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CALENDAR ANOMALIES IN EMERGING BALKAN EQUITY MARKETS

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Abstract: *This paper investigates calendar anomalies for four emerging stock markets (Romania, Bulgaria, Croatia and Turkey) and their mature counterpart in the Balkan region (Greece), during the period 2000-2008. Five well known calendar effects on both return and volatility are examined; the day of the week effect, the January effect, the half month effect, the turn of the month effect and the time of the month effect. We provide evidence for the existence of three calendar effects (day of the week, turn of the month, time of the month) in both mean and volatility equations for Greece and Turkey, which is consistent to the findings of previous studies. On the other hand, the effects for the three emerging Balkan markets are limited and exist only in volatility. This contradictory evidence could be due to a different level of liquidity and maturity for these markets.*

JEL Classification: *C32; G10*

Keywords: *Calendar anomalies; mean stock returns; volatility; Balkan stock markets.*

1. INTRODUCTION

Security price anomalies have attracted the interest of academic economists, statisticians and market professionals for many years. Since the seminal work of Fama (1965), a vast number of studies have been made and many books have been written on this subject. Some of these anomalies are broadly known as calendar effects. The most important calendar effects studied are the day of the week effect (significantly different returns on some day of the week; usually higher Friday returns and lower Monday returns), the monthly or January effect (relatively higher January returns), the half month effect (returns are statistically higher over the first half of the month), the turn of the month (statistically higher returns on turn of the month days than other trading days) and the time of the month effect (returns are higher on the 1st third of the month). Thaler (1987b) provides an early and partial survey, while Mills and Coutts (1995) and Coutts *et al.* (2000) provide selective and more recent international references.

Other studies have examined the time series stock price behaviour in terms of volatility by using generalized autoregressive conditional heteroskedasticity (GARCH) models (e.g., Campbell and Hentschel, 1992; French *et al.*, 1987; Glosten *et al.*, 1993). Generally, all those studies report that returns in stock markets are time varying and conditionally heteroskedastic.

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This study examines five calendar effects (day of the week effect, January effect, half month effect, turn of the month effect and time of the month effect) in mean stock returns and their variances. The data set consists of four emerging Balkan markets (Romania, Croatia, Bulgaria and Turkey) and their mature counterpart in the region (Greece), during the period 1/01/2000-31/08/2008.

This paper is motivated by a number of factors. First, there is no other published study investigating calendar anomalies in the three emerging Balkan markets (Romania, Croatia and Bulgaria) to the best of our knowledge. Second, it avoids data mining phenomenon by using data sets that are not repeatedly used and are different from those studies in which the calendar effects originally discovered. Third, it updates the existing literature for the Greek and Turkish stock markets. Fourth, it covers a period which includes some of the most important macroeconomic, political and stock market events took place in the examined countries; Romania and Bulgaria have recently joined EU, Turkey and Croatia remain EU accession candidates, while Greece became a member of the Economic and Monetary Union (EMU) and the Greek stock market is classified as a developed one since 2001.

It is worth noting that only a few studies concerning various calendar effects in Athens Stock Exchange (ASE) are reported in the finance literature and all support their existence during the 1980s and 1990s (Coutts *et al.*, 2000; Mills *et al.*, 2000; Tsamis and Georgantopoulos, 2007). Other studies relating to the existence of the Monday effect also conclude that this anomaly exists in Greece (Alexakis and Xanthakis, 1995; Kenourgios and Samitas, 2008). Similarly, there are a few studies analyzing well known anomalies in Istanbul Stock Exchange (ISE) during late 1980s and 1990s. Balaban (1995a) and Oguzsoy and Guven (2003) report a significant day of the week effect. Balaban (1995b) report the existence of the January effect, Balaban and Bulu (1996) support the presence of a semi-monthly effect, while Oguzsoy and Guven (2006) provide evidence on the turn of the month effect.

The rest of the paper is organized as follows. Section 2 describes the data set. Section 3 describes the methodology employed in the study. Section 4 presents the empirical results, while a summary of findings and concluding remarks are presented in Section 5.

2. DATA

The data used in this study consist of daily closing prices (in logs) in four emerging Balkan stock markets (Romania, Bulgaria, Croatia and Turkey) and Greece. The stock market indices of interest are SOFIX of Bulgaria, VANGUARD of Romania, CROBEX of Croatia, ISE NATIONAL 50 of Turkey and the Athens General Index (ASE) of Greece. All the national stock indices are selected to guarantee representativeness of the domestic markets examined in this study.

