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Changes in the stocks prices behavior before and after the public holidays: case of Bucharest Stock Exchange

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Abstract
Very often, the holiday effects are studied only for the first day before and for the first day after any public holiday. Beside these traditional forms of the holiday effects it was revealed an extended one, which refers to the abnormal stocks returns occurring in intervals, containing some days before and some days after public holidays. This paper approaches the persistence in time of the traditional and extended holiday effects on the Romanian capital market. We investigate these calendar effects by employing the daily values of four important indexes from the Bucharest Stock Exchange during three periods: one relative quiet, from September 1997 to December 2006, one turbulent, from January 2007 to December 2012 and another relative quiet period, from January 2013 to May 2018. The traditional holiday effects were present during the first two periods but they disappeared in the third one. Instead, we found that extended holiday effects were more persistent in time although they seemed sensitive to the capital market turbulences.

Keywords: calendar anomalies, Romanian capital market, holiday effects, quiet and turbulent times;

1. Introduction

In the last decades, several researches revealed the changes experienced by some important calendar anomalies. For many capital markets, some forms of the stock returns seasonality have weakened, disappeared or even gone to reverse (see, for example, Tan & Tat, 1998; Chong et al., 2005; Worthington, 2010; Dumitriu et al., 2012). Such evolutions could be seen as confirmations of the Dimson & Marsh (1999) Murphy's Law on market anomalies which stipulates that the decline of a calendar effect starts soon after it became well known among investors. Some studies associated the dynamics of the calendar effects to life cycles in which, after a peak, the seasonality goes inevitably to decline (Schwert, 2003; Marquering et al., 2006; Olson et al., 2010).

From a pragmatic perspective, the stability of calendar effects is a key factor of the trading strategies based on the knowledge about stock markets' seasonality (Barberis & Thaler, 2003; Lucey & Pardo, 2005). Such knowledge allows investors to identify the moments when the returns are expected to be much higher or lower than the averages. However, those trading strategies will become ineffective if seasonality declines or goes to reverse.

The persistence in time of a calendar effect is an important aspect in the dispute between two major theories of the financial markets: Fama (1970) Efficient Market Hypothesis (EMH) and the Behavioral Finance (BF). According to EMH, the information about past evolutions of the financial markets, such as their seasonality, couldn't be useful in designing successful trading rules. From the BF perspective, the potential profitability of strategies based on calendar effects could be used as an argument against EMH (Rozeff & Kinney, 1976; Barberis & Thaler, R., 2003). However, such arguments are contestable if the calendar effects are declining in time (Fama & French, 1996; Fama, 1998).

The financial markets literature offered several explanations for the changes that occur in the calendar anomalies. The structural transformations experienced by a capital market could have a significant impact on the stock returns seasonality (Schwert, 2003; Chong et al., 2005). For the emerging markets, the increasing influence of the developed markets could affect the calendar anomalies. From the EMH perspective, a calendar anomaly is only a temporary phenomenon so its decline is inevitable. Sometimes, when a financial market passed from a relative quiet period to a turbulent one, there are calendar anomalies that disappeared (see, for example, Holden et al., 2005; Lu et al., 2016).

The holiday effects, which consist in abnormal stock returns around public holidays, are among the best known calendar anomalies. There are two main forms of this calendar effect:

- the pre-holiday effect, associated to the days before public holidays;
- the post-holiday effect, referring to the days that follow public holidays.

Holiday effects were among the first calendar anomalies detected on the stock prices evolutions. Lakonishok & Smidt (1988) studied the evolution of Dow Jones Industrial Average, from the New York Stock Exchange, during the period of 1897-1986 and they revealed unusually high returns on the days around public holidays. Their results were confirmed by later researches (see, for example, Pettengill, 1989; Ariel, 1990; Liano et al., 1992).

In the last decades, studies on investors' behavior revealed some circumstances responsible for the holiday effects. The spirit of holiday could induce an optimist mood to the investors, making them to buy stocks before and after public holidays (Brockman & Michayluk 1998; Vergin & McGinnis 1999; Lahav et al., 2016). The investors' decisions could be also affected by the uncertainty regarding the events that could occur during public holidays (Meneu & Pardo, 2004). In the case of some non-secular public holidays, the mood of investors could be affected by the religiosity heightening (Canepa & Ibnrubbian, 2014; Al-Ississ, 2015; Satt, 2016).

