trading strategies are profitable, researchers will need to correct these shortcomings in testing.

II. LITERATURE REVIEW

Booth et al., brock et al., and Chen et al., all performed studies to determine the usefulness of technical analysis tools[8, 9, 12]. According to Zhu and Zhou, the deficiencies in previous technical analysis studies and the absence of clear conclusions prompted their ongoing study [11]. More consistent assumptions were, therefore, necessary to warrant technical analysis.

This technique lacks a scientific character owing to its subjectivity. Technical indicators like those utilized by [10, 13] are thought to contribute to asset overvaluation, making particular assets more appealing without justification. The TA indicators' profitability has been evaluated in a few small-scale tests across a variety of emerging-market market architectures. More study will be required in relation to the BRICS nations, which include Brazil, Russia, India, China, and South Africa. Chang et al., Chong et al., and Fama reported an isolated developing markets that share no characteristics[11, 13, 16]. When we compared our findings to those of others, we discovered that none of them had assessed how lucrative TA is for developing economies in general, thus we were

unable to respond to those queries. Due to their economic development techniques, a number of nations have had their curiosity piqued by their unique macroeconomic features, such as instability, uncertainty, and inflation. For investors seeking portfolio diversity, some studies have indicated that developing markets provide greater financial returns than consolidated markets in industrialized nations [17].

Emerging-market markets vary from developing-market markets in that they have easier access to developed-market markets, making them more desirable and dynamic to foreign investors. According to Ellis et al., in 2015, instrument costs vary due to macroeconomic factors. The strong predictability and large returns in developing markets that TA provides are not widely accepted in the literature. The Price Series of Emerging Markets has a high degree of autocorrelation, implying that the random walk hypothesis is invalid [15].

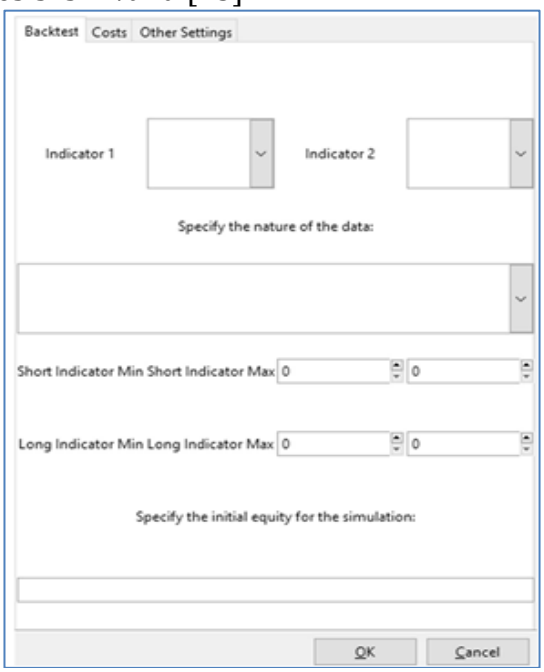

Figure 1: Automated trading system interface

TA for the low assets are profitable, but the profitability is not sustained as it is for more commonly traded assets, as [15] found. TA in India isn't profitable, according to [17]. The consolidated markets of developed and developing countries are more efficient than emerging markets. Among the Russian, Brazilian, and Argentinian markets, moving average crossover strategies performed better than static strategies [18].

In this research, an automated trading system (ATS) was used to simulate transactions with data generated by moving averages over asset prices, derived from patterns from data and associated with the signals generated by the ATS. Our portfolios included all securities traded on the markets of all BRICS countries. The asset prices from 2000 to 2016 were used for India,South Africa, andChina.

The program generated buy and sell signals as a consequence of studying a series of moving averages over prices, which triggered first capital market transactions. The strategy we chose in this work complements [19]. We revised the findings by utilizing more current data to include South Africa, which joined the BRICS in 2014 [12]. We looked at all BRICS countries having data from 2016, rather than just the BRIC countries.

Fama in 2020 did not analyze how trading strategies that took into account transaction costs performed. Our automated trading system allows us to determine if transaction costs impact the profitability of the strategies when it operates with and without brokerage fees [17].

