

Stock returns on Bucharest Stock Exchange during the second half of December

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Abstract: Several circumstances could influence the returns' behavior on Romanian capital market during the second half of December: the schedules of some payments, announcements about the macroeconomic situation or about the performances of companies, the practices of tax-loss selling and window dressing or the impact of two important public holidays: Christmas and New Year's Eve. This paper investigates the returns of eight indexes from Bucharest Stock Exchange in the period January 2017 – August 2023. Only one of these indexes displayed abnormal low returns during the second half of December. Instead, we found abnormal low returns for seven indexes during the third quarter of December and abnormal high returns for four indexes during the fourth quarter of the same month.

Keywords: Calendar anomalies; second half of December; Romanian capital market

JEL: G40, G10, G14

1. INTRODUCTION

In the last decades, several papers from the field of Behavioral Finance proved the presence of abnormal returns during various time intervals within a calendar month (e.g. Ariel, 1987; Ariel, 1988; Lakonishok and Smidt, 1988; Ziemba, 1991; Kohers and Patel, 1999). Several explanations were formulated for the intramonth calendar anomalies:

- the standardization of some essential payments (salaries, dividends, interest, and principal payments associated to various types of debts etc.);
- announcements about the macroeconomic situation or about the performances of companies that are scheduled to certain within-month time intervals;
- the tax-loss selling, and the window dressing practices etc. (e.g. Branch, 1977; Thaler, R. H., 1987; Jacobs and Levy, 1988; Pettengill and Jordan, 1988; Ritter and Chopra, 1989; Ogden, 1990; Lakonishok et al., 1991; Ogden, 1994; Gerlach, 2007; Nikkinen et al., 2007).

This paper approaches, for the period January 2017 - August 2023, the behavior of stock returns from Bucharest Stock Exchange (BSE) during the second half of December. BSE is an emerging market and during the period of investigation experienced significant turbulences. Some of them were caused by external factors (the COVID-19 pandemic, the Russian invasion of Ukraine, the global energy crisis etc.), while others came from

domestic circumstances (political instability, the acceleration of inflation, the Initial Public Offering for one of the most important Romanian companies - S.P.E.E.H. HIDROELECTRICA S.A., etc.).

The last month of the year has some particularities that could affect the returns from within-month time intervals. It includes a segment from the turn-of-the-year interval when the returns from many financial markets tend to be abnormal (e.g. Roll, 1983; Berges et al., 1984; Ritter, 1988). It also contains two important public holidays: Christmas and New Year's Eve that could influence the investors' mood (Lakonishok and Smidt, 1984; Agrawal and Tandon, 1994; Brockman and Michayluk, 1998; Lahav et al., 2016; Hirshleifer et al., 2020). We study the stock returns from the whole second half of December, but also for two components of this time interval: the third and the fourth quarters of the month. The rest of this paper is organized as it follows: the second part describes the data and methodology employed to investigate the presence of abnormal returns for the second half of December, the third part presents the empirical results, and the fourth part concludes.

2. DATA AND METHODOLOGY

2.1. Data Description

In this investigation about the behavior of stock returns during the second half of December we employ the daily closing values of eight major indexes from BSE: BET, BET-BK, BET-FI, BET-NG, BET-TR, BET-XT, BET-XT-TR and ROTX. The data was provided by BSE for the period mentioned in introduction. For each of eight indexes we compute the logarithmic returns ($r_{i,t}$) using formula:

$$r_{j,t} = [\ln(P_{j,t}) - \ln(P_{j,t-1})] \times 100 \quad (1)$$

in which $P_{j,t}$ and $P_{j,t-1}$ are the closing prices of the index j on the days t and $t-1$, respectively.

The Table 1 reports the descriptive statistics of the eight indexes returns. For all of them we found positive values of means and medians. The turbulences that affected BSE in this period are reflected in the range and in the standard deviation of returns. The results of Jarque-Bera test indicated that no one from the eight indexes' returns followed a normal distribution.

Tab. 1. Descriptive statistics of the returns

Variable	Mean	Median	Min	Max	Std. Dev.	Jarque-Bera test
BET	0.0376	0.0696	-11.8920	6.8169	1.0536	33432.69***
BET-BK	0.0363	0.0787	-9.3876	6.8895	0.9298	30242.81***
BET-FI	0.0302	0.0414	-9.5572	10.3556	0.9476	35258.92***
BET-NG	0.0315	0.0738	-10.4581	5.4087	1.0880	10056.43***
BET-TR	0.0671	0.0930	-11.8572	6.7067	1.0472	34958.10***
BET-XT	0.0345	0.0778	-11.3302	6.4584	0.9900	36825.57***
BET-XT-TR	0.0622	0.0989	-11.3213	6.3944	0.9859	38299.08***
ROTX	0.0438	0.0808	-12.2444	7.0032	1.0769	30693.53***

Note: *** means significant at 0.01 levels.

