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A Comparative Study on Calendar Effects: Greece Vs Bulgaria

Andreas G. Georgantopoulos* **and Anastasios D. Tsamis***

Abstract: *This paper investigates calendar anomalies for one emerging stock market (Bulgaria) and its matured counterpart in the Balkan region (Greece) during the period 2002 – 2008. Five popular calendar effects on both mean and variance 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. Most of the tested effects exist for Greece. On the other hand, the effects for Bulgaria are limited and exist only in variance. This contradictory evidence could be due to different levels of liquidity, capitalisation and maturity for these markets.*

JEL Classification: *C32; G10*

Keywords: *Calendar Anomalies; OLS; GARCH; Balkan economies*

1. INTRODUCTION

Calendar effects in stock market returns have puzzled financial economists for over 50 years. 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 first third of the month). Thaler (1987a, 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 generalised autoregressive conditional heteroskedasticity (GARCH) models (French *et al.*, 1987; Hamao *et al.*, 1990; Nelson, 1991; Campbell and Hentschel, 1992; and Glosten *et al.*, 1993). For example, French *et al.* (1987) support that unexpected stock market returns are negatively correlated to the unexpected changes in volatility, while Campbell and Hentschel (1992) found that an increase in

* Department of Public Administration, Panteion University, Greece

volatility raises the required rate of return on common shares and hence lowers stock prices. Generally, all those studies report that returns in stock markets are time varying and conditionally heteroskedastic.

This study examines the five calendar effects (day of the week effect, January effect, half month effect, turn of the month effect and time of the month effect, as defined above) in mean stock returns and their variances. The data set consists of one emerging Balkan market (Bulgaria) and its mature counterpart in the region (Greece), during the period 01/01/2002 – 31/07/2008.

This paper contributes to the existing literature by: first, investigating five calendar anomalies by applying both mean and variance specifications for an emerging Balkan country, (Bulgaria, where to the best of our knowledge previous literature findings do not exist). Second, updates the existing literature findings for Greece. Third, covering a period which includes important macroeconomic, political and stock market events that took place in the tested countries, (ie. Bulgaria entered the European Union in 2007, Greece became a member of the EMU in 2002) and forth, avoiding data mining phenomenon by using data sets that are not repeatedly used in similar studies and are different from those studies in which the calendar effects originally discovered.

In the empirical analysis, evidence have been found for the existence of these calendar effects in these two Balkan stock markets, but where they exist have different characteristics and results from (OLS) and GARCH [1,1] models did not always converge, producing very interesting results.

Other studies testing the existence of calendar effects in the Athens Stock Exchange, even though producing different results and conclusions, all agree that calendar effects are present in Greece (Alexakis and Xanthakis, 1995; Mills *et al.*, 2000; Coutts *et al.*, 2000; Tsamis and Georgantopoulos, 2007, Kenourgios and Samitas, 2008).

Regarding Bulgaria, it is worth mentioning that over the last decade, impressive changes have occurred in this economy. Since 2000, the Balkan economies in general, are through a transitory phase of structural adjustment towards a market oriented economic system. Nevertheless, during the tested period (2002 - 2008), the Balkan region displays robust growth rates, expanding more rapidly than the EU average. To be more concrete, in 2007 Bulgaria enters the European Union. This led to some immediate international trade liberalization, but there was no shock to the economy. The government is running annual surpluses of above 3%. This fact, together with annual GDP growth of above 5%, has brought the government indebtedness to 22.8% of GDP in 2006 from 67.3% five years earlier. This is to be contrasted with enormous current account deficits. Low interest rates guarantee availability of funds for investment and consumption. At the same time annual inflation in the economy is variable and during the period (2002-2007) has seen a low of 2.3% and high of 7.3%. Bulgaria's per-capita GDP is still only about a third of the EU25 average, while the country's nominal GDP per capita is about 13% of the EU25 average.

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

2. DATA ANALYSIS

Our study employs daily closing values (in logs) from one emerging Balkan stock market (Bulgaria) and one matured Balkan stock market (Greece). The stock indices of interest are the Athens General Index (ASE) and the SOFIX Index of Bulgaria. It is important to note at this point that both indices used in our study are the general indices of the respective examined countries. Furthermore, it should be mentioned that although Bulgaria, is an emerging stock market and lacks the economic maturity of Greece, exhibits a rapid economic growth (during the tested period) and greater political stability compared to the recent past.