Regarding the four emerging Balkan countries that are included in our data set, it is worth mentioning that impressive changes have occurred in their economies over the last

decades. Since the 1990s, the Balkan economies are through a transitory phase of structural adjustment towards a market oriented economic system (International Monetary Fund, 2000). After 2000, the Balkan region displays robust growth rates (over 4%), expanding more rapidly than the EU average. Romania, Croatia, Bulgaria and Turkey are among the top performers. Inflation of these countries continues to drop to a single-digit annual rate throughout the region. Since 2004, inflation rates converge to the EU average. The simultaneous growth increase and inflation decrease appreciated capital inflows of foreign direct and capital investments.

The Balkan stock markets have a brief history compared to the mature markets of Europe and United States of America (USA). These markets started trading in the mid 1980s-mid 1990s with a small number of stocks, many of which were illiquid. During 2000-2006, stock prices in Balkan markets increased on average over 70% in dollar terms, compared to the 15% of MSCI world market return. Among the Balkan stock markets, Turkey, Romania, Bulgaria and Croatia are considered the most developed, in terms of capitalization, turnover and market return. Despite the robust growth rates, the Balkan stock markets remain small in terms of capitalization, turnover and liquidity compared to developed markets.

The sample covers a period from January 2000 till July 2008 (excluding holidays). This period covers a long stock market cycle characterized as a bull market for the region, excluding the stock market crash period started on September 2008 due to the global financial crisis. The "close to close" data does not contain information about the payment of dividends on stocks. Although, there exists some evidence that the payment pattern of dividends may be a reason for seasonality in non-dividend adjusted returns (Phillips-Patrick and Schneeweis, 1988), most of the studies on calendar effects use non-dividend adjusted returns allowing for direct comparisons to the previously published results. Furthermore, the vast majority of previous studies which use non-dividend adjusted data report that systematic dividend payment patterns do not significantly change their results (e.g., Fishe *et al.*, 1993; French, 1980; Lakonishok and Smidt, 1988).

3. METHODOLOGY

The calendar effects in mean stock returns are investigated by employing the conventional OLS methodology on appropriately defined dummy variables.[1] On the other hand, we allow variances of errors to be time dependent to include a conditional heteroskedasticity that captures time variation of variance in stock returns. The GARCH (p,q) model proposed initially by Engle (1982) and further developed by Bollerslev (1986) has the following form:

$$h_t^2 = \alpha + \sum_{j=1}^{q} \beta_{j_a} \varepsilon_{t-j}^2 + \sum_{j=1}^{p} \gamma_{jb} \gamma h_{t-j}^2 \qquad (1)$$

Thus, error terms have a mean of zero and a time changing variance of $h_t^2[\varepsilon \sim (0, h_t^2)]$.

This specification requires that $\sum_{j=1}^{q} \beta_{ja} + \sum_{j=1}^{p} \gamma_{jb} \prec 1$ in order to satisfy the nonexplosiveness of the conditional variances. Furthermore, each α, $\beta_{j\alpha}$, and γ_{jb} has to be positive to satisfy the nonnegativity of conditional variances for each given time t.

Therefore, GARCH [1,1] models, including appropriately defined dummies, are used for testing the calendar effects in conditional variance of stock index returns. The parameters are estimated following the quasi-maximum likelihood (QML) estimation introduced by Bollerslev and Wooldridge (1992).[2]

3.1. Estimation of Calendar Effects

The day of the week effect is studied, using a model, originally proposed by French (1980). In this framework, the trading time hypothesis is evaluated, according to which returns are created only on the working days of the week. This hypothesis is tested using the following regression with dummy variables (e.g., Agrawal and Tandon, 1994; Jaffe and Westerfield, 1989; Mills and Coutts, 1995):

$$R_t = \alpha_1 + \sum_{i=2}^{5} \alpha_i D_{it} + \varepsilon_t \tag{2}$$

where, R_t is the daily logarithmic return on a selected index, $D_{it} = 1$ for day i and 0 for all other days ($i = 2,\ldots,5$ corresponds to Tuesday through to Friday), α_1 indicates the mean daily return for Monday, while α_2 to α_5 represent the difference between the mean daily return for Monday and the mean daily return for each of the other days of the week and ε_t is an error term assumed to be identically and independently distributed (IID). If there are no differences among index returns across days of the week, the parameters of α_2 to α_5 are zero. Therefore, the null hypothesis of the relevant Wald test is the following: $H_0 : \alpha_i = 0$ for $i = 2,\ldots,5$. If the null hypothesis is rejected, then stock returns should exhibit some form of the day of the week seasonality.