Most of the empirical researches on holiday effects studied this calendar anomaly only for one day before and one day after public holidays. There were also investigations on "the extended holiday effects" referring to the abnormal stock prices behaviors during more days adjacent to public holidays (see, for example, Rozeff & Kinney, 1976; Roll, 1983; Ariel, 1990; Yaktrakis & Williams, 2010; Wu, 2013; Casalin, 2018). There are some arguments in favor of such approaches. First, the spirit of holiday could be present for more than one day before and one day after a public holiday. Second, some investors prefer to deal early with the risks associated to the events that could occur during public holidays. Third, the religiosity heightening could start many days before a non-secular public holiday and it could last many days after.

In this paper we approach the persistence in time of extended holiday effect on the Bucharest Stock Exchange (BSE). We study this calendar anomaly for a period containing four working days before and four working days after each public holiday. Our investigation covers three periods:

- a pre-adhesion period, from January 1997 to December 2006 (in January 2007, Romania became member of the European Union);
- a crisis period, from January 2007 to December 2012;
- a post-crisis period, from January 2013 to May 2018.

The first and the third periods could be considered as relative quiet, while the second was marked by the turbulences caused by the global crisis. By comparisons, we intend to find out if extended holiday effect is sensitive to external turbulences.

The rest of this paper is organized as it follows: the second part briefly outlines the literature about holiday effects, the third part describes data and methodology employed in this investigation, the fourth part presents empirical results and the fifth part concludes.

2. Literature Review

The presence of the holiday effects was identified on many developed markets and emerging markets. Ziemba (1991) revealed significant pre-holiday effects on the Japanese capital markets between 1949 and 1988. Cadsby & Ratner (1992) studied the share prices behaviors for a group of developed markets during the period of 1962 -1989 and they identified abnormal high returns, for the days preceding public holidays, for the stock exchanges from Canada, Japan, Hong Kong and Australia. Meneu and Pardo (2004) investigated the presence of a pre-holiday effect in some important individual stocks of the Spanish Stock Exchange, which are also traded in both New York Stock Exchange and Frankfurt Stock Exchange. Their results indicated high abnormal returns on the trading day prior to holidays. Marrett & Worthington (2007) investigated the stock returns of some Australian industries for the period 1996 – 2006 and they detected pre-holiday effects but no significant post-holiday effect.

There are many studies that approached the holiday effects presence on the emerging markets. Mitchell & Ong (2006) analyzed the seasonality of four indexes from China's stock markets in the period 1990 - 2002. Their results revealed significant higher-than-normal returns occurring on China's stock markets before the public holidays, especially before the Chinese Lunar New Year, and also significant abnormal, both positive and negative, returns after the public holidays.

Alagidede (2008) investigated seven of the stock markets from seven African countries and he found pre-holiday effects only for one of them, South-Africa. Dodd & Gakhovich (2011) studied stock returns for 14 emerging markets from Central and Eastern European countries for periods starting in 1990s and ending in 2010. For most of these countries they found pre and post-holiday effects. Dumitriu et al. (2011) investigated the traditional holiday effects on six indexes from BSE for the period January 2007 - September 2011. They found post-holiday effects for six indexes and pre-holiday effects only for four indexes.

To our knowledge, until now, there were no attempts to investigate the persistence in time of both traditional and extended holiday effect on the Romanian capital market. The results of this investigation could be useful in revealing some characteristics of extended holiday effect on emerging markets.

3. Research Methods

3.1. Data description

In this investigation about the extended holiday effect on the Romanian capital market we employ daily closing values of four indexes from BSE: BET, BET-FI, BET-XT, BET-NG. As we mentioned before, we use three sub-samples of data, two associated to relative quiet periods and one to a turbulent period. The three sub-samples and the composition of the indexes are presented in the Table 1.

Table 1. Compositions and sub-samples of the BSE indexes

Index	Composition	First sub-sample	Second sub-sample	Third sub-sample
BET	the shares of most liquid 10 companies	From	From	From

Index	Composition	First sub-sample	Second sub-sample	Third sub-sample
	listed on the BSE regulated market	19-Sep-97 to 19-Dec-06	3-Jan-07 to 28-Dec-12	3-Jan-13 to 18-May-18
BET-FI	the shares of the five investment funds (SIFs) established in 1993 to facilitate the privatization of the Romanian economy	From 31-Oct-00 to 19-Dec-06	From 3-Jan-07 to 28-Dec-12	From 3-Jan-13 to 18-May-18
BET-XT	the most liquid 25 shares traded on the BSE, including SIFs	x	From 3-Jan-07 to 28-Dec-12	From 3-Jan-13 to 18-May-18
BET-NG	the shares of companies which have the main business activity located in the energy sector and the related utilities	x	From 3-Jan-07 to 28-Dec-12	From 3-Jan-13 to 18-May-18

Source: Bucharest Stock Exchange

For each index we compute the logarithmic returns ($r_{i,t}$) using the formula:

$$r_t = [\ln(P_t) - \ln(P_{t-1})] \times 100 \quad (1)$$

where P_t and P_{t-1} are the closing prices of an index on the days t and t-1, respectively.

