THE DAY-OF-THE-WEEK EFFECT ON THE ROMANIAN STOCK MARKET

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Abstract

The question whether the stock market shows any anomalies depending on the day of the week has already been extensively discussed in the specialized literature. There are many countries and stock exchanges analyzed. The results differ from period to period and from market to market and no final answers were received during the years of research. This paper's objective is to determine if any day-of-the-week anomaly is present on the Romanian capital market. We envisage a research of the day-of-the-week effect on the Romanian stock market using daily data on equity returns in the period January 2012 -l December 2016 by analyzing the Bucharest Exchange Trading Index (BET). The results show that Monday and Thursday effects are present on the Romanian Stock Exchange.

Keywords: *Efficient Market Hypothesis, Day-of-the-week-effect, Capital markets, Stock returns.*

***JEL classification**: G14*

Introduction

The calendar effect from a stock market perspective is considered to be any anomaly on a specific market that is strictly related to the calendar. These anomalies materialize as a temporal pattern on stock returns that appears in a moment of the day, in a specific day of the week, or in a period of the year (Carvalho and Malaquias, 2012). For example, according to the specialized literature, the weekend effect or the Monday effect appears when the mean returns are significantly lower at the beginning of the week, increasing in the following days (Reilly and Norton 2008). The weekday effect appears when stock returns record a certain pattern in correlation with the days of the week. In case these anomalies are correctly identified, the investors can take advantage and obtain significant higher returns on short periods of time.

1. Literature review

The specialized literature examined, during the past few decades, a large number of calendar anomalies and the results were very different

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depending on region, country or period. The existence of anomalies is a proof of capital market inefficiencies that was first discussed in the 1960s when the specialists considered the markets to be fully efficient. The Efficient Market Hypothesis (EMH) assumes that no investor has any opportunity to obtain abnormal returns by following some trading patterns that are not available to all the investors on the capital market.

The first investigators of the EMH were Fama (1965) and Samuelson (1965). In the following decades, more and more attention was oriented towards this subject and more and more controversial result were found. In 1970, Fama defined the efficient market as "a market with great number of rational, profit-maximizers actively competing, with each trying to predict future market values of individual securities, and where current important information is almost freely available to all participants".

Regarding the calendar effect, the most studied anomalies are the-month-of-the-year effect (the returns are significantly larger in one specific month, usually in January), the-week-of-the-year effect (the returns are significantly larger in one specific week) and the day-of-the-week effect (the returns offered by stocks are significantly different in a specific day, usually Monday – Monday effect). Damodaran (2010) defined the Monday effect as being "in fact a weekend effect, because the bulk of negative returns is manifested in the returns of the Friday closing of and the Monday opening". Cross (1973) and French (1980) were among the first researchers that found that the stock exchange returns on Mondays are significantly lower than the Friday returns.

On the developed countries, the January effect for small companies was found by Horowitz, Loughran and Savin (1996) by using data between 1980 and 1994 from New York Stock Exchange, American Stock Exchange and Nasdaq. Kiymaz and Berument (2003) analyzed the capital markets from US, Canada, Japan and Germany between 1998 and 2003 and found significant positive and negative returns on distinct days depending on the country. Prokorp (2010) reported that no day-of-the-week effect persisted since 2000 on the US stock market. Olson et al. (2015) found that the US stock market returns tend to revert to their mean on Monday so that the day-of-the-week anomaly disappeared on long term between 1975 and 2013.

On the emerging markets, Choudhry (2000) found the day-of-the-week effect is present on some Asian markets. Al-Loughani and Chapell (2001) found the same effect in Kuwait, while Bhattacharya et al. (2003) showed that the Indian stock market has significant positive returns on Thursdays and Fridays. Twenty-one countries were analyzed by Basher and Sadorsky (2006) and only Taiwan, Pakistan and Philippines were found to have recorded day-of-the-week effect. On the other hand, Lin and Yeh (2011) found no day-of-the-week effect on eight large industries in Taiwan. Yan et al. (2016) showed that in Taiwan in 2009-2014, Monday's short selling ratio is significantly larger than Friday's one. According to

Alagidede (2008), Zimbabwe, Nigeria and South Africa recorded daily seasonality of the stock market returns. Ariss et al (2011) analysed the Gulf Cooperation Council countries and the-day-of-the-week effect was obtained in all of them. In 2012, Yunita and Martain analysed the stock markets from Indonesia, Singapore and Malaysia and resulted Friday effect with significant positive return for the markets in Indonesia and Malaysia. According to the study of Haroon and Shah (2014), the Pakistan stock market recorded mixed results as follows: no day-of-the-week effect for the period between 2004 and 2007 but significant presence of negative returns on Mondays and positive returns on Fridays between 2008 and 2011. Mamede and Malaquias (2016) analyzed the anomalies of the Brazilian hedge funds with no redemption restrictions and found that the Monday effect is present between January 2005 and March 2014, with lower returns as compared to any other day of the week