The day of the week effect in variance is studied by estimating the following conditional volatility function:

$$h_t^2 = a + \beta\varepsilon_{t-1}^2 + \gamma h_{t-1}^2 + \sum_{i=2}^{5} \delta_i D_{it} \tag{3}$$

where, h_t^2 is the conditional variance of ε_i in the equation (3). If there is no day of the week effect in variance, the parameters δ_2 to δ_5 are zero, so the relevant null is $H_0 : \delta_i = 0$ for $i = 2,\ldots,5$.

For the monthly or January effect, the model used is described by the following equation (e.g., Gultekin and Gultekin, 1983; Jaffe and Westerfield, 1989):

$$R_t = \beta_1 + \sum_{i=2}^{12} \beta_i M_{it} + \varepsilon_t \tag{4}$$

where, M_{it} = 1 if the return at time t belongs to month i and 0 if the it belongs to any other month (i = 2,…,12 corresponds to February through December). The intercept β_1 measures the mean return for January, while the coefficients β_2 to β_{12} represent the average differences in return between January and each individual month. The null hypothesis tested in this equation is $H_0 : \beta_i = 0$ for i = 2,…,12. Days before stock market vacations are excluded from the analysis.

As in the case of the day of the week effect, the monthly effect in variance is examined by estimating the following equation:

$$h_t^2 = a + \beta\varepsilon_{t-1}^2 + \gamma h_{t-1}^2 + \sum_{i=2}^{12} \delta_i M_{it} \tag{5}$$

For the half month effect, we follow Lakonishok and Smidt (1988), defining as H_{1t} = 1 if day t is from the first to the fifteenth calendar day of the month if it is a trading day, and if it is not, to the next trading day, and H_{1t} = 0 otherwise. The mean and variance models for the half month effect are the following:

$$R_t = \gamma_0 + \gamma_1 H_{1t} + \varepsilon_t \tag{6}$$

$$h_t^2 = a + \beta\varepsilon_{t-1}^2 + \gamma h_{t-1}^2 + \delta H_{1t} \tag{7}$$

Lakonishok and Smidt (1988) find that the mean returns on days around the turn of the month are significantly higher than the mean returns on the rest of the month days. Moreover, they observe that the returns are higher especially during a four day period starting from the last trading day of the old month until the first three business days of the new month. To test for the existence of the turn of the month effect in mean return, the following model is used:

$$R_t = \lambda_0 + \lambda_1 M(-3)_t + \lambda_2 M(-2)_t + \lambda_3 M(-1)_t + \lambda_4 M(+1)_t + \lambda_5 M(+2)_t + \lambda_6 M(+3)_t + \varepsilon_t \tag{8}$$

where, $M(-3)_t$ to $M(+3)_t$ are turn of the month dummy variables.

The turn of the month effect in variance is tested by using the following model:

$$h_t^2 = a + \beta\varepsilon_{t-1}^2 + \gamma h_{t-1}^2 + \delta_1 M(-3)_t + \delta_2 M(-2)_t + \delta_3 (M(-1)_t + \delta_4 M(+1)_t + \delta_5 M(+2)_t + \delta_6 M(+3)_t \tag{9}$$

The last anomaly to be investigated is the time of the month effect. This monthly anomaly was first identified by Kohers and Patel (1999). They split a calendar month into

three segments. The first segment extends from the 28th day of a previous month to the 7th day of the month, the second segment extends from 8th day to the17th day of the month and the last segment consists of the other days, that is, 18th day to the 27th day of the month. Using the Standard & Poor's Index (S&P) during the period January 1960-June 1995 and the National Association of Securities Dealers Automated Quotations (NASDAQ) Index, during the period January 1972- June 1995, they report that the returns are highest during the "first third", experience a drop during the "second third" and are lowest, and in most cases negative, during the "last third" of a month. Following Kohers and Patel (1999), the following regression is estimated:

$$R_t = \beta_0 + \beta_1 d_{2t} + \beta_2 d_{3t} + \varepsilon_t \tag{10}$$

where, R_t is the mean return of the stock index on day t and the dummy variable d_{it} indicates the day on which the return is observed (d_{2t} = first-third of the month days and d_{3t} = second-third of the month days). d_{2t} attains a value of 1 if the return is observed on the first-third of the month days, 0 otherwise. Similarly, d_{3t} attains a value of 1 if the return is observed on the second-third of the month days, 0 otherwise.