The Table 2 reports the descriptive statistics of the four indexes returns for the three sub-samples. They have only positive means for the first and third sub-samples, associated to relative quiet periods and only negative means for the second sub-sample, associated to a turbulent period. The standard deviation values of the four indexes returns are much larger for the second sub-sample comparing to the other two sub-samples. With a single exception (the return of BET-FI for the first sub-sample) the returns have negative skewness. The values of the excess kurtosis indicate, for all three sub-samples, leptokurtic distributions of the indexes returns. Jarque-Bera tests indicate, for all sub-samples, that returns are not normal distributed.

Table 2. Descriptive statistics of the returns

Index	Mean	Median	Std. Dev.	Skew.	Ex. Kurt.	Jarque-Bera test
First sub-sample						
BET	0.090	0.053	1.736	-0.145	5.879	3328.75***
BET-FI	0.276	0.146	2.331	0.227	3.663	863.78***

Index	Mean	Median	Std. Dev.	Skew.	Ex. Kurt.	Jarque-Bera test
Second sub-sample						
BET	-0.028	0.035	1.954	-0.525	6.106	2416.55***
BET-FI	-0.059	0.000	2.813	-0.190	5.536	1938.93***
BET-XT	-0.048	0.032	2.102	-0.465	5.517	1969.56***
BET-NG	-0.031	-0.014	2.043	-0.368	8.676	4769.50***
Third sub-sample						
BET	0.036	0.037	0.781	-0.709	7.037	2894.44***
BET-FI	0.030	0.011	0.810	-0.594	8.240	3893.2***
BET-XT	0.009	0.022	0.830	-0.699	6.334	2363.37***
BET-NG	0.035	0.040	0.741	-0.856	8.345	4075.78***

Note: *** means significant at 0.01 level.

In order to avoid the spurious regressions we investigated the indexes returns stationarity. We use the classic Augmented Dickey – Fuller (ADF) unit root test (Dickey & Fuller, 1979; Dickey & Fuller, 1981) with two variants:

- with an intercept and no trend;
- with an intercept and trend.

On the regressions of these tests we chose the number of lags based on Akaike Information Criteria (Akaike, 1971). The results of ADF tests, presented in the Table 3, indicate that all returns are stationary for all the sub-samples.

Table 3. Results of the ADF tests

Parameter/Index	With an intercept and no trend		With an intercept and trend	
	Nr. of lags	Test statistic	Nr. of lags	Test statistic
First sub-sample				
BET	15	-29.925***	15	-30.0340***
BET-FI	15	-12.322***	15	-12.323***
Second sub-sample				
BET	15	-7.9705***	15	-7.997***
BET-FI	15	-12.960***	15	-12.989***
BET-XT	15	-7.8292***	15	-7.879***
BET-NG	15	-10.905***	15	-10.916***
Third sub-sample				
BET	15	-23.293***	15	-23.289***
BET-FI	15	-18.287***	15	-18.319***
BET-XT	15	-23.644***	15	-23.639***

Parameter/Index	With an intercept and no trend		With an intercept and trend	
	Nr. of lags	Test statistic	Nr. of lags	Test statistic
BET-NG	14	-24.364***	14	-24.355***

Note: *** means significant at 0.01 level.

The Romanian capital market is closed during some secular (Romanian Principalities Unification Day, Labor Day, Children's Day, National Day, New Year's Day etc.) and religious (Orthodox Easter, Orthodox Pentecost, Assumption of Virgin Mary, St Andrew's Day, Christmas etc.) public holidays. Over the years, the rules of BSE regarding public holidays suffered changes. For example, until 2006, the transactions were suspended every year for a period that started some days before the Christmas and it ended in the first days of next year (Dumitriu & Stefanescu, 2017). In order to investigate the extended holiday effects we follow Casalin (2018) method by defining three categories of dummy variables associated to a number of j working days before and after each public holiday. The first category refers to the dummy variables ($DH_{j,t}$) associated to symmetrical intervals of j days preceding and j days following public holidays [-j; +j]:

$$DH_{j,t} = \begin{cases} 1, \ if\ the\ day\ t\ belongs\ to\ the\ interval\ [-j;+j] \\ 0, \ otherwise \end{cases} \quad (2)$$

In order to find the amplitude of extended holiday effect we use different values of j, from 1 to 4.