We employ the Augmented Dickey – Fuller unit root test (Dickey & Fuller, 1979; Dickey & Fuller, 1981) to investigate the stationarity of the eight indexes’ returns. For two variants of this test (with and without constant) we use Akaike (1974) Information Criterion to identify the optimum number of lags. For each index the null hypothesis of a unit root presence in returns was rejected (Table 2).

Tab. 2. Results of the Augmented Dickey – Fuller (ADF) unit root tests

Index	Test without constant		Test with constant	
	Number of lags	Test statistic	Number of lags	Test statistic
BET	14	-9.38057***	14	-9.4499***
BET-BK	14	-9.13089***	14	-9.19864***
BET-FI	14	-8.45471***	14	-8.50755***
BET-NG	11	-10.4772***	11	-10.5124***
BET-TR	13	-9.61162***	13	-9.83504***
BET-XT	14	-9.27686***	14	-9.33962***
BET-XT-TR	14	-9.23927***	14	-9.7376***
ROTX	13	-9.66564***	13	-9.75605***

Note: *** means significant at 0.01 levels.

2.2. Methodology

We investigate the presence of abnormal returns on BSE for three time intervals:

- the second half of December, denoted by [15_{DEC}; 30_{DEC}], an interval that starts in the 15th day of December and it ends in the last trading day of the year;
- the third quarter of December, denoted by [15_{DEC}; 22_{DEC}], an interval that starts in the 15th day of December and it ends in the 22th day of the same month;
- the fourth quarter of December, denoted by [23_{DEC}; 30_{DEC}], an interval that starts in the 23th day of December and it ends in the last trading day of the year.

We identify the abnormal returns using OLS models with dummy variables. In the case of whole second half of December the OLS model has the form:

$$r_{j,t} = \theta_0 + \theta_1 \times D_SH_DEC_t + \sum_{i=1}^n \xi_i \times r_{j,t-i} + \varepsilon_t \tag{2}$$

where:

- θ_0 is a constant term;
- $D_SH_DEC_t$ is a dummy variable associated to the second half of December defined by formula:

$$D_SH_DEC_t = \begin{cases} 1, & \text{if the trading day } t \text{ belongs to } [15_{DEC}; 30_{DEC}] \\ 0, & \text{otherwise} \end{cases}$$

- θ_1 is the coefficient associated to the dummy variable $D_SH_DEC_t$ expressing the difference between the average of returns from [15_{DEC}; 30_{DEC}] and those from the rest of the year;
- ξ_i is a coefficient associated to the i lagged value of the dependent variable;
- n is the number of the lagged value of $r_{j,t}$, chosen by Akaike (1974) Information Criterion;

- ε_t is the error term that follows a normal distribution with a mean of zero and a constant variance h ($\varepsilon \sim N(0, h)$).

When the θ_1 coefficient is statistically significant we could consider that returns from the second half of December are abnormal.

For the third and fourth quarters of December the OLS model has the equation:

$$r_{j,t} = v_0 + v_1 \times D_Q3_DEC_t + v_2 \times D_Q4_DEC_t + \sum_{i=1}^n \xi_i \times r_{j,t-i} + \varepsilon_t \quad (3)$$

where:

- v_0 is a constant term;
- $D_Q3_DEC_t$ is a dummy variable associated to the third quarter of December

defined by formula:

$$D_Q3_DEC_t = \begin{cases} 1, & \text{if the trading day } t \text{ belongs to } [15_{DEC}; 22_{DEC}] \\ 0, & \text{otherwise} \end{cases}$$

- v_1 is a coefficient associated to the dummy variable $D_Q3_DEC_t$ expressing the difference between the average of returns from $[15_{DEC}; 22_{DEC}]$ and those from the rest of the year;

- $D_Q4_DEC_t$ is a dummy variable associated to the fourth quarter of December defined by formula:

$$D_Q4_DEC_t = \begin{cases} 1, & \text{if the trading day } t \text{ belongs to } [23_{DEC}; 30_{DEC}] \\ 0, & \text{otherwise} \end{cases}$$

- v_2 is a coefficient associated to the dummy variable $D_Q4_DEC_t$ expressing the difference between the average of returns from $[23_{DEC}; 30_{DEC}]$ and those from the rest of the year;

- ξ_i , n and ε_t have the same significations as in the equation (2).

When a coefficient corresponding to a dummy variable is statistically significant, we could consider that returns from the time interval associated are abnormal.