The sample period starts on 1 January 2002 and ends at 31 July 2008 (excluding holidays) for both markets. In both indices dividends are not included. 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), as Steeley (2001) argues, most of the studies on calendar effects use non - dividend adjusted returns and therefore using such returns permits 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. French, 1980; Lakonishok and Smidt, 1988; Choy and O' Hanlon, 1989; Fishe *et al.*, 1993).

3. METHODOLOGY

The calendar effects in mean stock returns are studied by the OLS regression of the complete return series on appropriately defined dummy variables[1]. Furthermore, we allow variances of errors to be time dependent to include a conditional heteroskedasticity that captures time variation of variance in stock returns applying the GARCH (p, q) model proposed initially by Engle (1982) and further developed by Bollerslev (1986)[2]. 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)[3].

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., French, 1980;

Rogalski, 1984; Jaffe and Westerfield, 1989; Agrawal and Tandon, 1994; Mills and Coutts, 1995):

$$R_t = \alpha_1 + \sum_{i=2}^{5} \alpha_i D_{it} + \varepsilon_t \tag{1}$$

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 relevant null hypothesis is: $H_0 : \alpha_i = 0$ 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:

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

h_t^2 is the conditional variance of ε_t in the equation (2). Here, we take into account the possibility that the lagged values of the squared residuals and the conditional variances might be too restrictive. 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; Raj and Thurston, 1994):

$$R_t = \beta_1 + \sum_{i=2}^{12} \beta_i \mathbf{M}_{it} + \varepsilon_t \tag{3}$$

where, $M_{it} = 1$ if the return at time t belongs to month i and 0 if the it belongs to any other month ($i = 2,\ldots,12$ 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 $i = 2,\ldots,12$. As before, 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 studied by estimating the following equation:

$$h_t^2 = a + \beta\varepsilon_{t-1}^2 + \gamma h_{t-1}^2 + \sum_{i=2}^{12} \delta_i \mathbf{M}_{it} \tag{4}$$

For the half month effect we follow Lakonishok and Smidt's (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:

$$R_t = \gamma_0 + \gamma_1 \mathrm{H}_{1t} + \varepsilon_t \tag{5}$$

$$h_t^2 = a + \beta\varepsilon_{t-1}^2 + \gamma h_{t-1}^2 + \delta H_{1t} \tag{6}$$

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 turn of the month effect in mean return in the data set the following model is used:

$$R_t = \lambda_0 + \lambda_1\mathrm{M}(-3)_t + \lambda_2\mathrm{M}(-2)_t + \lambda_3\mathrm{M}(-1)_t + \lambda_4\mathrm{M}(+1)_t + \lambda_5\mathrm{M}(+2)_t + \lambda_6\mathrm{M}(+3)_t + \varepsilon_t \tag{7}$$

where $\mathrm{M}(-3)_t$ to $\mathrm{M}(+3)_t$ are turn of the month dummy variables.

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

$$h_t^2 = a + \beta\varepsilon_{t-1}^2 + \gamma h_{t-1}^2 + \delta_1\mathrm{M}(-3)_t + \delta_2\mathrm{M}(-2)_t + \delta_3(\mathrm{M}(-1)_t + \delta_4\mathrm{M}(+1)_t + \delta_5\mathrm{M}(+2)_t + \delta_6\mathrm{M}(+3)_t \tag{8}$$

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 the 17th day of the month and the last segment consists of the other days, that is, the 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 NASDAQ Index during the period January 1972 – June 1995, they reported 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. Furthermore, they indicated that this pattern remained remarkably consistent for the two indices examined. It also held up well over the business cycles and many different sub-periods tested. Following Kohers and Patel (1999) the below regression is estimated:

$$R_t = \beta_0 + \beta_1 d_{2t} + \beta_2 d_{3t} + \varepsilon_t \tag{9}$$

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 ($d_{2\mathrm{t}}$ = first – third – month days and $d_{3\mathrm{t}}$ = second third month days). $d_{2\mathrm{t}}$ attains a value of 1 if the return is observed on the first- third – of – the – month days, 0 otherwise. Similarly, $d_{3\mathrm{t}}$ 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 used the following equation:

$$h_t^2 = a + \beta\varepsilon_{t-1}^2 + \gamma h_{t-1}^2 + \delta_1 d_{2t} + \delta_2 d_{3t} \qquad (10)$$

4. EMPIRICAL ANALYSIS

Table 1 reports the descriptive statistics for the sample of the two indices. The highest average daily return and the largest unconditional volatility appear for the SOFIX Index (Bulgaria). These results were expected, due to the fact that the Bulgarian stock exchange is an emerging market and therefore much smaller and more volatile than the ASE. Furthermore, descriptive statistics indicate that returns are not normally distributed and are characterised as leptokurtic and skewed.

