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Review Article

JANUARY EFFECT ANOMALY AND MARKET EFFICIENCY IN THE WESTERN BALKANS ECONOMIES

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Abstract: *The issue of the existence of calendar anomalies in financial markets has not lost its relevance for years; on the contrary, it remains a subject of ongoing debate and investigation among numerous economists. Most studies place particular emphasis on examining the efficiency of small and insufficiently developed financial markets, as well as on the possibility of generating above-average returns within them. This paper focuses on the analysis of the January effect in the context of the efficiency of financial markets in Bosnia and Herzegovina, Serbia, Montenegro, Croatia, and North Macedonia over the period from January 2019 to December 2023. The analysis is based on daily values of the stock market indices BIRS, SASX10, BELEX15, MONEX, CROBEX, and MBI10. The starting hypothesis of the study posits that the January effect anomaly is not statistically significant in the financial markets of the Western Balkans, that is, these markets exhibit efficiency in this respect. The research employs panel data as a unified dataset, along with the t-test as the primary analytical method. The results obtained confirm the null hypothesis, indicating that within the given sample and applied methodological framework, the January effect was not observed in the analyzed markets during the specified period. The paper also outlines the limitations of the conducted test, as well as the specific characteristics of the selected time interval, which should be taken into account when interpreting the results. A descriptive examination of the panel data reveals certain simultaneous increases or decreases in returns across all observed financial markets, which may be interpreted as a form of pattern or seasonal anomaly. However, given that this observation has not been statistically validated, future research should be directed toward examining other seasonal monthly anomalies, as well as the day-of-the-week effect.*

Key words*: January effect, financial markets, Western Balkans, efficiency*

JEL classification*: G14, C12, C22*

1. INTRODUCTION

Disagreements among leading economists regarding the validity of the efficient market theory, originally established in the 1970s by Fama, have never lost their relevance. On the contrary, even today, a significant number of economists continue to challenge this theory and, through numerous studies and scientific papers, attempt to substantiate their claims. One of the fundamental "weak points" of the financial market efficiency theory lies in calendar anomalies. This topic is also of considerable interest to professional investors, as the existence of such anomalies would imply the possibility of achieving above-average profits in financial markets. This paper examines one of the most significant calendar anomalies, namely the January effect. The starting hypothesis of the study posits that the January effect anomaly is not statistically significant in the financial markets of the Western Balkans, that is, that these financial markets are efficient in this respect. The objective of the paper is to test the presence of the January effect in the financial markets of the Western Balkan region using daily stock index data over the period from January 2019 to December 2023. Panel data, as a unified dataset, and the t-test were employed to examine the stated issue. In addition to the abstract and the introductory section, the paper consists of three logically connected parts. The first part addresses the theoretical framework of the research subject and provides an overview of previous studies, while the second part elaborates on the research methodology. The third part focuses on the interpretation of the research results, and the paper concludes with final considerations.

2. THEORETICAL FRAMEWORK

Financial markets, as markets in general, represent nothing more than a place where the supply and demand for specific goods and services meet. In

the case of financial markets, these goods and services are financial instruments.

In practice, there are numerous financial instruments traded on financial markets, which can also be referred to as financial assets or securities, among which the most important include money, foreign exchange, deposits, stocks, bonds, and financial derivatives (Erić et al., 2021).

The fundamental question and the main focus of interest for both traders and investors is the price of financial instruments.

Vasiljević (1997, p. 13), in his book, states that "the functions performed by the financial market confer upon it the significance of a segment of the economic system, equal in importance to the product market and the factor market."

The term "efficient market" refers to a situation in which the prices of instruments in financial markets fully reflect all publicly available information about those instruments (Đurković, 2026).

The theoretical framework of this hypothesis incorporates the notion that future events cannot be predicted and, consequently, that price movements cannot be forecasted. However, the question of whether it is possible to predict average price movements is often overlooked. If future ranges of price movements and returns could be anticipated on the basis of historical data and the application of certain statistical methods, this could represent a powerful tool that investors might exploit (Radonjić, 2012, p. 220).

Despite the existence of a large number of scientific studies addressing this issue and encompassing a wide range of financial markets, the efficient market hypothesis has not been sufficiently proven to be valid. Certain studies have demonstrated that younger and less developed markets are less efficient compared to larger and more developed ones (Bećirović & Kozarević, 2018).