An opinion survey conducted by [22] asked foreign exchange dealers in the UK to express their views on technical analysis in 1998. According to the survey, 75% of respondents are technical analysts, an increase of 20% from five years ago. Furthermore, 26% of dealers said that technical trading determines the movement of exchange rates most frequently over the medium term. [22]

The survey found that about 30% of the traders attributed their trading strategy to technical analysis. Just 19% of all traders tended to use technical analysis as their primary trading method five years ago. Three-quarters of the traders said that technical trading affected exchange rate movements in the first six months of the year. The importance of fundamental and technical analysis was brought up by forex traders and financial journalists in Frankfurt, London, Vienna, and Zurich [19].

Technical analysis was used more often by forex traders than fundamental analysis in predictions up to a 3-month horizon, whereas it was used more frequently by financial journalists up to a 1-month prediction horizon. However, the forecasting techniques varied in trading locations with shorter forecasting horizons. The technical analysis was a greater factor in the forecasting horizon of traders in smaller trading locations than it was in bigger trading locations (London and Frankfurt). Technical analysis is commonly used along with fundamental analysis by traders. Fewer than 3% of traders used both forecasting methods exclusively. Furthermore, over the past 26 years, the importance of technical analysis has increased for foreign exchange traders in London when compared to [19], whose survey was conducted in 1988.

III. METHOD

An automated trading system (ATS) is utilized to meet the goals, which automatically softened price series and recognized patterns using classic technical analysis and moving averages. According to [12], investment opportunities are recognized using artificial intelligence in automated trading systems that are based on artificial intelligence. The methods utilized to design a trading strategy differ significantly. Technical indicators have been extensively employed for this purpose as a result of their widespread usage by market practitioners. The core premise of trading systems is the same, regardless of the method: price forecasts are derived by examining historical performance. The importance of risk-adjusted returns is stressed in [22]'s research because future price predictions may be sensitive to a number of unpredictable causes other than previous market patterns. Stock market fluctuations are influenced by a variety of variables, some of which are linked to changes in economic, political, and industrial situations. Stock market fluctuations are influenced by changes in underlying economic, political, and industrial situations, according to [21]. According to the authors, determining the best or worst techniques for generating profits in the market necessitates determining the suitable approach for analysis. The psychology of investors is represented in the TA model, according to [18,21], since it is founded on the notion that prices are impacted by individual sentiments, i.e., the mass psychology of the crowd. Herd behavior is assumed to swing between phases of boldness and confidence, as well as bouts of pessimism and fear, according to technical analysis. Through its widespread usage by financial market analysts [23], the crossing of moving averages is a well-established signal generating method [24], and it may be applied in a reasonably simple way. The crossover of two moving averages, one short-term and one long-term, calculated from the quoted assets, generates buy signals. A purchase signal was provided when the short-term moving average got greater than the

long-term moving average, according to [20], while a sell signal was issued when the short-term moving average went smaller than the long-term moving average.
Because they did not allow for the creation of buy/sell signals, a part of the assets in the database was ineligible to be included in the portfolio. The statistics for China, India, and South Africa go from 2000 to 2016. The time frame for Russia and Brazil is 2007 to 2016. The simulations were run using daily closing prices. Simulations were run using the US$ 10,000.00 local currency rate as of June 24, 2016, assuming an external investor's viewpoint on the investment. Costs, as well as those that did not, were included in the return estimates.

