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THE EFFICIENT MARKET HYPOTHESIS UNDER PRESSURE FROM BEHAVIORAL REALITIES: AN EMPIRICAL PERSPECTIVE ON ABNORMAL RETURNS

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Abstract: *This paper examines the validity of the Efficient Market Hypothesis (EMH) in its weak form by analyzing the autocorrelation of daily returns for stock indices from emerging, developing, and developed markets over a 10-year period. While traditional definitions of abnormal returns arise in event studies, this paper uses the term more broadly to refer to potential systematic profits enabled by autocorrelation patterns, which contravene the "random walk" postulate of EMH. Findings suggest partial inefficiencies across all market types, especially during periods of economic or technological turbulence, and raise questions about the assumption of fully rational investor behavior posited by classical financial theory.*

Keywords: EMH, autocorrelation, investor behavior, financial efficiency, abnormal returns

1. Introduction

The Efficient Market Hypothesis (EMH), formalized by Eugene Fama in the 1970s, postulates that financial markets fully reflect all available information, making it impossible to consistently achieve returns that outperform the overall market [1]. However, this theoretical construct has faced mounting scrutiny, especially from the perspective of behavioral finance, which highlights the cognitive biases and emotional responses that often drive investor behavior [2]. Investors are not always perfectly rational, and phenomena such as panic selling, herd behavior, and overreaction to news can lead to price deviations that EMH would deem unlikely.
This paper aims to empirically investigate whether stock market returns demonstrate patterns inconsistent with the EMH, particularly in its weak form, by analyzing the autocorrelation of daily returns over a ten-year period for indices representing emerging, developing, and developed markets. Through this approach, we examine whether observable behavioral inefficiencies—such as trend persistence or post-event drift—can be inferred from return patterns. We focus on six major stock indices (from India, Brazil, Malaysia, Mexico, the United States, and Germany) to capture a diverse set of market environments. By employing these analyses, we seek to understand the extent to which real-world markets align with or deviate from the efficient markets ideal.
The reminder of this study is as follows: section 2 presents the theoretical framework, section 3 details the methodology, section 4 presents the results

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and discussions and section 5 concludes the study.

2. Theoretical Framework

EMH is traditionally categorized into three forms: *weak*, *semi-strong*, and *strong* [1,3]. The weak form posits that current asset prices fully reflect all information contained in past trading data, such as historical prices and volumes. Under weak-form efficiency, price changes should follow a "random walk," and no trading strategy based on past price patterns (technical analysis) should consistently yield abnormal profits [4]. The semi-strong form extends this to assert that all publicly available information (including not just past prices, but also news, earnings reports, economic data, etc.) is already incorporated into stock prices. If a market is semi-strong efficient, prices will adjust immediately and unbiasedly to new public information, leaving no opportunity for investors to profit from news after its announcement. Finally, the strong form of efficiency is the most stringent, claiming that all information—public and private (insider information)—is fully reflected in prices. In a strong-form efficient market, even investors with exclusive insider knowledge cannot consistently achieve excess returns, as any such information is purportedly already priced in.

These forms rely on several fundamental assumptions: (a) investors are rational and value securities rationally based on available information, (b) if some investors are not fully rational, their trades are random and cancel out without affecting prices, and (c) if investors deviate from rationality, arbitrage by others will correct any mispricings quickly [1]. Under these premises, prices always reflect true fundamental values and respond only to new information, not to past price trends or investor emotions.

In practice, a growing body of research in behavioral finance questions these assumptions [5]. Herbert Simon's concept of bounded rationality suggests that investors have cognitive limitations and may not process information optimally [6]. Tversky and Kahneman [7] demonstrate that individuals use heuristics (mental shortcuts) that can lead to systematic biases in judgment under uncertainty. Such cognitive biases and emotional influences mean that investors often deviate from the fully rational behavior assumed by EMH. For example, investors commonly exhibit overconfidence (overestimating their knowledge or predictive skills) and loss aversion (reacting more strongly to losses than to gains), which can distort decision-making. Overconfident investors may trade excessively or hold biased expectations [8], while loss-averse behavior can cause overreaction to downturns (selling in panic) or underreaction to good news.