Studies of the Central and Eastern Europe countries found distinct results regarding the-day-of-the-week effect. Patev (2003) showed that Romania and Czech Republic recorded negative Monday effect in the period 1997-2000. Ajayi et al. (2004) found mixed results between 1990 and 2002. Heininen and Pluttonen (2008) analyzed the CEE countries in 1997-2008 and Romania was not among the countries with significant day-of-the-week effect or month-of-the-year effect. Rakesh and Francesco (2010) found evidence of the effect for 1999-2009 only in Slovenia, while the analyses comprised also Poland, Hungary, Czech Republic, Slovakia, Romania, and Bulgaria. Guidi, Gupta and Maheshwari (2010) found that no random walk process is followed by the capital markets from Central and Eastern Europe (Poland, Hungary, the Czech Republic, Slovakia, Romania, Bulgaria, and Slovenia) by analyzing daily data between 1999 and 2009. Still, no day-of-the-week effect is meaningful in most of the countries, including Romania. But, Romanian stock market recorded significant Monday effect on volatility.

Zhang et al. (2017) analyzed day-of-the-week effect in 28 stock markets from 25 countries (13 emerging markets and 12 developed countries) between 1990 and 2016. They found week-of-the-day anomaly being present in all the analyzed countries, some of them recording the Monday effect, others having Tuesday, Wednesday or other day-of-the-week anomalies.

Only few additional studies discuss the Romanian market. Stancu and Geambasu (2012) analyzed data between 2002 and 2010 and proved the existence of January effect on the Bucharest Stock Exchange, a sign of market inefficiency. Balint and Gica (2012) analyzed two data samples for the period before the financial crisis (2003-2007) and during the financial crisis (2008-2010). They found that the January effect was significant for the pre-crisis period, while for the second sample just the returns of the companies with the smallest capitalization recorded January anomalies.

Diaconasu et al. (2012) concluded that no Monday or January effects were present on the Romanian stock market between 2000 and 2011, still a Thursday effect is significant. Tilica and Oprea (2014) found, using daily data between 2005 and 2011, that a Friday effect is present on the Bucharest Stock Exchange, when stock returns are significantly higher than in other days of the week. Still, these anomalies were not caused by the Romanian market but by the global market risk. On the same line, the article published by Dumitru and Stefanescu (2010) analyzing the Romanian foreign exchange market concluded that different day-of-the-week effect were present between 2005 and 2010 as a consequence of the adhesion of Romanian to the European Union and of the global crisis.

2. Data and Methodology

The present study uses the daily closing prices from 1st of January 2012 to 31st of December 2016 except for official holidays for the Bucharest Exchange Trading Index (BET). The index is value-weighted and is provided by the Bucharest Stock Exchange.

Because, according to EMH, an anomaly is corrected on a short period of time, six different samples will be used: one for the entire period and five for each year.

- Sample 1: all the daily data from 1st of January 2012 to 31st of December 2016, 1,255 observations;
- Sample 2: all the daily data from 1st of January 2012 to 31st of December 2012, 249 observations;
- Sample 3: all the daily data from 1st of January 2013 to 31st of December 2013, 251 observations;
- Sample 4: all the daily data from 1st of January 2014 to 31st of December 2014, 250 observations;
- Sample 5: all the daily data from 1st of January 2015 to 31st of December 2015, 251 observations;
- Sample 6: all the daily data from 1st of January 2016 to 31st of December 2016, 254 observations.

To test the existence of the day-of-the-week anomaly on BET Index, the regression used is the following:

$$r_t = \sum_{k=1}^{5} \alpha_k D_{kt} + e_t \quad \textbf{(1)}$$

Where

- r_t is the return on day t;

- D_{kt} is the dummy for each day of the week, k (k for Monday = 1; Tuesday = 2; Wednesday = 3; Thursday = 4; Friday = 5); for example, if t is a Monday, D_1 is one, D_2, D_3, D_4 and D_5 are zero;
- α_k is the dependent variable to be determined using the regression (1) and represent the day-of-the-week mean return for the analyzed period
- e_t is the error term of the regression;

The null hypothesis of the regression is that the dummy coefficients are equal for each day of trading for each sample:

$$H_0 : D_1 = D_2 = D_3 = D_4 = D_5 = 0$$

In case the null hypothesis is invalidated, it follows that at least one day in a week presents abnormal returns as compared to the rest of the days of the week and the market is inefficient.