On the other hand, in order to test the time of the month effect in variance, we estimate the following equation:

$$h_t^2 = a + \beta\varepsilon_{t-1}^2 + \gamma h_{t-1}^2 + \delta_1 d_{2t} + \delta_2 d_{3t} \tag{11}$$

4. EMPIRICAL RESULTS

Table 1 reports the descriptive statistics for the sample of the five indices. The highest average daily appears for the Sofix Index (Bulgaria) and the lowest for the ASE Index (Greece). The largest unconditional volatility and the largest range for the returns is recorded for Vanguard Index (Romania). Overall, descriptive statistics indicate that returns are not normally distributed and are characterised as leptokurtic and skewed.

Table 1
Summary Statistics

Period: (2000-2008)	*Greece (ASE Index)*	*Romania (Vanguard Index)*	*Bulgaria (Sofix Index)*	*Croatia (Crobex Index)*	*Turkey (ISE Index)*
Mean	-0.000278	0.000543	0.001481	0.000683	-0.000102
Maximum	0.076225	2.415993	0.210733	0.113073	0.198904
Minimum	-0.096152	-2.407902	-0.208995	-0.090852	-0.207278
Std. Dev.	0.014007	0.089708	0.019333	0.013734	0.034590
Skewness	-0.152469	0.148374	-0.433680	0.211085	-0.075532
Kurtosis	7.865744	665.2268	36.20232	12.88170	8.375709

Table 2 displays the estimates of the day of the week effects using return equation (2). Using the Wald test, the null hypothesis that the day of the week dummy variables are

jointly equal to zero is not rejected for Romania, Bulgaria and Croatia. On the other hand, there is strong evidence that day of the week effect exists in Greece and Turkey. In addition, we observe that for both countries the estimated coefficients are negative and statistically significant on Mondays and positive and statistically significant on Fridays.

Table 2
The Day of the Week Effect in Mean

Index	α_1	α_2	α_3	α_4	α_5	*Wald test*
Greece	-0.0022***	0.0004	0.0019*	-0.0038***	0.0034***	5.1752
(ASE Index)	(0.0007)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	[0.0004]
Romania	0.0062	-0.0021	-0.0005	-0.0063	-0.0148*	1.2546
(Vanguard Index)	(0.0005)	(0.0071)	(0.0071)	(0.0071)	(0.0071)	[0.2859]
Bulgaria	0.0006	0.0023	-0.0004	0.0024*	0.0002	1.4540
(Sofix Index)	(0.0009)	(0.0015)	(0.0015)	(0.0005)	(0.0015)	[0.2139]
Croatia	0.0005	0.0003	0.0000	-0.0003	0.0006	0.2258
(Crobex Index)	(0.0007)	(0.0010)	(0.0011)	(0.0011)	(0.0010)	[0.9240]
Turkey	-0.0060***	-0.0033	0.0059**	0.0096***	0.0107***	5.2957
(ISE Index)	(0.0019)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	[0.0003]

Notes: *, **, *** denote significance at 1%, 5% and 10% respectively. Standard errors are reported in parentheses and p values in brackets.This note also applies to the subsequent Tables.

Table 3 reports the estimates of the GARCH (1,1) coefficients (equation 3). We observe that the day of the week effect is also present for Greece and Turkey. For both countries, Monday presents high and statistically significant variance, while Thursdays and Fridays appear to have significantly lower variances than Monday's. Moreover, in contrast to mean return results, the day of the week effect in volatility appears to be strongly present in Bulgaria.[3]

Table 3
The Day of the Week Effect in Volatility

Index	α	β	γ	δ_2	δ_3	δ_4	δ_5	*Wald test*
Greece	0.0001***	0.1147***	0.8670***	0.0002	0.0008	0.0020***	0.0018**	2.4607
(ASE Index)	(0.0000)	(0.0007)	(0.0121)	(0.0007)	(0.0008)	(0.00076)	(0.0008)	[0.0436]
Romania	0.0006***	0.0897***	0.5399***	-0.0015	0.0002	-0.0013	-0.0147	0.0501
(Vanguard Index)	(0.0016)	(0.0182)	(0.1189)	(0.0413)	(0.0820)	(0.0893)	(0.0330)	[0.9953]
Bulgaria	0.0000***	0.1251***	0.8946***	-0.0022***	0.0000	0.0016**	0.0003	4.7111
(Sofix Index)	(0.0001)	(0.0071)	(0.0046)	(0.0006)	(0.0007)	(0.0007)	(0.0008)	[0.0009]
Croatia	0.0003***	0.0487***	0.9290***	0.0008	0.0006	0.0004	0.0000	0.3317
(Crobex Index)	(0.0000)	(0.0047)	(0.0065)	(0.0009)	(0.0008)	(0.0009)	(0.0010)	[0.8567]
Turkey	0.0001***	0.1031***	0.8869***	0.0000	0.0017	0.0035**	0.0041**	2.2981
(ISE Index)	(0.0000)	(0.0103)	(0.0096)	(0.0019)	(0.0019)	(0.0019)	(0.0021)	[0.0581]