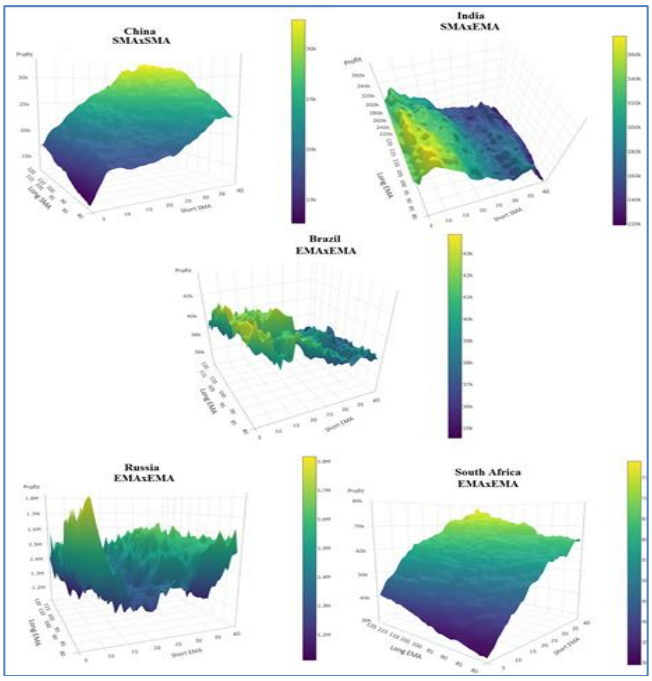

Figure 2: Graphic representation

Because the simulation assumptions were 10,000.00 local currency units and transaction costs were not taken into consideration, [18] did not incorporate these features in their simulations. The building of a portfolio with a diverse range of assets was the focus of our study. We were able to calculate the average profitability attained by technical analysis for each BRICS member country's stock market in this fashion. At the current exchange rate, the investor examined here acquired numerous assets in the nation for US$10,000.00 in June 2016. A purchase signal is generated when short-term moving averages exceed long-term moving averages, suggesting the start of an uptrend or the conclusion of a downturn. The longer-term moving average is higher than the shorter-term moving average, indicating a sell signal. This is recognized as a key concept among chartists. Our trading algorithm looked at three different forms of moving average crossovers: SMA-SMA, SMA-EMA, and EMA-EMA. All courses in the short-term MA utilized five to forty sessions, whereas the long-term MA used 80 to 120 periods. The long-term MA had an estimated time horizon of four to six months, whereas the short-term MA had an estimated time horizon of less than two months. Using the software's language, an algorithm was created [25]. There were 1.476 crossover methods with long- and short-term MAs ranging from five to forty sessions. Because the purpose of the research was to establish an automated technique to analyze the profitability and efficiency of technical analysis in developing markets, we utilized local currency rates to determine the return in dollars at the investment's launch date [27]. The

transactions were unaffected by variations in the exchange rate or inflation using this approach [25-28].

IV. RESULTS

The results of each asset in each country were compiled using an automated trading system. In order to measure the profitability of operations, the proportion of assets from each country for each strategy was established. By taking a lower-risk strategy, we were able to outperform the market via buy and hold. Long-term assets are purchased and kept for the long term and are only sold at a greater price than the market average when the assets are revalued, resulting in above-market returns.

We didn't look into the causes for the differences in performance across the nations, despite the fact that India and Russia had higher returns. TA only considers past data and ignores macro and micro factors that might influence future price behavior. As a result, rather than clarifying future feasible strategies, the results of the study revealed possible market inefficiencies.

In the most consolidated of the samples, the South African market, the most consistent results were recorded. MA crossings in all three categories and for all simulation types of cost showed favorable in all simulations when done at the interval (37; 40) with the long-term MA at (116; 120).

V. CONCLUSION

The use of technical analysis to solve this issue was both practical and advantageous. Overall, the investment yielded a higher return than the original investment. Despite certain assets' poor performance, others have compensated for the losses suffered by others. The purchase and hold approach, on the other hand, beat most moving average combinations. The findings of our research also indicate that technical and basic analyses may coexist. According to our concept, TA might be used to find groupings of firms listed on the market with a non-static capitalization that constitute a good investment opportunity. The BRICS markets section of our research looked at moving average combinations that regularly deliver favorable returns.

According to Lo AW, the research also shows that market age has a direct impact on market efficiency [27]. As a result, even when transaction costs were added to the automated trading system, the notion that markets grow more efficiently with time was upheld. There was a link between this outcome with age as a consequence of the poor average return on the Brazilian stock market. According to the data, markets grow more efficiently with time, implying that previous stock prices may not supply enough information to yield above-average returns in older stock markets.

Because there is no conclusive a priori hypothesis, the study's findings cannot tell if there is a definitive link between market efficiency and stock market age. The stock markets of these two nations are not always identical, despite belonging to the same economic category and being developing. This conclusion was reached due to the difficulties in determining the combinations of the moving averages that could yield a consistent return across all nations studied.

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