The second category of dummy variables is related to the days that precede public holidays ($DBH_{j,t}$). They are defined by the relation:

$$DBH_{j,t} = \begin{cases} 1, \ if\ the\ day\ t\ is\ j\ working\ days \\ before\ a\ public\ holiday \\ 0, \ otherwise \end{cases} \quad (3)$$

Finally, the third category of dummy variables is associated to the days that follow public holidays ($DAH_{j,t}$), being defined by the relation:

$$DAH_{j,t} = \begin{cases} 1, \ if\ the\ day\ t\ is\ j\ working\ days \\ after\ a\ public\ holiday \\ 0, \ otherwise \end{cases} \quad (4)$$

3.2. Methodology

We try to identify extended holiday effects by performing regressions with the three categories of dummy variables described before. We employ the first one ($DH_{j,t}$) in regressions with the form:

$$r_t = \alpha + \beta_j \times DH_{j,t} + \varepsilon_t \quad (5)$$

where:

- α is the intercept term which captures the mean of the returns from the days that are not included in the interval [-j; +j];
- β_j is the slope term which indicate the mean of excess returns of the days from the [-j; +j] interval relative to the other days (equal to the differences between the average of returns of the days from [-j; +j] interval and returns of the other days);

- ε_t is the error term.

On the results of this regression we test the null hypothesis H_0: $\beta=0$ against the alternative hypothesis that β is significantly different from 0. The rejection of the null hypothesis indicates the presence of extended holiday effects. As we mentioned before, we perform these regressions for different lengths associated to the interval [-j; +j] of extended holiday effects ($1 \le j \le 4$).

We also employ the second and the third categories of dummy variables ($DBH_{j,t}$ and $DAH_{j,t}$) in a regression with the equation:

$$r_t = \gamma + \sum_{j=1}^{4} \lambda_j \times DBH_{j,t} + \sum_{j=1}^{4} \mu_j \times DAH_{j,t} + \omega_t \quad (6)$$

where:

- γ is the intercept term which captures the mean of returns from the days that are not associated to $DBH_{j,t}$ and $DAH_{j,t}$ dummy variables;
- λ_j and μ_j are the coefficients associated to $DBH_{j,t}$ and, respectively, $DAH_{j,t}$ dummy variables reflecting the mean of excess returns of the associated days relative to the other days;
- ω_t is the error term.

For each coefficient we test the null hypothesis that its value is not significantly different from 0. The rejection of this hypothesis suggests the presence of an abnormal return on the day associated to the dummy variable's coefficient.

For each regression, we investigate the residuals by employing Breusch-Godfrey (1980) Lagrange multiplier tests and, respectively, White (1980) tests. If the two tests indicate the presence of the serial correlations or heteroskedasticity we apply Newey-West (1994) corrections to the standard errors and the p-values associated to the regressions coefficients.

4. Empirical Results

4.1. Results for the first sub-sample

The estimated coefficients of regressions for the four intervals of adjacent days to public holidays for the first sub-sample are presented in the Table 4. In the case of BET index we found, for each interval, positive significant values of β_j coefficients (the most significant value was for the interval [-2; +2]). Instead, we obtained no significant value of any β_j for the index BET-FI.

Table 4. Parameters of the regressions for the four intervals of adjacent days to public holidays (the first sub-sample)

Index	BET	BET-FI
Regressions with dummy variable DH_1 (interval [-1; +1])		
α	0.077**	0.262***
	(0.036)	(0.060)
β_1	0.575*	0.469
	(0.316)	(0.536)
Regressions with dummy variable DH_2 (interval [-2; +2])		
α	0.066*	0.248***
	(0.037)	(0.060)

Index	BET	BET-FI
β_2	0.506***	0.538
	(0.195)	(0.339)
Regressions with dummy variable DH_3 (interval [-3; +3])		
α	0.067*	0.250***
	(0.037)	(0.061)
β_3	0.337**	0.325
	(0.167)	(0.263)
Regressions with dummy variable DH_4 (interval [-4; +4])		
α	0.068*	0.241***
	(0.037)	(0.061)
β_4	0.232*	0.338
	(0.129)	(0.235)

Notes: Standard errors in round brackets; Newey-West (1994) corrections were applied to all standard errors and p-values; ***, ** and * mean significant at 0.01, 0.05, and 0.1 levels, respectively.