The results for the January effect using the mean model (equation 4) are presented in Table 4. We find no evidence that January effect exists in any of the Balkan countries. On the other hand, the results in variance (equation 5), presented in Table 5, are different, since the effect appears to be present in Greece, Croatia and Turkey at 5 per cent, 10 per cent and 1 per cent level, respectively. In Greece, January has the highest significant variance, while March, June and September appear to have significantly different and lower variances than January. In Croatia, monthly effect is strongly present but with different characteristics, since February, April, May, June, August, September, October, November and December appear to have statistically different and lower variances than January's. In this case too, January appears to have the highest and significant variance. Finally, in Turkey, the monthly effect exists (weaker though), since June and December appear to have (statistically significant) negative and lower variances than January's.

Table 6 provide no evidence for the half month effect in mean (equation 6), since no country presents statistically different results for the first half of the month. The results are the same measuring the above effect in variance (equation 7), according to Table 7.

Table 8 presents the results of testing the turn of the month effect in mean (equation 8). The turn of the month effect appears to be present in Greece, since coefficients λ_3, λ_4 and λ_5, for days (-1), (+1) and (+2), respectively, are significantly higher than the rest of the month days. Finally, the effect is present in Turkey, but with different characteristics, since coefficient λ_1 was found significantly lower than the rest of the month days. On the other hand, coefficients λ_3 and λ_6 appear to be significantly higher than the rest of the month days.

Results of the turn of the month effect in variance (equation 9), presented at Table 9, are in line with those of the mean model, since this effect exists in Greece and Turkey. In Greece, the coefficients δ_1 and δ_6 are negative and significantly lower than rest of the month days, while coefficient δ_5 is positive and significantly higher. On the other hand, in Turkey, the coefficients δ_3 and δ_5 are negative and significantly lower than rest of the month days, while coefficient δ_4 is positive and significantly higher.

Table 10 presents the results of testing the time of the month effect in mean (equation 10). This anomaly appears to be stronger in Greece and weaker in Turkey, presenting different characteristics in the two markets. The first- third of the month is significant in both markets, but it is higher than the last third of the month in Greece and lower than the last third of the month in Turkey.

Finally, Table 11 presents the estimation results for the variance model (equation 11). These findings appear to be in line with the mean model results. The anomaly is strongly present in Greece and Turkey at 99 per cent level of confidence. In addition, the variance equation shows that the anomaly strongly exists in Croatia too, due to the fact that the second-third of the month appears to have a significantly higher volatility than the last third of the month.

Table 4
The January Effect in Mean

Index	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*Wald test*
Greece	-0.0002	-0.0001	-0.0019	0.0013	-0.0000	-0.0010	0.0010	-0.0004	-0.0017	0.0007	0.0011	0.0009	0.8516
(ASE Index)	(0.0011)	(0.0016)	(0.0016)	(0.0016)	(0.0016)	(0.0016)	(0.0016)	(0.0016)	(0.0017)	(0.0016)	(0.0016)	(0.0017)	[0.5880]
Romania	0.0042	-0.0032	-0.0072	-0.0035	-0.0037	-0.0043	-0.0032	-0.0038	-0.0036	-0.0038	-0.0037	-0.0048	0.0439
(Vanguard Index)	(0.0074)	(0.0110)	(0.0108)	(0.0109)	(0.0107)	(0.0109)	(0.0108)	(0.0107)	(0.0109)	(0.0108)	(0.0109)	(0.0108)	[1.0000]
Bulgaria	0.0015	0.0016	-0.0039	-0.0003	-0.0019	-0.0021	0.0014	- 0.0005	0.0011	0.0005	-0.0004	-0.0002	0.8693
(Sofix Index)	(0.0016)	(0.0023)	(0.0024)	(0.0024)	(0.0025)	(0.0025)	(0.0024)	(0.0024)	(0.0025)	(0.0024)	(0.0023)	(0.0024)	[0.5702]
Croatia	0.0020*	-0.0000	-0.0016	-0.0023	-0.0017	-0.0017	-0.0026	-0.0008	-0.0002	-0.0011	0.0005	-0.0022	0.7088
(Crobex Index)	(0.0012)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0016)	(0.0017)	(0.0018)	(0.0017)	[0.7311]
Turkey	0.0026	-0.0072*	-0.0056	0.0007	-0.0060	-0.0050	-0.0029	-0.0026	-0.0058	-0.0025	-0.0013	-0.0003	1.0710
(ISE Index)	(0.0029)	(0.0042)	(0.0042)	(0.0041)	(0.0041)	(0.0042)	(0.0042)	(0.0041)	(0.0042)	(0.0042)	(0.0042)	(0.0042)	[0.3811]