Behavioral finance provides alternative explanations for why these anomalies and deviations occur, emphasizing factors that the EMH does not consider. Key among these are herd behavior and market sentiment. Herd behavior [9] is when investors collectively follow each other's actions (e.g. buying because others are buying), even if those actions may not be justified by fundamentals. This can lead to asset price bubbles in which prices inflate far above intrinsic value, or conversely, crashes where prices overshoot on the downside. Limited arbitrage is another critical concept: even if mispricings are recognized, real-world arbitrage is risky, costly, and often limited [10]. This means that mispricings caused by irrational behavior can persist because arbitrageurs either lack the capital or are unwilling to bear the risk of fighting against a collective irrational trend. These insights help explain how markets can deviate from efficiency: prices might not reflect true value in the short-to-medium term if enough investors are influenced by biases or constraints.

Recent literature has increasingly emphasized the intersection between digital transformation, cognitive augmentation, and the behavior of complex organizations in uncertain environments—an area of interest closely aligned with empirical challenges to the Efficient Market Hypothesis (EMH). Mustață et al. [11] conducted an experimental study analyzing ChatGPT's role in human–AI-assisted decision-making, revealing that AI tools can enhance or bias cognitive processes in tasks such as problem-solving and report drafting. This supports the notion that information processing is far from purely rational and may introduce systematic deviations in financial behavior. Similarly, Rădoiu et al. [12] underline the critical importance of organizational adaptability and digitalization in fostering resilience in volatile economic conditions, indirectly pointing to the ways in which market participants' behaviors and expectations are shaped by external technological and systemic pressures. In the realm of bibliometric research, Mănescu and Giurgiu [13] highlight the convergence between emerging and disruptive technologies, suggesting that the complexity of financial systems is increasingly interlinked with technological shocks—factors that can precipitate abnormal returns inconsistent with EMH predictions. Furthermore, Ranf et al. [14] explore how the integration of emotional intelligence into military organizational cultures enhances adaptive performance under stress, reinforcing the behavioral argument that psychological and cultural dimensions play a non-trivial role in economic decision-making. Together, these studies provide a multi-dimensional foundation for reassessing EMH in light of cognitive, organizational, and technological dynamics that systematically affect market efficiency.

These theoretical perspectives frame the expectations for our empirical analysis. Under a strict EMH view, we would expect to find no predictable patterns in returns (no significant autocorrelations) and no post-event price drifts. The behavioral view, however, anticipates that we might uncover some predictable structure in returns and possibly evidence of delayed information incorporation around events.

3. Methodology

3.1. Data Collection

The empirical analysis employs daily closing price data for six major stock indices representing various levels of market development: India (Nifty 50 index), Brazil (Bovespa), Malaysia (FTSE KLCI), Mexico (IPC index), United States (S&P 500), and Germany (DAX). These indices were chosen to include a mix of *emerging markets* (India, Brazil), *developing/frontier markets* (Malaysia, Mexico), and *developed markets* (USA, Germany) in order to compare efficiency across different market contexts. The sample period spans ten years, from January 1, 2015 through January 1, 2025. This period includes various sub-periods of economic expansion, volatility, and crises (e.g., the COVID-19 pandemic shock in 2020), providing a rich dataset to observe how market efficiency might be maintained or compromised under different conditions. Daily returns for each index were computed as the percentage change in the closing price from one trading day to the next. Using daily frequency (as opposed to weekly or monthly) gives a large number of observations and allows us to detect short-term dependencies that are most relevant for weak-form efficiency testing.