The Table 5 reports the estimated coefficients of the regressions with DBH_j and DAH_j dummy variables (associated to specific days before and after the public holidays). For BET index we found a positive significant value of μ_1 coefficient (corresponding to DAH_1 dummy variable which is associated to the first working day after a public holiday). For BET-FI index we obtained a positive significant value of λ_4 coefficient (corresponding to the DBH_4 dummy variable which is associated to the fourth working day before a public holiday).

Table 5. Parameters of the regressions for the adjacent days to public holidays (the first sub-sample)

Index	BET	BET-FI
γ	0.067*	0.242***
	(0.037)	(0.062)
λ_4	0.085	1.432*
	(0.344)	(0.833)
λ_3	-0.571	-0.450
	(0.375)	(0.554)
λ_2	0.354	0.615
	(0.281)	(0.517)
λ_1	0.299	0.060
	(0.336)	(0.506)
μ_1	0.894*	0.913
	(0.462)	(1.097)
μ_2	0.463	0.610

Index	BET	BET-FI
	(0.489)	(0.480)
μ_3	0.595	0.224
	(0.559)	(0.628)
μ_4	-0.147	-0.748
	(0.287)	(0.528)

Notes: Standard errors in round brackets; Newey-West (1994) corrections were applied to all standard errors and p-values *** and * mean significant at 0.01 and 0.1 levels, respectively.

4.2. Results for the second sub-sample

Estimated coefficients of the regressions associated to intervals of the adjacent days to the public holidays are presented in the Table 6. We found no significant value of β_1 coefficients, but significant positive values of the β_2, β_3 and β_4 coefficients (the larger value were, again, those of β_2 coefficients).

Table 6. Parameters of regressions for the four intervals of adjacent days to the public holidays (the second sub-sample)

Index	BET	BET-FI	BET-NG	BET-XT
Regressions with dummy variable DH_1 (interval [-1; +1])				
α	-0.040	-0.075	-0.046	-0.056
	(0.051)	(0.073)	(0.054)	(0.055)
β_1	0.252	0.380	0.373	0.206
	(0.288)	(0.449)	(0.264)	(0.281)
Regressions with dummy variable DH_2 (interval [-2; +2])				
α	-0.072	-0.119	-0.078	-0.093
	(0.053)	(0.075)	(0.055)	(0.058)
β_2	0.540***	0.744***	0.588***	0.578***
	(0.164)	(0.264)	(0.182)	(0.163)
Regressions with dummy variable DH_3 (interval [-3; +3])				
α	-0.065	-0.118	-0.080	-0.088
	(0.054)	(0.077)	(0.056)	(0.058)
β_3	0.307***	0.484**	0.411***	0.342***
	(0.117)	(0.190)	(0.149)	(0.130)
Regressions with dummy variable DH_4 (interval [-4; +4])				
α	-0.073	-0.115	-0.093	-0.092
	(0.055)	(0.079)	(0.057)	(0.059)
β_4	0.278***	0.344**	0.394***	0.279**
	(0.102)	(0.168)	(0.131)	(0.119)

Notes: Standard errors in round brackets; Newey-West (1994) corrections were applied to all standard errors and p-values; *** and ** mean significant at 0.01 and 0.05 levels, respectively.

The results of regressions for the adjacent days to public holidays, presented in the Table 7, revealed significant positive values of λ_2 coefficient (for BET, BET-FI and BET-XT**)**, λ_1 coefficient (for BET, BET NG and BET XT) and μ_2 coefficient (for BET, BET NG and BET XT).