We investigate, for each equation, the homoskedasticity and the autocorrelation of the residuals. We employ Breusch - Pagan (1979) test of heteroskedasticity and Breusch-Godfrey LM test for autocorrelation (Godfrey, 1976; Breusch, 1978). When the results of these tests indicated the presence of heteroskedasticity and autocorrelation, we apply Newey-West (1987) corrections on the standard errors and p-values.

3. EMPIRICAL RESULTS

The Table 3 displays the coefficients of equation (2). For seven indexes we obtained values of the θ_1 coefficient that are not statistically significant. For the 8th coefficient, BET-NG, θ_1 has a significant negative value.

Tab. 3. Coefficients of OLS models associated to the second half of December

Index	θ_0	θ_1	Breusch-Pagan test	LM test for autocorrelation
BET	0.0426* (0.0256)	-0.1428 (0.1705)	274.773***	5.978***
BET-BK	0.0381* (0.0225)	-0.0531 (0.1691)	166.062***	8.544***
BET-FI	0.0265 (0.0235)	0.1056 (0.1377)	32.266***	9.995***
BET-NG	0.0409 (0.0268)	-0.2704* (0.1635)	147.239***	5.782***
BET-TR	0.0725*** (0.0256)	-0.1549 (0.1598)	261.977***	7.265***
BET-XT	0.0389 (0.0241)	-0.1246 (0.1567)	274.422***	6.392***
BET-XT-TR	0.0669*** (0.0241)	-0.1369 (0.1527)	264.286***	7.298***
ROTX	0.0493* (0.0263)	-0.1587 (0.1686)	280.151***	5.183***

Notes: Standard errors are within parentheses; Newey-West (1987) corrections were applied on the standard errors and p-values; *** and * mean significant at 0.01 and 0.1 levels, respectively.

The coefficients of equation (3) are reported in the Table 4. For all indexes, except BET-FI, we found significant negative values of the v_1 coefficient. We also obtained, for four indexes (BET, BET-FI, BET-XT and BET-XT-TR) significant positive values of the v_2 coefficient.

Tab. 4. Coefficients of OLS models associated to the third and fourth quarters of December

Index	v_0	v_1	v_2	Breusch-Pagan test	LM test for autocorrelation
BET	0.0426* (0.0253)	-0.5019* (0.1948)	0.3313* (0.1888)	293.602***	5.682***
BET-BK	0.0381* (0.0227)	-0.3147* (0.1982)	0.2922 (0.1931)	192.328***	8.122***
BET-FI	0.0265 (0.0234)	-0.0661 (0.2403)	0.3323** (0.1516)	42.404***	9.920***
BET-NG	0.0409 (0.0264)	-0.5898** (0.2855)	0.1511 (0.2479)	149.172***	5.477***
BET-TR	0.0725*** (0.0252)	-0.4973* (0.1962)	0.2970 (0.1896)	280.775***	6.942***
BET-XT	0.0389 (0.0239)	-0.4545* (0.1976)	0.3107* (0.1585)	299.978***	6.060***
BET-XT-TR	0.0669*** (0.0239)	-0.4523* (0.1962)	0.2794* (0.1540)	289.675***	6.949***
ROTX	0.0493* (0.0259)	-0.5253* (0.3161)	0.3252 (0.2066)	291.919***	4.919***

Notes: Standard errors are within parentheses; Newey-West (1987) corrections were applied on the standard errors and p-values; ***, ** and * mean significant at 0.01, 0.05 and 0.1 levels, respectively.

4. CONCLUSIONS

This investigation didn't identify, for the whole second half of December, abnormal returns on seven from the eight indexes. We found, only from the BET-NG index, which

reflects the evolution of shares prices of companies from the field of energy, abnormal low returns. We could link such different behavior to the global energy crisis impact.

For the two components of the second half of December, the third and the fourth quarters of the last month, we obtained different results. Seven from the eight indexes displayed abnormal low returns. Such evolution could be explained by the reluctance of traders to invest in the stock market in a complex context, before the last days of the year, a time interval known for a high degree of uncertainty. The only index which didn't experience abnormal returns was BET-FI which had in composition six investment funds. Despite the significant turbulences from the capital market, in the period of investigation there appeared some profitable opportunities for investment.

During the fourth quarter of December, four indexes (BET, BET-FI, BET-XT and BET-XT-TR) experienced abnormal high returns. Such results are consistent with an investigation for the turn-of-the-year effect on BSE, for the period July 2012 - August 2017, which concluded that in the last trading days of a year and the first trading days of the next year the stock prices experienced significant increases (Dumitriu and Stefanescu 2017). The euphoria specific to Christmas and New Year's Eve could spread optimism among investors despite the difficult context. Another explanation consists in the reactions of some traders to the decrease of returns during the third quarter of December. They could perceive some stocks as undervalued and they could decide to buy them.

This investigation about stock returns' behavior during the second half of December could be extended to the financial markets from other emerging or developed economies.

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