Research conducted in previous periods clearly indicates certain deficiencies in financial markets with respect to efficiency, which are referred to as anomalies (Milošević-Avdalović & Milenković, 2017, p. 10).

Shleifer (2000) defines anomalies as patterns of returns or price behavior that cannot be explained by standard models and that are inconsistent with the efficient market hypothesis, as they imply the possibility of achieving above-average returns.

Researchers have identified numerous types of anomalies, among which calendar anomalies are the most prominent.

Certain studies confirm that abnormal returns are, in some cases, associated with holidays, specific days of the week, as well as the ends of weeks, months, or years. One of the most significant calendar anomalies, and one of the most frequently examined in the literature, is the January effect anomaly.

The January effect represents an anomaly in which a large number of stocks generate higher returns compared to returns in other months, thereby defying the "random walk" principle of prices and the efficient market hypothesis (Tabot-Enow, 2024).

This anomaly is commonly explained by the recovery in stock values following declines caused by December sell-offs motivated by tax considerations. On the other hand, the existence of the effect is also often associated with increased trading volume and the purchase of financial instruments at the beginning of the year, as investors reallocate funds from "passive" holdings into investment flows (Haugen & Jorion, 1996).

Financial markets in the countries of the Western Balkans represent young and insufficiently developed markets characterized by a relatively low number of transactions. As previously noted, smaller and less developed markets are often inefficient and more susceptible to anomalies, which constitutes one of the key reasons why these particular markets were selected for analysis.

2.1. REVIEW OF PREVIOUS RESEARCH

Since the peak of the efficient market hypothesis more than half a century ago, researchers have gradually undermined this theoretical framework. Empirical tests have yielded mixed results, some of which indicate the presence of significant anomalies in certain financial markets (Ackert & Deaves, 2009).

Milošević-Avdalović and Milenković (2017) analyze the efficiency of financial markets in the Balkan countries in terms of the presence of the "January effect." Their study encompasses daily data from the financial markets of Serbia, Croatia, Bosnia and Herzegovina, North Macedonia, Montenegro, Romania, and Bulgaria over the period from 2008 to 2014. Panel data and the t-test were employed in the analysis. The results indicate weak support for the efficient market hypothesis in the observed markets, while also revealing that the January effect is present only on the Macedonian Stock Exchange.

Karadžić and Backović Vulić (2011) examine the capital market of Montenegro by analyzing its efficiency through the presence of certain calendar anomalies. The study investigates the following anomalies: the January effect, the holiday effect,

and the turn-of-the-month effect. Daily values of the NEX20 index were used for the period from 2004 to 2010. The findings show that the January effect was present in the market until the onset of the global financial crisis in 2008, as well as the existence of a turn-of-the-month anomaly. It was also established that the holiday effect is not statistically significant in this market.

Filipovski and Tevdovski (2017), in their study, focus on examining calendar effects across ten stock exchanges in Southeast Europe over the period from 2007 to 2014, using regression models and GARCH models with dummy variables. The results indicate that the random walk hypothesis is rejected for all observed exchanges, except for the Sarajevo Stock Exchange. With regard to calendar anomalies, the research identifies a large number of anomalies, with each exchange exhibiting at least two or more such anomalies.

Tkalčević and Kalodera-Schmiedecke (2020), in their analysis of the January effect on the London, New York, and Tokyo stock exchanges, examine securities of selected micro-capitalization companies over the period from 2010 to 2017, employing regression analysis. Their findings suggest that the January effect is not present in the targeted capital markets within the micro-cap segment. However, the authors also propose further research using longer time series and a broader set of companies.

Sajter (2012) analyzes the January effect and the Monday effect on stock exchanges in Serbia, Croatia, and Slovenia from their establishment until 2011, using statistical tests. The results indicate that there is no statistically significant January effect in these markets.

Sahin, Topaloglu, and Ege (2017) examine the January effect on the Istanbul and Bucharest stock exchanges over the period from 2000 to 2014, using daily closing prices and power ratio analysis. The results demonstrate a strong January effect in both observed markets.

Luhan, Novotná, and Obrová (2011) investigate the efficiency of the Prague Stock Exchange in terms of the existence of calendar anomalies. In their study, they analyze stock prices of selected companies over the period from 2007 to 2010 using random walk tests and anomaly tests. The findings indicate that, unlike in other years, the January effect was present in the observed market only in 2007, which may be interpreted as a consequence of the onset of the global economic crisis that immediately impacted financial markets.