3.2. Weak-Form Efficiency Tests

To assess weak-form market efficiency, we analyze the serial correlation (autocorrelation) in the return series of each index. If returns follow a true random walk (as weak-form efficiency implies), there should be no significant correlation between returns on different days – in other words, past returns should not predict future returns. We computed the sample autocorrelation coefficients ρ_k at various lags k (from 1 up to 10 trading days) for each index's return series. The autocorrelation at lag k is defined as in Equation 1.

$$\rho_k = \frac{\sum_{t=k+1}^{T}(r_t-\bar{r})(r_{t-k}-\bar{r})}{\sum_{t=1}^{T}(r_t-\bar{r})^2} \qquad (1)$$

where r_t is the return on day t, $\bar{r}$ is the mean return, and T is the total number of observations. This statistic measures the linear dependence between returns k days apart. For an efficient market, we expect ρ_k to be around 0.

In addition to examining individual ρ_k values, we apply the Ljung-Box Q-test to each index's return series. The Ljung-Box test provides a joint test for whether any of the autocorrelations up to a certain lag m are significantly different from zero. The test statistic is defined as in Equation 2.

$$Q(m) = n(n+2)\sum_{k=1}^{m}\frac{\rho_k^2}{n-k} \qquad (2)$$

where n is the sample size (number of returns) and ρ_k is the sample autocorrelation at lag k. Under the null hypothesis that the returns have no autocorrelation (i.e., are white noise), *Q(m)* is asymptotically chi-square distributed with m degrees of freedom. We perform the Ljung-Box test for m=10 lags on each index. A p-value below the 5% significance level for this test would lead us to reject the null of no serial correlation, indicating that the return series exhibits statistically significant autocorrelation (and thus a deviation from weak-form efficiency).

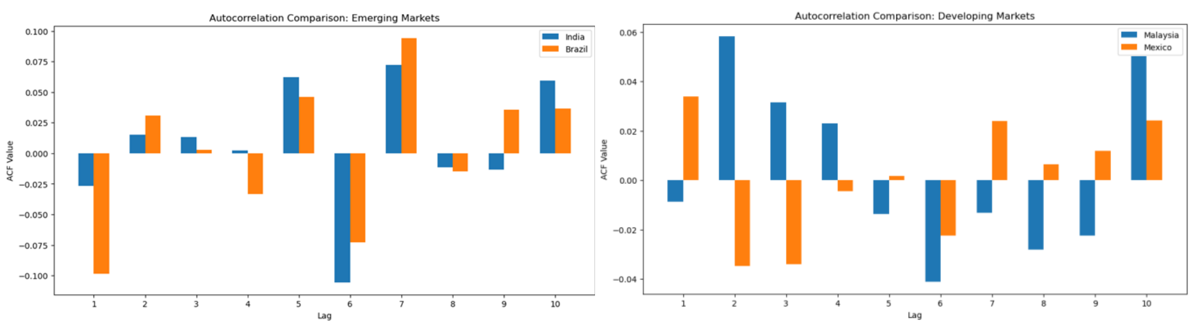
It's worth noting that there are other tests for weak-form efficiency that we considered conceptually, even if our primary focus is autocorrelation. For instance, the runs test examines the sequence of price changes to see if the signs of returns (+/−) are random or exhibit streaks. The variance ratio test [15] checks if the variance of multi-period returns is proportional to the time horizon (a property of random walks); deviations from linear variance scaling indicate predictability. These tests have been used in literature to detect mean reversion or momentum in stock returns. In our analysis, the autocorrelation and Q-tests effectively capture similar information about linear predictability. For simplicity, we concentrate on the autocorrelation approach, since significant autocorrelations (especially at non-zero lags) directly imply that past returns contain information about future returns that a trader could exploit, thus violating weak-form EMH.

All data handling, return calculations, and statistical tests were conducted using Python. The analysis prioritized replicability and robustness: for example, we confirmed that results are not sensitive to reasonable variations in the sample period or minor data issues (like missing data points or different return calculation methods).

4. Results and Discussions

4.1. Weak-Form Efficiency Results

The autocorrelation analysis of the six stock indices reveals notable deviations from the zero-correlation expectation of the EMH. Figure 1 illustrates a comparison between the six markets for the 10 years period.