Table 5
The January Effect in Volatility

Index				*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*Wald test*
Greece (ASE Index)	0.0001*** (0.0001)	0.0999*** (0.0095)	0.8869*** (0.0103)	-0.0014 (0.0012)	-0.004*** (0.0011)	-0.0001 (0.0013)	-0.0009 (0.0012)	-0.0021* (0.0012)	-0.0005 (0.0012)	-0.0018 (0.0013)	-0.0022* (0.0013)	-0.0005 (0.0013)	-0.0002 (0.0012)	-0.0004 (0.0012)	2.1297 [0.0159]
Romania (Vanguard Index)	0.0011*** (0.0012)	1.3039*** (0.1215)	0.3372*** (0.0320)	-0.0012 (0.0015)	-0.004 (0.0015)	-0.0007 (0.0014)	-0.0002 (0.0012)	0.018 (0.0016)	-0.1200 (0.0040)	-0.0018 (0.0014)	-0.0002 (0.0010)	-0.0012 (0.0011)	-0.03 (0.0011)	-0.0027 (0.0013)	0.6441 [0.8591]
Bulgaria (Sofix Index)	0.0022** (0.0032)	0.1278*** (0.0077)	0.8875*** (0.0051)	-0.0022 (0.0019)	-0.0002 (0.0005)	-0.0001 (0.0001)	0.0002 (0.0002)	-0.0011 (0.0009)	-0.0009 (0.0005)	-0.0007 (0.0005)	-0.0002 (0.0001)	0.0011 (0.0007)	-0.0005 (0.0008)	0.0021 (0.0016)	1.5912 [0.1641]
Croatia (Crobex Index)	0.0000*** (0.0000)	0.0622*** (0.0089)	0.8972*** (0.0109)	-0.0009*** (0.0005)	-0.0001 (0.0002)	-0.0004*** (0.0003)	-0.0009* (0.0007)	-0.0004*** (0.0005)	-0.0001 (0.0002)	-0.0005*** (0.0004)	-0.0005** (0.0004)	-0.0009*** (0.0007)	-0.0003*** (0.0002)	-0.0007*** (0.0010)	16.650 [0.0000]
Turkey (ISE Index)	0.0002*** (0.0001)	0.1034*** (0.0124)	0.8749*** (0.0119)	0.0000 (0.0001)	0.0007 (0.0004)	-0.0021 (0.0016)	0.0009 (0.0006)	-0.0012** (0.0009)	-0.0005 (0.0004)	-0.0007 (0.0005)	0.0008 (0.0006)	0.0004 (0.0002)	-0.0006 (0.0009)	-0.0003** (0.0007)	1.8741 [0.0819]

Table 6
The Half Month Effect in Mean

Index	γ_0	γ_1
Greece	-0.00037	0.00019
(ASE Index)	(0.00049)	(0.00070)
Romania	0.00057	-0.0039
(Vanguard Index)	(0.00318)	(0.0045)
Bulgaria	0.0022***	-0.0013
(Sofix Index)	(0.0007)	(0.0010)
Croatia	0.0006	0.0009
(Crobex Index)	(0.0004)	(0.0007)
Turkey	-0.0002	0.0002
(ISE Index)	(0.0012)	(0.0017)

Table 7
The Half Month Effect in Variance

Index	α	β	γ	δ
Greece	0.0004***	0.1052***	0.8823***	-0.0002
(ASE Index)	(0.0011)	(0.0010)	(0.0106)	(0.0004)
Romania	0.0009***	0.4400***	0.0583***	0.0002
(Vanguard Index)	(0.0005)	(0.8666)	(0.0120)	(0.0001)
Bulgaria	0.0006	0.1239***	0.8950***	0.0006
(Sofix Index)	(0.0005)	(0.0069)	(0.0045)	(0.0007)
Croatia	0.0004***	0.0482***	0.9293***	-0.0008
(Crobex Index)	(0.0006)	(0.0054)	(0.0079)	(0.0009)
Turkey	0.0001*	0.1024***	0.8892***	0.0002
(ISE Index)	(0.0003)	(0.0105)	(0.0097)	(0.0004)