Enow (2024) examines the January effect in the Nikkei 225, JSE, CAC 40, DAX, and NASDAQ indices over the period from February 2019 to February 2024 using the F-test. The results show no deviation of January returns from returns in other months across the observed markets.

Based on the analysis of the aforementioned studies, it can be concluded that the results are heterogeneous and that it is not possible to derive a single, universally supported conclusion. The reasons for this are numerous, primarily reflected in the use of different testing methodologies, varying time intervals, and diverse financial markets under consideration. Accordingly, it can be inferred that a detailed and comprehensive analysis is required, employing appropriate statistical tests and sufficiently long time series in order to mitigate the influence of short-term exogenous shocks.

3. METHODOLOGY

As previously stated, this paper examines the existence of the January effect in the financial markets of the Western Balkan countries. The analysis employs, as the primary variables, daily closing values of stock market indices over the period from January 1, 2019 to December 31, 2023. The selected time interval was chosen because it represents the most recent period without significant interruptions in the availability of historical data on official stock exchange websites. Any substantial lack of data would complicate the attainment of relevant results, diminish their validity, and, to some extent, hinder the implementation of the planned methodology. It should also be noted that the observed time period is specific and primarily marked by the COVID-19 pandemic, which had a strong impact on financial markets and resulted in certain disruptions that must be taken into account when interpreting the obtained results.

The data used in the research were obtained from the official websites of the stock exchanges, namely: the Zagreb Stock Exchange (CROBEX), the Belgrade Stock Exchange (BELEX15), the Sarajevo Stock Exchange (SASX-10), the Banja Luka Stock Exchange (BIRS), the Montenegro Stock Exchange (MONEX), and the Macedonian Stock Exchange (MBI10) (Zagreb Stock Exchange, 2023; Belgrade Stock Exchange, 2023; Sarajevo Stock Exchange, 2023; Banja Luka Stock Exchange, 2023; Montenegro Stock Exchange, 2023; Macedonian Stock Exchange, 2023).

Due to insufficient trading volume and a low level of liquidity, the financial market of Albania does not have its own stock market index and lacks a sufficiently long historical data series; therefore, it was not included in the financial analysis (Albanian Securities Exchange, 2026).

The collected daily index data were transformed into logarithmic returns in order to track trends.

The formula used to calculate daily returns is as follows:

$$r_t = I_n \frac{P_{nt}}{P_{nt-1}} x\ 100$$

where:

- r□ - daily return on day t
- ln - natural logarithm
- P□□ - price of financial instrument n on day t
- P□□$_{-1}$ - price of the same instrument n on the previous day (t-1)
- × 100 - converts the decimal return into percentage form for easier interpretation

Subsequently, the analysis was conducted using SPSS software, through which graphical representations of average monthly returns and standard deviations of the observed indices were created. The graphical representation enables easier identification of deviations in the values of average monthly returns and standard deviations in specific months relative to the rest of the year. This approach also facilitates a clearer overview of the relevant data and the identification of potential anomalies within the markets. Particular emphasis was placed on monitoring the behavior of these indicators in January compared to other months of the year.

Following the graphical data analysis, statistical testing of average daily returns for all months of the year was conducted in order to determine their statistical significance, that is, their deviation from zero. For this purpose, the t-test was employed. This test is widely accepted and frequently used in the literature, with advantages including simplicity, clarity of interpretation, and a focus on mean values, which is particularly useful in this context. The t-test is calculated as follows:

$$t = \frac{\bar{X} - \mu}{\frac{\delta}{\sqrt{n}}}$$

where:

- t – test statistic value
- $\bar{x}$ – sample mean
- μ – population mean (assumed value)
- s – sample standard deviation
- n – number of observations in the sample
- √n – square root of the number of observations

The t-test was conducted by analyzing the difference between the average daily returns in January and the returns in other months of the year. A statistically significant difference in average returns would indicate the presence of the January effect anomaly in the observed markets within the selected time interval.