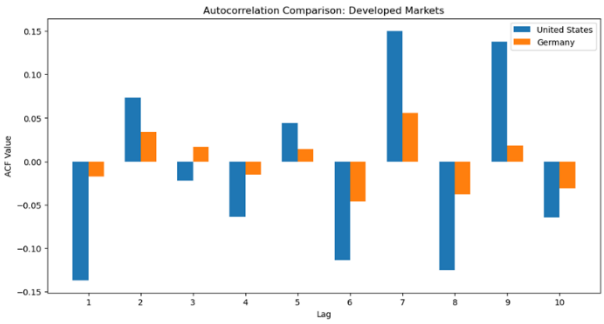


Figure 1: Autocorrelation of daily returns

Looking at the detailed results for all six indices, we find that none of the markets perfectly meet the weak-form efficiency criteria (i.e., all have at least one statistically significant autocorrelation). However, the degree of inefficiency varies:

- India (Nifty 50) – Autocorrelations were mostly insignificant at short lags (1–4 days), but became significantly positive at medium lags (around lag 5–10). The Ljung-Box test for lags 1–10 yields a p-value well below 0.05 for India's index, driven by these medium-term correlations. This suggests that while day-to-day changes might appear random, there are multi-day trends or cycles in the Indian market returns. Such patterns could arise from factors like weekly cyclicality or investor herding that plays out over a few days.
- Brazil (Bovespa) – Perhaps the strongest evidence against weak-form efficiency was found in Brazil's market. We observed sizable autocorrelation coefficients at nearly all lags 1 through 10, often in the range of 0.1 to 0.3, and all highly significant ($p < 0.01$). The Ljung-Box Q-statistic for Brazil was extremely large (with p-value effectively ~0.000 for 10 lags), indicating strong serial dependence. This implies that returns in Brazil followed identifiable short-term trends or momentum over the entire period. Such behavior could reflect persistent market momentum and also possibly structural factors (like periodic macroeconomic news cycles or technical trading by local investors).
- Malaysia (FTSE KLCI) – The Malaysian index showed a mix: the first lag autocorrelation was around zero (insignificant), but lags 2 through about 7 were modestly positive and statistically significant. This pattern (no one-day momentum, but multi-day dependence) might indicate that any immediate overreaction is corrected the next day (zero lag1 autocorrelation), yet some short-run trend persists after that. One interpretation is that the market might digest information or shocks over a few days rather than all at once.
- Mexico (IPC) – Mexico's market mostly showed weak autocorrelation except a notable outlier at lag 3 (a significant autocorrelation at lag 3 while other lags were not significant). This isolated significance could be a statistical fluke or might point to a specific three-day cycle or recurring event timing in that market. Overall, aside from that third-day effect, returns in Mexico appeared close to random walk behavior for other lags, suggesting a higher degree of efficiency relative to some of the other emerging/developing markets in the sample.
- United States (S&P 500) – The U.S. market is often considered one of the most efficient. Surprisingly, our full-sample analysis found that autocorrelations at all tested lags 1–10, while small in magnitude, were statistically significant (the Q-test p-value < 0.01 for S&P 500). This indicates that even in the U.S., returns were not perfectly random. However, the magnitude of these autocorrelations was very low (often between 0.05 and 0.10 or even smaller), albeit significant due to the large sample size. This suggests that there may be slight predictabilities (perhaps related to continued responses to persistent factors

like interest rate trends or macroeconomic cycles). Interestingly, the U.S. showed positive autocorrelation at short lags as well, which might reflect short-term momentum or liquidity effects, and perhaps some negative autocorrelation at slightly longer lags (as markets correct themselves), although in our aggregate test it came out as overall significant serial correlation.