Table 8
The Turn of the Month Effect in Mean

Index	λ_0	λ_1	λ_2	λ_3	λ_4	λ_5	λ_6	*Wald test*
Greece	-0.0009**	0.0020	-0.0003	0.0037**	0.0033**	0.0028*	0.0014	1.9957
(ASE Index)	(0.0004)	(0.0016)	(0.0016)	(0.0016)	(0.0017)	(0.0017)	(0.0016)	[0.0632]
Romania	0.0004	-0.0035	-0.0002	-0.0004	0.0008	0.0050	-0.0009	0.0592
(Vanguard Index)	(0.0027)	(0.0109)	(0.0109)	(0.0109)	(0.0109)	(0.0109)	(0.0109)	[0.9992]
Bulgaria	0.0015*	0.0026	0.0053**	-0.0026	-0.0020	-0.0022	-0.0019	1.5732
(Sofix Index)	(0.0006)	(0.0024)	(0.0025)	(0.0025)	(0.0025)	(0.0025)	(0.0025)	[0.1512]
Croatia	0.0005	0.0008	0.0018	0.0018	0.0007	0.0006	-0.0004	0.4222
(Crobex Index)	(0.0008)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	[0.8645]
Turkey	-0.0016	-0.0008*	0.0023	0.0124***	0.0054	0.0029	0.0095**	2.4544
(ISE Index)	(0.0010)	(0.0041)	(0.0042)	(0.0042)	(0.0042)	(0.0042)	(0.0042)	[0.0229]

Table 9
The Turn of the Month Effect in Volatility

Index				*1*	*2*	*3*	*4*	*5*	*6*	*Wald test*
Greece	0.0004***	0.1183***	0.8654***	-0.0003**	0.0002	0.0004	0.0003	0.0008*	-0.0005**	2.2641
(ASE Index)	(0.0003)	(0.0112)	(0.0129)	(0.0005)	(0.0001)	(0.0002)	(0.0001)	(0.0003)	(0.0003)	[0.0352]
Romania	0.0002*	0.0003***	0.0005***	-0.0009	-0.0002	-0.0008	0.0007	0.0003	0.0004	0.3128
(Vanguard Index)	(0.0003)	(0.0001)	(0.0003)	(0.0006)	(0.0001)	(0.0004)	(0.0005)	(0.0002)	(0.0003)	[0.8325]
Bulgaria	0.0007**	0.1341***	0.8882***	0.0002	0.0006	-0.0008	0.0002	-0.0004	-0.0003	0.4091
(Sofix Index)	(0.0006)	(0.0080)	(0.0050)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	[0.7903]
Croatia	0.0008	0.0535***	0.9215***	-0.0005	0.0003	-0.0001	-0.0002	0.0002	-0.0003	0.6322
(Crobex Index)	(0.0002)	(0.0061)	(0.0083)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	[0.3211]
Turkey	0.0005	0.1107***	0.8756***	0.0004	0.0002	-0.0002**	0.0007***	-0.0005***	0.0002	7.3052
(ISE Index)	(0.0003)	(0.0115)	(0.0111)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	[0.0000]

Table 10
The time of the Month Effect in Mean

Index	β_0	β_1	β_2	*Wald test*
Greece	0.0010	0.0023***	-0.0001	4.9682
(ASE Index)	(0.0006)	(0.0008)	(0.0009)	[0.0071]
Romania	0.0012	-0.0006	-0.0013	0.0273
(Vanguard Index)	(0.0039)	(0.0055)	(0.0056)	[0.9730]
Bulgaria	0.0025***	-0.0016	-0.0015	0.9792
(Sofix Index)	(0.0046)	(0.0015)	(0.0012)	[0.3559]
Croatia	0.0003	0.0003	0.0009	0.5371
(Crobex Index)	(0.0006)	(0.0009)	(0.0009)	[0.5846]
Turkey	0.0001	-0.0022*	-0.0025	2.5075
(ISE Index)	(0.0005)	(0.0021)	(0.0021)	[0.0818]