Table 7. Parameters of the regressions for adjacent days to the public holidays (the second sub-sample)

Index	BET	BET-FI	BET-NG	BET-XT
γ	-0.070	-0.112	-0.095*	-0.088
	(0.054)	(0.078)	(0.056)	(0.058)
λ_4	0.278	-0.234	0.302	0.103
	(0.294)	(0.335)	(0.287)	(0.310)
λ_3	-0.257	-0.068	0.258	-0.142
	(0.263)	(0.425)	(0.335)	(0.263)
λ_2	0.419**	0.867**	0.354	0.610**
	(0.211)	(0.436)	(0.263)	(0.310)
λ_1	0.601*	0.643	0.685*	0.553*
	(0.317)	(0.442)	(0.356)	(0.303)
μ_1	0.095	0.184	0.131	-0.070
	(0.473)	(0.756)	(0.433)	(0.579)
μ_2	1.107***	1.124	1.236**	1.080***
	(0.325)	(0.734)	(0.515)	(0.416)
μ_3	-0.258	-0.111	-0.065	-0.254
	(0.353)	(0.497)	(0.316)	(0.442)
μ_4	0.132	0.117	0.363	0.129
	(0.307)	(0.401)	(0.422)	(0.338)

Notes: Standard errors in round brackets; Newey-West (1994) corrections were applied to all standard errors and p-values; ***, ** and * mean significant at 0.01, 0.05, and 0.1 levels, respectively.

4.3. Results for the third sub-sample

Estimated coefficients of the regressions associated to intervals adjacent to the public holidays are reported in the Table 8. We found significant positive values of each β_i coefficients for BET, BET-NG and BET-XT indexes. In the case of BET-FI index no β_i coefficients have significant values.

Table 8. Parameters of regressions for the four intervals of adjacent days to public holidays (the third sub-sample)

Index/ Parameter	BET	BET-FI	BET-NG	BET-XT
Regressions with dummy variable DH_1 (interval [-1; +1])				
α	0.027	0.024	−0.002	0.026
	(0.022)	(0.023)	(0.023)	(0.021)
β_1	0.180*	0.124	0.190*	0.168*
	(0.102)	(0.109)	(0.108)	(0.092)
Regressions with dummy variable DH_2 (interval [-2; +2])				
α	0.021	0.028	−0.008	0.022
	(0.022)	(0.023)	(0.024)	(0.021)
β_2	0.141**	0.024	0.149**	0.118*
	(0.067)	(0.065)	(0.062)	(0.064)
Regressions with dummy variable DH_3 (interval [-3; +3])				
α	0.017	0.024	−0.011	0.017
	(0.023)	(0.024)	(0.025)	(0.021)
β_3	0.121**	0.035	0.124**	0.107**
	(0.054)	(0.056)	(0.051)	(0.054)
Regressions with dummy variable DH_4 (interval [-4; +4])				
α	0.012	0.028	−0.018	0.014
	(0.023)	(0.024)	(0.025)	(0.022)
β_4	0.110**	0.007	0.121**	0.093**
	(0.047)	(0.052)	(0.048)	(0.046)

Notes: Standard errors in round brackets; Newey-West (1994) corrections were applied to all standard errors and p-values; ** and * mean significant at 0.05, and 0.1 levels, respectively.

The Table 9 reports estimated coefficients of the regressions for adjacent days to the public holidays. We found no significant value of any λ_j or μ_j coefficients.

Table 9. Parameters of regressions for the adjacent days to public holidays (the third sub-sample)

Index	BET	BET-FI	BET-NG	BET-XT
γ	0.012	0.029	−0.016	0.014
	(0.023)	(0.024)	(0.025)	(0.022)
λ_4	0.194	−0.014	0.199	0.143
	(0.120)	(0.115)	(0.132)	(0.129)
λ_3	−0.020	−0.027	0.011	−0.009
	(0.114)	(0.114)	(0.117)	(0.101)

Index	BET	BET-FI	BET-NG	BET-XT
λ_2	0.141	−0.041	0.101	0.112
	(0.120)	(0.142)	(0.118)	(0.135)
λ_1	0.115	0.113	0.117	0.126
	(0.130)	(0.131)	(0.095)	(0.120)
μ_1	0.216	0.065	0.239	0.163
	(0.166)	(0.157)	(0.228)	(0.158)
μ_2	0.039	−0.087	0.088	0.019
	(0.104)	(0.146)	(0.102)	(0.109)
μ_3	0.214	0.157	0.127	0.197
	(0.143)	(0.188)	(0.133)	(0.141)
μ_4	−0.009	−0.115	0.042	−0.018
	(0.146)	(0.211)	(0.134)	(0.167)

Notes: Standard errors in round brackets; Newey-West (1994) corrections were applied to all standard errors and p-values.

5. Conclusions

The main purpose of this investigation was to find out if the extended holiday effect on the Romanian capital market is persistent in time. The empirical results revealed some significant changes that occurred during the three periods taken into consideration.