- Germany (DAX) – The German market's results were somewhat in-between. We found that most lower lags were not significantly different from zero, but a few higher-order lags (around lag 7–10) showed significant autocorrelation in the DAX returns. The Q-test p-value was marginal (just below 0.05) for Germany. This suggests an overall weak serial dependence. Broadly, the DAX is quite efficient on a day-to-day basis (consistent with weak-form EMH for short lags), but like the U.S., not entirely devoid of any pattern on a multi-day horizon.

Aggregating these findings, the Ljung-Box tests indicate rejection of the pure random walk hypothesis for all six indices, meaning each market exhibited some statistically detectable autocorrelation structure. This ranges from very mild (Germany, Mexico) to pronounced (Brazil, India). Notably, the presence of autocorrelation means that an investor employing a simple strategy (for example, momentum trading on the past day's return for Brazil, or a contrarian 3-day cycle strategy in Mexico) could have had a better-than-random chance of earning abnormal returns. In real terms, exploiting these inefficiencies might still be challenging, but the key point is that return patterns were not entirely unpredictable.

These results put pressure on the weak-form EMH, as even the developed markets in our sample do not perfectly align with it. However, efficiency is a matter of degree. The economic significance of the inefficiencies is likely much higher in emerging markets (where trends were stronger and more persistent) and relatively minor in developed markets (where any predictability might be within the noise of transaction costs). The findings align with a common view in the literature: emerging markets often deviate from random walks due to factors like lower liquidity, higher influence of retail investors (who might herd or react emotionally), and possibly less continuous information flow, whereas developed markets are closer to the ideal of efficiency, albeit not flawless [16,17].

From a behavioral standpoint, the autocorrelation patterns can be interpreted through the lens of investor psychology and market microstructure. Positive autocorrelations (momentum) in emerging markets could be driven by herding behavior – investors seeing a rising market and jumping in, further fuelling the rise, leading to short-term trend continuation. This is often underpinned by overconfidence and the recency bias (investors giving more weight to recent news or returns and expecting them to continue). On the other hand, cases where we see a mix of positive and negative autocorrelations at different lags (such as initial momentum that reverses later) suggest overreaction and correction. For example, a surge followed by a dip a few days later could mean investors initially overreacted to some news (or rumor), pushing prices too far, and then as they realize the overshoot, prices mean-revert.

It is also insightful that markets in the same broad category (emerging vs developed) did not all behave identically. India and Brazil both are emerging markets, yet India had mostly medium-term autocorrelations while Brazil had persistent autocorrelation at all horizons. Similarly, the U.S. and Germany both are developed, yet their patterns differed slightly. This underscores that local factors matter. Each market has unique institutional features, dominant investor profiles, and perhaps idiosyncratic events that imprint on the return series. For instance, Brazil's period from 2015–2025 included several political and economic upheavals (multiple presidential changes, commodity cycle swings) that might have induced prolonged trends or volatility clustering. India's market grew rapidly with increasing foreign investor participation, which might have introduced periodic inflows and outflows causing those medium-term autocorrelation blips. The U.S. market went through an unprecedented tech boom and a pandemic shock, which might have introduced short-lived inefficiencies, though competition in that market quickly arbitraged many opportunities away.

In conclusion on the weak-form tests, developed markets are "more efficient" in that their price changes are closer to uncorrelated noise, whereas emerging markets show clearer signs of predictability, validating some arguments of behavioral finance that less mature markets are prone to trends and investor sentiment effects [18]. However, even developed markets cannot be assumed to be perfectly random in returns at all times. The presence of statistically significant autocorrelation in the S&P 500 is a caution that even the most watched market can deviate from the EMH in subtle ways (a fact that quantitative investors often try to exploit with sophisticated algorithms searching for those small edges).

Our results have practical implications for investors and policymakers. For investors, the presence of inefficiencies means that active strategies might add value, especially in certain markets or periods. For example, employing momentum strategies in emerging markets or event-driven strategies around news releases could yield abnormal returns if done carefully. However, this is not a guarantee of easy money – inefficiencies can be fickle and transaction costs or timing risks can erode profits. The modest nature of inefficiencies in developed markets suggests that for most individual investors, a passive approach (assuming near-efficiency) remains sound, but those with specialized skill or information might beat the market occasionally.