Table 11
The Time of the Month Effect in Volatility

Index	α	β	γ	δ_1	δ_2	*Wald test*
Greece	0.0004**	0.1019***	0.8877***	-0.0003**	-0.0001	6.1182
(ASE Index)	(0.0002)	(0.0099)	(0.0107)	(0.0002)	(0.0002)	[0.0052]
Romania	0.0108**	-0.0002***	-0.0005***	-0.0099	0.0186	0.1943
(Vanguard Index)	(0.0007)	(0.0001)	(0.0017)	(0.0011)	(0.0020)	[0.9492]
Bulgaria	0.0004	0.1193***	0.8982***	-0.0004	0.0004	1.7981
(Sofix Index)	(0.0003)	(0.0068)	(0.0044)	(0.0003)	(0.0002)	[0.2204]
Croatia	0.0003*	0.0552***	0.9185***	-0.0003	0.0006***	35.6318
(Crobex Index)	(0.0001)	(0.0067)	(0.0093)	(0.0001)	(0.0004)	[0.0000]
Turkey	0.0002**	0.0902***	0.9022***	0.0005***	0.0004***	7.7111
(ISE Index)	(0.0001)	(0.0096)	(0.0090)	(0.0002)	(0.0003)	[0.0000]

Table 12
Summary of Calendar Effects in Mean and Volatility

Index	*Day of the Week*		*January*		*Half Month*		*Turn of the Month*		*Time of the Month*	
	Mean	*Volatility*	*Mean*	*Volatility*	*Mean*	*Volatility*	*Mean*	*Volatility*	*Mean*	*Volatility*
Greece (ASE Index)	**Strong**	**Strong**	None	**Strong**	None	None	**Weak**	**Strong**	**Strong**	**Strong**
Romania (Vanguard Index)	None	None	None	None	None	None	None	None	None	None
Bulgaria (Sofix Index)	None	**Strong**	None	None	None	None	None	None	None	None
Croatia (Crobex Index)	None	None	None	**Strong**	None	None	None	None	None	**Strong**
Turkey (ISE Index)	**Strong**	**Strong**	None	**Strong**	None	None	**Strong**	**Strong**	**Weak**	**Strong**

5. SUMMARY AND CONCLUDING REMARKS

This study investigates five calendar effects for four emerging Balkan markets (Romania, Bulgaria, Croatia and Turkey) and their mature Balkan counterpart (Greece), using OLS and conditional variance methodologies. When using daily closing values of their major stock indexes for the period 2000-2008, we document the existence / non-existence of the day of the week effect, the January (monthly) effect, the half month effect, the turn of the month effect and the time of the month effect in both mean and volatility equations.

The empirical analysis discussed in the previous section is summarized and tabulated in Table 12 for both the mean and the variance models. It clearly emerges from the table that (i) the calendar effects are not present in mean returns for Romania, Bulgaria and Croatia, (ii) the only country which does not present any calendar effects in volatility is Romania, (iii) the day of the week effect in variance is strongly present in Bulgaria, while the monthly (January) and the time of the month effects in variance exist for Croatia, (iv) day of the week, turn of the month and time of the month effects exist for Greece and Turkey in both the return and variance equations, in line with the evidence of previous related studies, (v) the January effect is strongly present only in variance for both Greece and Turkey. Overall, it seems that the largest and more mature markets of the region continue to exhibit market inefficiencies not following the general trend of their disappearance in the developed markets.

In a decision-making process, a rational financial decision maker must take into account not only returns but also the variance (risk) or volatility of returns. The calendar effect patterns in return and volatility might enable investors to take advantage of relatively regular market shifts by designing and implementing trading strategies, which account for such predictable patterns. Uncovering certain volatility patterns in returns might also benefit investors in valuation, portfolio optimization, and risk management. However, obtaining profits from calendar anomalies is a risky business, especially in Balkan stock markets, which display high volatility and sudden movements that can not be followed reactively. Finally, future research may examine the calendar anomalies on these emerging markets by covering a switch from a strong bull to a severe bear market situation under the 2008 global financial crisis.

Notes

1. To address the drawback of the OLS that error terms may not be white noise due to autocorrelation and heteroskedasticity problems resulting to misleading inferences, the significance of the regression estimates (t-statistics) is observed using the Newey-West heteroskedasticity- and autocorrelation-adjusted standard errors (Newey and West, 1987).
2. One disadvantage of using the GARCH [1,1] with the relevant dummies for each anomaly is the possibility of being too restrictive. In order to assess the conditional variance better, we include additional terms in the conditional variance equation. Specifically we include (a) additional lag values for the ARCH term [GARCH (1,2)] and (b) additional lag values for the GARCH coefficient [GARCH (2,1)]. The results for all indices are robust with our previous findings and these findings are not tabulated and reported.

3. The Ljung-Box *Q* and ARCH-LM tests for various lags are also employed in the investigation of each calendar anomaly in variance for all markets. The results, not presented here, confirm that the standardized residuals terms have constant variances and do not exhibit autocorrelation.

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