We found the traditional holiday effects (first day before and first day after a public holiday) only for the first two periods. For the first sub-sample we found a post-holiday effect for BET index, while for the other index we found an abnormal positive return for the fourth day before a public holiday. For the second sub-sample, the results revealed pre-holiday effects for three of the four indexes (BET, BET-FI and BET- XT) and also some abnormal returns for the second days before or after a public holiday. Instead, for the third sub-sample, the traditional holiday effects disappeared. This evolution could be seen as a confirmation of Murphy Law on the calendar effects. It could be also viewed as evidence that traditional holiday effects were sensitive to the external turbulences: we found pre-holiday effects only for the turbulent period of 2007 - 2012 and post-holiday effects only for the relative quiet period of 1997 - 2006.

However, the situation is different for extended holiday effects associated to the intervals [-j; +j]. For the first sub-sample the results indicated, in the case of BET index, positive abnormal effects for all intervals taken into consideration (from [-1; +1] to [-4; +4]). Instead, we found no extended holiday effect for BET-FI index. For the second sub-sample, all four indexes had abnormal positive return for the intervals [-2; +2], [-3; +3] and [-4; +4]. The holiday effects absence for the interval [-1; +1] during the turbulent period of 2007-2012 could be associated to the uncertainty regarding events that could occur during the public holidays. For the third first sub-sample the results revealed abnormal positive returns associated to the four intervals for three indexes (BET, BET-NG and BET-XT). No holiday effect was found for BET-FI index, which seemed to be less sensitive to this calendar anomaly.

This investigation on the persistence in time of the holiday effects could be extended to the capital markets from other countries.

References

Akaike, H. (1998). Information theory and an extension of the maximum likelihood principle. In *Selected Papers of Hirotugu Akaike* (pp. 199-213). Springer, New York, NY.

Al-Ississ, M. (2015). The holy day effect. *Journal of Behavioral and Experimental finance*, *5*, 60-80.

Alagidede, P. (2008). *Month-of-the-year and pre-holiday seasonality in African stock markets*. Stirling Economics Discussion Paper 2008-23.

Ariel, R. A. (1990). High stock returns before holidays: Existence and evidence on possible causes. *The Journal of Finance*, *45*(5), 1611-1626.

Barberis, N., & Thaler, R. (2003). A survey of behavioral finance. *Handbook of the Economics of Finance*, *1*, 1053-1128.

Breusch, T. S., & Godfrey, L. G. (1980). *A review of recent work on testing for autocorrelation in dynamic economic models*. Southampton University Discussion Paper in Economics and Econometrics No 6017.

Brockman, P., & Michayluk, D. (1998). The persistent holiday effect: Additional evidence. *Applied Economics Letters*, *5*(4), 205-209.

Cadsby, C. B., & Ratner, M. (1992). Turn-of-month and pre-holiday effects on stock returns: Some international evidence. *Journal of Banking & Finance*, *16*(3), 497-509.

Canepa, A., & Ibnrubbian, A. (2014). Does faith move stock markets? Evidence from Saudi Arabia. *The Quarterly Review of Economics and Finance*, *54*(4), 538-550.

Casalin, F. (2018). Determinants of holiday effects in mainland Chinese and Hong-Kong markets. *China Economic Review*, 49, 45-67.

Chong, R., Hudson, R., Keasey, K., & Littler, K. (2005). Pre-holiday effects: International evidence on the decline and reversal of a stock market anomaly. *Journal of International Money and Finance*, *24*(8), 1226-1236.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American statistical association*, *74*(366a), 427-431.

Dickey, D. A., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica: Journal of the Econometric Society*, 1057-1072.

Dimson, E., & Marsh, P. (1999). Murphy's Law and Market Anomalies. *The Journal of Portfolio Management*, *25*(2), 53-69.

Dodd, O., & Gakhovich, A. (2011). The holiday effect in Central and Eastern European financial markets. *Investment Management and Financial Innovations*, *8*(4), 29-35.

Dumitriu, R., Stefanescu, R., & Nistor, C. (2011). *Holiday effects on the Romanian stock market*. Vanguard Scientific Instruments in Management, 4(1), 35-40.

Dumitriu, R., Stefanescu, R., & Nistor, C. (2012). *Holiday effects during quiet and turbulent times*. The Proceedings of the 14th International Conference AFASES - "Scientific Research and Education in the Air Force".

Dumitriu, R., & Stefanescu, R. (2017). *Turn-of-the-Year Effects on Bucharest Stock Exchange*. The Tenth International & Interdisciplinary Scientific Conference Vanguard Scientific Instruments in Management, Ravda, Bulgaria, September 13-17, 2017. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3056643

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, *25*(2), 383-417.