For policymakers and regulators, recognizing that markets are not perfectly efficient underscores the importance of transparency and investor protection. Market inefficiencies can lead to unfair outcomes (insiders profiting at the expense of regular investors) and can destabilize the system (as seen when herd behavior contributes to bubbles or crashes). Strengthening information disclosure rules, discouraging manipulative herd-like behavior (for instance, through circuit breakers or monitoring), and educating investors about cognitive biases could help nudge markets closer to efficiency and stability.

5. Conclusions

This paper examined the Efficient Market Hypothesis through the weak form (analyzing serial correlations in stock index returns across various markets). Our empirical findings provide mixed evidence on market efficiency. In weak-form tests, we found that developed markets (like the U.S. and Germany) *largely* conform to the EMH with returns approximating a random walk most of the time, whereas emerging and some developing markets (like Brazil, India, Malaysia) exhibit clear patterns inconsistent with the random walk theory. Even in developed markets, subtle but statistically detectable patterns were present, indicating that perfect efficiency is an idealization rather than a constant reality.

These results underscore that the EMH, particularly in its pure form, does not always hold up under the pressure of real-world behavioral forces. Markets are efficient *to an extent*—certainly, gross inefficiencies are quickly eliminated and one cannot expect easy arbitrage opportunities at every turn. However, markets are not perfectly efficient. There exist pockets of predictability and periods where irrational behavior prevails, leading to mispricings. This reinforces the view of bounded rationality in markets: investors are often rational but within limits, and those limits can lead to systematic errors that savvy others (or time) will correct.

Our findings contribute to a nuanced interpretation of market efficiency: one that appreciates the efficiency of markets as a general tendency but also acknowledges the episodic departures caused by investor psychology, information dissemination lags, and structural frictions. Rather than viewing EMH and behavioral finance as outright conflicting paradigms, one can see them as complementary [19]. The EMH sets the baseline expectation for what markets would look like under ideal rational conditions, while behavioral finance explains the deviations from that baseline. In normal times, or over longer horizons, markets may behave quite efficiently, but in times of stress, exuberance, or uncertainty, behavioral effects can dominate until corrected.

For researchers and practitioners, this suggests several avenues for future exploration. One direction is to investigate the time-variation in efficiency: for example, applying rolling-window tests to see if autocorrelations increase during crises or speculative booms and subside in stable periods. Another avenue is exploring cross-sectional differences: why do some emerging markets show more inefficiency than others, or which stock characteristics (size, liquidity, investor base) correlate with deviation from random walks? Additionally, with the rise of algorithmic and high-frequency trading, it would be interesting to assess if certain inefficiencies (like very short-term autocorrelations or immediate post-news reactions) are shrinking, while others (like longer-term anomalies or those involving complex information) persist. The Adaptive Markets Hypothesis [20] could be a useful framework, suggesting that markets evolve and oscillate between states of more efficiency and less efficiency depending on environmental conditions and the population of market participants.

In conclusion, the efficient market hypothesis remains a cornerstone of financial economics, but it operates within the bounds of human behavior and real-world complexity. Market efficiency is not an all-or-nothing condition; it is a continuum. Our study showed that even in modern markets, there are inefficiencies that attentive investors (or researchers) can detect. Recognizing these patterns can improve investment strategies and inform regulatory policies, bridging the gap between the elegant ideal of efficient markets and the often messy reality of how markets behave. As the famous saying (attributed to Keynes) goes, “the market can stay irrational longer than you can stay solvent,” reminding us that while betting against market irrationality can be profitable, timing and managing that bet is crucial, because mispricings can endure and even widen before correction. Balancing the EMH perspective with behavioral insights leads to a more robust understanding of financial markets – one that neither naively assumes perfection nor cynically assumes chaos, but appreciates the conditional efficiency of markets influenced by the ever-human element of investor behavior.