The hypotheses for testing the January effect are defined as follows:

$$H_o: \mu_1 = \mu_2$$

$$H_1: \mu_1 \neq \mu_2$$

where:

- H_0 – null hypothesis
- H_1 – alternative hypothesis
- μ_1 – average return in January
- μ_2 – average return in the remaining months

The initial assumption of the test is that there are no calendar anomalies in the observed stock exchanges in the region, that is, January returns do not differ statistically significantly from returns in the rest of the year. The critical value of the test is 0.05. If the obtained p-value is greater than the critical value, it is considered that there is no statistically significant January effect, thereby confirming the null hypothesis. Conversely, if the obtained p-value is less than the critical value, this indicates a statistically significant deviation, which may be interpreted as the presence of the January effect anomaly, leading to the rejection of the null hypothesis

Table 1: Summarized Statistical Indicators of Daily Returns of Stock Exchange Indices in the Observed Capital Markets

Index	BIRS	SASX10	CROBEX	BELEX15	MONEX	MBI10
N valid	1263	1212	1242	1252	1081	1228
Mean	0.0427	0.0424	0.0307	0.0143	0.0341	0.0458
Skewness	0.628	0.720	-3.901	-0.980	0.033	-2.511

Std. Er. of Skewness	0.069	0.070	0.069	0.069	0.074	0.070
Kurtosis	27.674	8.492	49.304	11.464	172.631	35.742
Std. Er. of Kurtosis	0.138	0.140	0.139	0.138	0.149	0.140
Minimum	-11.219	-4.189	-10.732	-6.183	-23.544	-9.847
Maximum	9.449	6.186	5.622	4.087	23.340	6.791

Source: Author's calculations

At the end of the methodological section, Table 1 presents selected statistical indicators of the daily returns of stock exchange indices in the observed capital markets. The purpose of presenting these data is to facilitate a clearer understanding of the distribution and nature of the data used in the test.

From the table, it can be observed that the number of daily observations used in the analysis varies between 1081 and 1263, which represents a sufficiently large sample to yield reliable results.

The average return over the observed period is positive across all analyzed financial markets, which may be interpreted as an indicator of a favorable investment climate. The skewness values vary across stock exchanges and, therefore, cannot be interpreted uniformly. Financial markets with positive skewness (Sarajevo, Banja Luka, and Montenegro Stock Exchanges), in combination with positive average returns, exhibit larger upward movements than declines, which may be interpreted positively from an investor's perspective. On the other hand, a positive average return combined with negative skewness indicates overall market growth accompanied by occasional downturns.

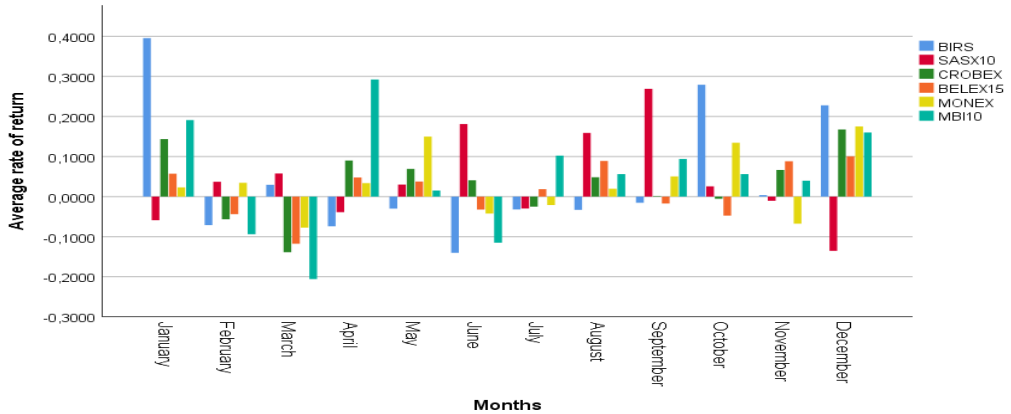
However, when considering market efficiency and the existence of anomalies, most authors agree that a negative skewness coefficient is a characteristic of developed financial markets, and vice versa (Milošević-Avdalović & Milenković, 2017).

Accordingly, the average growth in returns does not necessarily imply anything in the context of the January effect; rather, these data should be analyzed in conjunction with additional analyses of volatility, standard deviation, and the relationships among deviations, which is precisely the purpose of the t-test. It is also important to note certain limitations of the t-test. Primarily, the test assumes that the data are normally distributed. Although it is theoretically designed for small samples, if the data are not normally distributed, the results may be unreliable. In small samples, the test may struggle to detect actual differences, which often represents a significant limitation. Furthermore, extreme values may exert a strong influence on the mean and standard deviation, thereby affecting the test results.