The regression will be used for each of the six predefined samples. We expect that, in case the day-of-the-week anomaly is detected in one specific year, it will be corrected in the next period of time.

The daily return r_t is computed as:

$$r_t = (p_t / p_{t-1}) - 1$$

Where p_t and p_{t-1} are the closing prices of the BET index from the day t and for the day $t-1$, respectively.

After obtaining the results from the first regression, a second one will be implemented to determine if the abnormal returns are true and if additional significant returns appear. For example, in case the returns on Mondays appear to be abnormal, the Monday effect regression will be used. The same will apply for any other day of the week as the below regressions indicate.

Monday Effect: $r_{Mt} = \beta_0 + \beta_1 D_M$

Tuesday Effect: $r_{Tt} = \beta_0 + \beta_1 D_T$

Wednesday Effect: $r_{Mt} = \beta_0 + \beta_1 D_W$ **(2)**

Thursday Effect: $r_{THt} = \beta_0 + \beta_1 D_{TH}$

Fridaay Effect: $r_{Ft} = \beta_0 + \beta_1 D_F$

where:

- β_0 is the intercept and represents the average returns on Mondays for the Monday effect; the same will apply for any other day of the week;
- β_1 represent the difference between the returns on Mondays (or other days of the week at which the regression refers) and the returns on each of the rest of the days in a week;

The null hypothesis is: $\beta_1 = 0$

3. Empirical results

Table 1 presents the main statistics of the daily returns of BET index for each of the samples.

Table 1. Daily returns of the Bucharest Exchange Trading Index (BET)

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Sample 1: 2012-2016					
Observations	244	254	252	252	254
Mean	-0,096	0,063	0,044	0,143	0,055
Standard deviation	1,042	0,767	0,778	0,848	0,826
Skewness	-1,813	0,714	-0,343	0,184	-0,572
Kurtosis	8,148	2,131	1,131	3,852	3,734
Sample 2: 2012					
Observations	48	49	50	52	51
Mean	-0,171	0,156	0,048	0,187	0.133
Standard deviation	1,275	0,851	0,988	1,013	1.034
Skewness	-0,827	0,568	-0,704	-0,470	-1.215
Kurtosis	2,259	2,438	1,234	3,569	5.240
Sample 3: 2013					
Observations	50	50	49	50	52
Mean	0,057	0,020	0,113	0,208	0,078
Standard deviation	0,643	0,824	0,780	0,797	0,681
Skewness	-0,090	0,104	0,394	1,297	0,902
Kurtosis	-0,589	0,021	1,282	4,403	2,335
Sample 4: 2014					
Observations	49	52	50	49	50
Mean	0,030	0,022	0,013	0,076	0,049
Standard deviation	0,909	0,667	0,745	0,866	0,751
Skewness	-1,062	-0,012	-0,656	0,218	0,056
Kurtosis	5,873	1,167	0,300	4,728	0,066
Sample 5: 2015					
Observations	49	51	52	50	49
Mean	-0,143	-0,036	0,010	0,142	0,035
Standard deviation	1,179	0,747	0,660	0,598	0,763
Skewness	-3,025	1,459	-0,018	0,063	-0,254
Kurtosis	15,178	4,370	-0,051	-0,436	0,344
Sample 6: 2016					
Observations	48	52	51	51	52

Mean	-0,246	0,155	0,038	0,100	-0,022
Standard deviation	1,089	0,750	0,710	0,928	0,879
Skewness	-2,081	1,486	-0,311	0,358	-0,883
Kurtosis	7,184	3,670	0,638	3,274	4,530

All the returns were multiplied by 100 due to their small size..

Table 2 presents the results obtained by using regression (1). It results that

- For Sample 1 covering the entire analyzed period between 2012 and 2016, the Monday effect is present at a confidence level of 90% meaning that the returns obtained on Mondays are significantly smaller compared to the returns obtained in other days of the week; when the subsamples are analyzed, the effect is observable only for Sample 6 covering the year 2016;
- The Thursday effect is observed for the Sample 1 for 2012-2016 at a confidence level of 95%, with mean returns significantly larger than those recorded in the other days of the week; but no significant findings appear for the rest of the samples with the exception of year 2013 which shows similar results.