References

[1] Fama, E. F. Efficient capital markets: A review of theory and empirical work. Journal of Finance, 25(2), 1970, 383–417.

[2] Shiller, R. J., From efficient markets theory to behavioral finance. Journal of Economic Perspectives, 17(1), 2003, 83–104.

[3] Fama, E. F., Efficient capital markets: II. Journal of Finance, 46(5), 1991, 1575–1617.

[4] Brătian, V., Acu, A. M., Oprean-Stan, C., Dinga, E., & Ionescu, G. M. (2021). Efficient or Fractal Market Hypothesis? A Stock Indexes Modelling Using Geometric Brownian Motion and Geometric Fractional Brownian Motion. Mathematics, 9, 2983, 2021.

[5] Dinga, E., Oprean-Stan, C., Tănăsescu, C. R., Brătian, V., & Ionescu, G. M. Entropy-based behavioural efficiency of the financial market. Entropy, 23(11), 2021, 1396.
[6] Simon, H. A., A behavioral model of rational choice. Quarterly Journal of Economics, 69(1), 1955, 99–118.
[7] Tversky, A., & Kahneman, D., Judgment under uncertainty: Heuristics and biases. Science, 185(4157), 1974, 1124–1131.
[8] Barber, B. M., & Odean, T. Boys will be boys: Gender, overconfidence, and common stock investment. Quarterly Journal of Economics, 116(1), 2001, 261–292.
[9] Banerjee, A. V. A simple model of herd behavior. Quarterly Journal of Economics, 107(3), 1992,797–817.
[10] Shleifer, A., & Vishny, R. W. The limits of arbitrage. Journal of Finance, 52(1), 1997, 35–55.
[11] Mustață, M. A., Iliescu, D., Mavriș, E., Jude, C. R., Bojor, L., Tudorache, P., Urseiu, C. T. ChatGPT-Assisted Decision-Making: An In-Depth Exploration of the Human–AI Interaction. International Journal of Human–Computer Interaction, 2025, 1–16. https://doi.org/10.1080/10447318.2025.2499165.
[12] Rădoiu, A., Bătușaru, C. M., & Porancea-Răulea, A. Digitalization, a crucial tool to improve the resilience of organisations. Revista Economică, 76(1), 2024.
[13] Mănescu, G., & Giurgiu, I. T., Emerging and Disruptive Technologies – A Bibliometric Analysis. Land Forces Academy Review, XXIX, 2(114), 2024.
[14] Ranf, D. E., Halmaghi E. E., & Badea D. (2022). Opportunities to Increase Performance by Integrating Emotional Intelligence into a Resilient Military Organisation's Culture. Proceedings of the 16th International Management Conference "Management and resilience strategies for a post-pandemic future" 3rd– 4th November 2022, Bucharest, Romania.
[15] Lo, A. W., & MacKinlay, A. C. Stock market prices do not follow random walks: Evidence from a simple specification test. Review of Financial Studies, 1(1), 1988, 41–66.
[16] Oprean-Stan, C. Testing informational efficiency: the case of UE and BRIC emergent markets. Studies in Business and Economics, 7(3), 2012, 94-112.
[17] Oprean, C., & Tanasescu, C. Applications of chaos and fractal theory on emerging capital markets. International Journal of Academic Research in Business and Social Sciences, 3(11), 2013, 633.
[18] Oprean-Stan, C., Tanasescu, C., & Bratian, V., Are the capital markets efficient? A fractal market theory approach. Economic Computation & Economic Cybernetics Studies & Research, 48(4) 2014.
[19] Oprean-Stan, C. Theoretical and methodological proposals regarding the informational efficiency of Financial Markets. Revista Economica, 67(6), 2015, 66-80.
[20] Lo, A. W. The adaptive markets hypothesis: Market efficiency from an evolutionary perspective. Journal of Portfolio Management, 30(5), 2004, 15–29.