4. INTERPRETATION OF RESULTS

Figure 1 graphically presents the average returns of stock exchange indices by month over the period from January 2019 to December 2023. The figure illustrates the average returns of the analyzed exchanges, as well as the deviations among them.

Figure 1: Average Return of Stock Indices per Month in the Period from 2019 to 2023



Source: Author's calculations

From the presented data, it can be observed that the Banja Luka Stock Exchange index (BIRS) records its highest average returns in January (0.3955), minimal positive average daily returns in

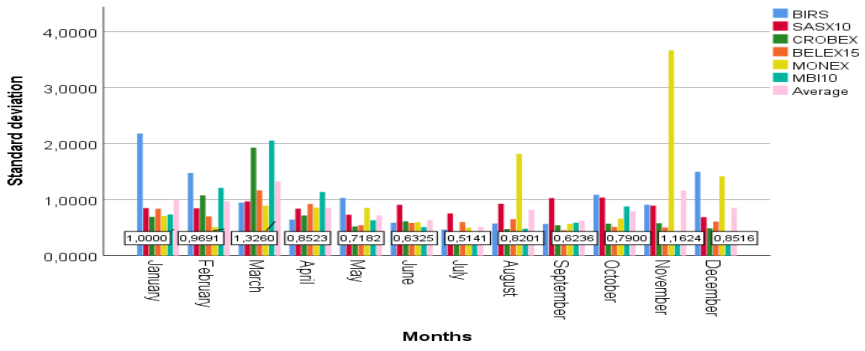
March (0.0295) and November (0.0037), and its lowest returns in June (-0.1403). Overall, the Banja Luka Stock Exchange achieves positive average returns in only five months, while returns are negative in the remaining seven months. The Sarajevo Stock Exchange index (SASX10) records its highest average returns in September (0.2691), June (0.1810), and August (0.1589), while the lowest return is observed in December (-0.135). In total, the Sarajevo Stock Exchange records positive average returns in seven months and negative returns in the remaining five months. The Zagreb Stock Exchange index (CROBEX) records its highest average daily return in December (0.1675), followed by January (0.1435), while the lowest return is recorded in March (-0.1387). Similar to the Sarajevo Stock Exchange, it achieves positive returns in seven months during the observed period. The Belgrade Stock Exchange index (BELEX15) does not exhibit significant fluctuations in average returns; the highest return is recorded in December (0.1004), while the lowest is recorded in March (-0.1176). This exchange, like the previous two, achieves positive average returns in seven months. The Montenegro Stock Exchange index (MONEX) records somewhat better results than the previously mentioned indices, achieving positive average returns in eight months. The highest return is recorded in December (0.1751), while the lowest is recorded in March (-0.0775). The Macedonian Stock Exchange index (MBI10) exhibits significant fluctuations, with the highest average returns recorded in April (0.2921), January (0.1911), and December (0.1600), while the lowest returns are recorded in March (-0.2057) and June (-0.1151). Overall, the Macedonian Stock Exchange achieves the best performance, recording positive returns in nine months of the year.

In the context of the January effect analysis, it can be observed that, with the exception of the Banja Luka Stock Exchange, there is no notable increase in average returns in January compared to other months. However, the statistical significance of this observation is further examined using the t-test. Based on the above results, it can be concluded that the Banja Luka Stock Exchange has the fewest months with positive average returns (five), while the Macedonian Stock Exchange has the highest number. Additionally, a descriptive analysis reveals certain recurring patterns, where specific months exhibit significantly lower or higher average returns compared to others. Four out of the six observed exchanges, Zagreb, Belgrade, Montenegro, and Macedonia, record their lowest average returns in March, while only the exchanges from Bosnia and Herzegovina show positive returns in this month. On the other hand, most exchanges record significantly higher average returns in December compared to other months, with the Zagreb, Montenegro, and Belgrade Stock Exchanges achieving their highest average returns during this month. The only exchange recording a negative average return in December is the Sarajevo Stock Exchange. All of the above suggests the possible existence of certain seasonal anomalies and predictable patterns that are inconsistent with the random walk hypothesis; however, these observations are not statistically confirmed and would require further research for validation.

The following Figure 2 presents the standard deviation of daily returns by month for the indices of the observed stock exchanges over the period from January 2019 to December 2023.