Table 2. Test for the day-of-the-week effect on the Romanian capital market

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**F-statistic**
Sample 1: 2012-2016						
Mean	-0,096	0,063	0,044	0,144	0,055	
t-stat	-1,751**	1,173	0,816	2,653*	1,015	2,635*
p-value	0,080	0,241	0,414	0,008	0,310	
Sample 2: 2012						
Mean	-0,171	0,156	0,048	0,187	0,133	
t-stat	-1,139	1,052	0,326	1,300	0,916	1,007
p-value	0,256	0,294	0,745	0,195	0,361	
Sample 3: 2013						
Mean	0,057	0,020	0,113	0,208	0,078	
t-stat	0,539	0,191	1,062	1,966*	0,756	1,179
p-value	0,590	0,848	0,289	0,050	0,450	
Sample 4: 2014						
Mean	0,030	0,022	0,013	0,076	0,049	
t-stat	0,269	0,201	0,118	0,672	0,436	0,154
p-value	0,788	0,841	0,906	0,502	0,663	
Sample 5: 2015						
Mean	-0,159	-0,036	0,010	0,142	0,035	
t-stat	-1,361	-0,318	0,088	1,234	0,299	0,714
p-value	0,175	0,751	0,930	0,219	0,765	
Sample 6: 2016						
Mean	-0,246	0,155	0,038	0,100	-0,022	
t-stat	-1,940**	1,273	0,312	0,810	-0,182	1,234
p-value	0,053	0,204	0,756	0,419	0,856	

All the mean values were multiplied by 100 due to their small size.
*denotes significant at 5%; **denotes significant at 10%

Table 3 presents the conclusions after analyzing the regression (2). The obtained results are:

- For the entire period between 2012 and 2016, the difference between the mean Monday return and average returns through all the other days of the week is significantly smaller at a confidence level of 95%; the same is true for Sample 2 and Sample 6 at a confidence level of 90% and 95%, respectively;
- The Thursday effect is present for 2012-2016 with significantly higher returns on Thursdays than on the other days of the week at a confidence level of 95%, but no similar results are obtained for the five sub-periods.

Table 3. Test for the day-of-the-week effect on the Romanian capital market

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Sample 1: 2012-2016					
β_0	0,076	0,037	0,042	0,017	0,040
t-stat	2,828*	1,382	1,562	0,646	1,461
β_1	-0,172	0,026	0,002	0,126	0,015
t-stat	-2,820*	0,424	0,028	2,079*	0,248
Sample 2: 2012					
β_0	0,132	0,053	0,080	0,044	0,058
t-stat	1,809**	0,728	1,087	0,591	0,790
β_1	-0,302	0,103	-0,032	0,144	0,075
t-stat	-1,821**	0,621	-0,195	0,887	0,459
Sample 3: 2013					
β_0	0,105	0,114	0,091	0,067	0,100
t-stat	1,991*	2,167*	1,730**	1,280	1,883**
β_1	-0,048	-0,094	0,023	0,141	-0,021
t-stat	-0,405	-0,795	0,191	1,197	-0,182
Sample 4: 2014					
β_0	0,040	0,042	0,044	0,029	0,035
t-stat	0,715	0,751	0,791	0,515	0,631
β_1	-0,009	-0,020	-0,031	0,047	0,014
t-stat	-0,074	-0,162	-0,247	0,378	0,110
Sample 5: 2015					
β_0	0,037	0,008	-0,004	-0,037	-0,010
t-stat	0,649	0,136	-0,069	-0,641	-0,171
β_1	-0,196	-0,044	0,014	0,179	0,045
t-stat	-1,512	-0,345	0,110	1,393	0,344
Sample 6: 2016					
β_0	0,068	-0,029	0,001	-0,015	0,016
t-stat	1,110	-0,474	0,014	-0,234	0,262

β_1	-0,314	0,184	0,037	0,114	-0,038
t-stat	-2,236*	1,346	0,270	0,825	-0,280

The intercepts and the coefficients were multiplied by 100 due to their small size.
*denotes significant at 5%
**denotes significant at 10%

The results obtained by using the both models are in accordance with some of the articles already published on the field like Patev (2003) and partially in accordance with Diaconasu et al. (2012) who found no Monday effect but Thursday effect in place.

Conclusions

This paper's objective was to determine whether a day-of-the-week effect is present on the Romanian stock market. Two different models were used for consistency. After analyzing a five-year period and each year separately, the results indicate that two effects are present on the market, namely the Monday and the Thursday effect.

The mean Monday returns for 2012-2016 are significantly lower than on the other days of the week, while on Thursday, the opposite effect is observed. When analyzing the sub-periods, the two regressions used provide distinct results with the exception of year 2016 when the Monday effect was present.

As a result, we conclude that Monday and Thursday effects are present on the Romanian stock market for the period 2012-2016; regarding the one-year sub-samples, the Monday effect is observed only in Sample 6 (covering 2016), but no grounded results were obtained for the rest of the sub-periods.

In conclusion, despite the fact that the Romanian stock market recorded a significant evolution in the last years if referring to both transaction volumes and number of companies listed on Bucharest Stock Exchange, through this paper we proved that anomalies continue to be present causing abnormal returns. As a result, the Romanian capital market continues to be informationally inefficient.

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