Fama, E. F., & French, K. R. (1996). Multifactor explanations of asset pricing anomalies. *The Journal of Finance*, *51*(1), 55-84.

Fama, E. F. (1998). Market efficiency, long-term returns, and behavioral finance. *Journal of Financial Economics*, *49*(3), 283-306.

Holden, K., Thompson, J., & Ruangrit, Y. (2005). The Asian crisis and calendar effects on stock returns in Thailand. *European Journal of Operational Research*, *163*(1), 242-252.

Lahav, E., Shavit, T., & Benzion, U. (2016). Can't wait to celebrate: Holiday euphoria, impulsive behavior and time preference. *Journal of Behavioral and Experimental Economics*, *65*, 128-134.

Lakonishok, J., & Smidt, S. (1988). Are seasonal anomalies real? A ninety-year perspective. *The review of Financial Studies*, *1*(4), 403-425.

Liano, K., Marchand, P. H., & Huang, G. C. (1992). The holiday effect in stock returns: Evidence from the OTC market. *Review of Financial Economics*, *2*(1), 45.

Lu, X., Mehran, J., & Gao, H. (2016). Holiday Trading in China: Before and During the Financial Crisis. *Journal of Applied Finance and Banking*, *6*(2), 117-126.

Lucey, B. M., & Pardo, A. (2005). Why investors should not be cautious about the academic approach to testing for stock market anomalies. *Applied Financial Economics*, *15*(3), 165-171.

Marquering, W., Nisser, J., & Valla, T. (2006). Disappearing anomalies: a dynamic analysis of the persistence of anomalies. *Applied Financial Economics*, *16*(4), 291-302.

Marrett, G. J., & Worthington, A. C. (2009). An empirical note on the holiday effect in the Australian stock market, 1996–2006. *Applied Economics Letters*, *16*(17), 1769-1772.

Meneu, V., & Pardo, A. (2004). Pre-holiday effect, large trades and small investor behaviour. *Journal of Empirical Finance*, *11*(2), 231-246.

Mitchell, M. J. D., & Ong, M. L. L. (2006). *Seasonalities in China's stock markets: cultural or structural?*. International Monetary Fund Working Paper 06/04.

Newey, W. K., & West, K. D. (1994). Automatic lag selection in covariance matrix estimation. *The Review of Economic Studies*, *61*(4), 631-653.

Olson, D., Chou, N., & Mossman, C. (2010). Life cycle of the weekend effect. *Journal of Financial Economics*, *21*, 542-422.

Pettengill, G. N. (1989). Holiday closings and security returns. *Journal of Financial Research*, *12*(1), 57-67.

Roll, R. (1983). Vas ist das?. *Journal of Portfolio management*, *9*(2), 18-28.

Rozeff, M. S., & Kinney Jr, W. R. (1976). Capital market seasonality: The case of stock returns. *Journal of Financial Economics*, *3*(4), 379-402.

Satt, H. (2016). Religious holidays and analysts forecast optimism: Evidence from MENA countries. *Journal of Economic & Financial Studies*, *4*(04), 01-11.

Schwert, G. W. (2003). Anomalies and market efficiency. *Handbook of the Economics of Finance*, *1*, 939-974.

Tan, R. S. K., & Tat, W. N. (1998). The diminishing calendar anomalies in the stock exchange of Singapore. *Applied Financial Economics*, *8*(2), 119-125.

Vergin, R. C., & McGinnis, J. (1999). Revisiting the holiday effect: is it on holiday?. *Applied Financial Economics*, *9*(5), 477-482.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica: Journal of the Econometric Society*, 817-838.

Worthington, A. C. (2010). The decline of calendar seasonality in the Australian stock exchange, 1958–2005. *Annals of Finance*, *6*(3), 421-433.

Wu, C. (2013). The Chinese New Year holiday effect: evidence from Chinese ADRs. *Investment Management and Financial Innovations*, *10*(2), 8-14.

Yaktrakis, P., & Williams, A. (2010). The Jewish Holiday Effect: Sell Rosh Hashanah, Buy Yom Kippur. *Advances in Business Research*, *1*(1), 45-52.

Ziemba, W. T. (1991). Japanese security market regularities: Monthly, turn-of-the-month and year, holiday and golden week effects. *Japan and the World Economy*, *3*(2), 119-146