The values represented in the columns of Figure 2 correspond to the average monthly standard deviation in the observed period

Figure 2: The Standard Deviation of the Average Amount per Month in the Period from 2019 to 2023, Stock Indices and the Average Movement of Standard Deviation per Month



Source: Author's calculations

The Banja Luka Stock Exchange records the highest deviations from the average in January (2.1797), February (1.4749), and December (1.4981), with above-average volatility observed in a total of five months. The Sarajevo Stock Exchange exhibits relatively similar standard deviations across months, with a maximum in October (1.0371). Overall, standard deviation values are slightly above average in six months. The Zagreb Stock Exchange records the highest deviation in March (1.9283), while slightly above-average values are also observed in February (1.0763). In all other months, standard deviation values remain below average. The Belgrade Stock Exchange records slight increases in standard deviation above average in April (0.9227) and June (0.5835), while in all other months, standard deviation remains below average. The Montenegro Stock Exchange records standard deviations similar to or below average in most months, with notable deviations in November (3.6660), August (1.8178), and December (1.4177).The Macedonian Stock Exchange records above-average standard deviation in a total of five months, with the highest value observed in March (2.0536).

Overall, the highest standard deviation, both in absolute terms and relative to the average, is recorded by the Montenegro Stock Exchange in November (3.6660). When analyzing average standard deviation values, the highest value is observed in November (1.1624). From the visual representation of standard deviation values, both average and individual, no clear pattern or behavior indicative of an anomaly can be identified.

Following the graphical analysis and its interpretation, a t-test was conducted to examine the existence of the January effect, that is, to determine whether returns in January differ statistically significantly from returns in other months.

Table 2: T-test Results

Stock indices	**Months**	***N***	***Mean***	***Std. Deviation***	***t***	***Sig. (2-tailed)***
BIRS	***January***	*91*	*0.4297*	*2.4717*	1.5901	**0.115**
	Other months	1172	0.0127	1.3888		
SASX10	***January***	*99*	*-0.0589*	*0.8483*	*-1.1971*	**0.2314**
	Other months	1113	0.0514	0.8821		
CROBEX	***January***	*102*	*0.1435*	*0.6930*	*1.4253*	***0.1543***
	Other months	1140	0.0206	0.8453		
BELEX15	***January***	*91*	*0.0573*	*0.8363*	*0.6073*	***0.5437***
	Other months	1161	0.0109	0.6891		
MONEX	***January***	*81*	*0.0229*	*0.7085*	*-0.0763*	***0.9391***
	Other months	1000	0.0350	1.4075		
MBI10	***January***	*94*	*0.1911*	*0.7340*	*1.5791*	***0.1145***
	Oher months	1134	0.0338	0.9421		

Source: Author's calculations

Table 2 presents the most relevant parameters obtained using the t-test. Due to the large number of tables generated through the t-test, only the most important results relevant to the research objective are presented. The obtained results indicate that, for all analyzed stock exchanges, the p-value (Sig. (2-tailed)) exceeds the significance threshold of 0.05, implying that there is no statistically significant difference between returns in January and those in other months.

Based on the above, it can be concluded that the results do not provide empirical support for the existence of the January effect in the analyzed markets, thereby confirming the null hypothesis.

CONCLUSION

The conducted research aimed to determine the existence of the January effect anomaly in the context of financial market efficiency in the countries of the Western Balkans. The study included the presentation and interpretation of daily panel data and the application of the t-test.

The initial hypothesis posited that the January effect anomaly is not statistically significant in the financial markets of the Western Balkans, that is, these markets are efficient in this respect. The obtained empirical results confirm the null hypothesis, indicating that, within the given sample and applied methodology, the January effect was not observed in the analyzed markets during the specified period. Based on these findings, it can be concluded that the targeted financial markets exhibit a certain degree of efficiency in the context of the January effect anomaly. Nevertheless, it is important to acknowledge the limitations of the applied test, as well as the specific characteristics of the selected time interval. For greater robustness of the results, further research should be conducted using longer time series and a combination of different methodological approaches.

A descriptive analysis of the panel data reveals certain simultaneous increases or decreases in returns across all observed financial markets, which may be interpreted as a form of pattern or seasonal anomaly. However, given that this observation has not been statistically confirmed, future research should be directed toward examining other seasonal monthly anomalies, as well as the day-of-the-week effect.

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