Table 1
Summary Statistics

Period: (1/1/2002 – 31/07/2008)	*Greece (ASE Index)*	*Bulgaria (SOFIX Index)*
Mean	-0.000232	0.001124
Maximum	0.081546	0.264281
Minimum	-0.092597	-0.177644
Std. Dev.	0.015778	0.022869
Skewness	-0.149364	-0.400821
Kurtosis	8.921486	41.82254

Table 2 displays the estimation results of equation (1). Results clearly indicate that there is no day of the week effect in Bulgaria. On the other hand there is enough evidence that day of the week effect strongly exists in Greece and that Monday returns are negative and statistically significant while Friday returns are positive and statistically significant. In addition, it is clear that Monday returns are the lowest and Friday returns are the highest, findings that match perfectly with the 'Monday effect definition'.

Table 2
The Day of the Week Effect in Mean

Index	α_1	α_2	α_3	α_4	α_5	*Wald*
Greece	-0.0021***	0.0003	0.0015*	-0.0035***	0.0041***	5.2299***
(ASE Index)	(0.0007)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	[0.0004]
Bulgaria	0.0004	0.0022	-0.0006	0.0021*	0.0004	1.41258
(SOFIX Index)	(0.0009)	(0.0015)	(0.0015)	(0.0005)	(0.0015)	[0.2011]

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 presents the results of estimating the variance model in equation 2, where we can see that day of the week effect exists again for Greece at 95% level of confidence (i.e. not as strong as in equation 1). Monday presents high and statistically significant variance and Thursdays and Fridays appear to have lower variances than Monday's and significant. It is important to add that day of the week effect in variance appears to be strongly present in Bulgaria since Tuesday and Thursday variances appear to be statistically significant. This result comes to opposition with the results of equation (1) for Bulgaria.

Table 3
The Day of the Week Effect in Volatility

Index	α	β	γ	δ_2	δ_3	δ_4	α_5	*Wald*
Greece	0.0001***	0.1171***	0.8972***	0.0002	0.0009	0.0023***	0.0021**	2.5236**
(ASE Index)	(0.0000)	(0.0119)	(0.0134)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	[0.0466]
Bulgaria	0.0000***	0.1258***	0.9031***	-0.0032***	0.0001	0.0024**	0.0004	4.7622***
(SOFIX Index)	(0.0001)	(0.0073)	(0.0056)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	[0.0005]

The results for the January effect using the mean model (equation 3) are presented in Table 4, where we find no evidence that January effect exists in any of the two examined Balkan stock markets.

On the other hand, testing the monthly (January) effect in variance (equation 4), we find interestingly different results (Table 5), since the effect appears to be present in Greece. Furthermore, in Greece, January has the highest significant variance, while March, June and September appear to have significantly different and lower variances than January. In addition, testing the monthly effect in Bulgaria, using the GARCH model we reach to the conclusion of non-existence, since the GARCH findings are in line with the mean results.

As shown in Table 6, there is no evidence for the half month effect in mean (equation 5) for both indices since neither tested country presented statistically different results for the first half of the month.

Table 7 reports on findings occurred measuring this effect in variance using equation 6, so we are obliged to accept to null hypothesis of equal half months for both equity markets.

Table 8 presents the results of testing the turn of the month effect in mean (equation 7). 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 where found to be significantly higher than the rest of the month days. On the other hand, testing this effect for Bulgaria, we found no presence of the TOM effect at any acceptable level of confidence.

Table 4
The January Effect in Mean

Index	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	β_{10}	β_{11}	β_{12}	*Wald*
Greece	-0.0003	-0.0001	-0.0022	0.0015	-0.0001	-0.0012	0.0011	-0.0005	-0.0018	0.0008	0.0012	0.0010	0.8788
(ASE Index)	(0.0012)	(0.0017)	(0.0017)	(0.0016)	(0.0017)	(0.0017)	(0.0017)	(0.0016)	(0.0017)	(0.0017)	(0.0016)	(0.0017)	[0.6125]
Bulgaria	0.0016	0.0017	-0.0043	-0.0005	-0.0021	-0.0022	0.0017	- 0.0008	0.0015	0.0006	-0.0005	-0.0006	0.9001
(SOFIX Index)	(0.0017)	(0.0024)	(0.0024)	(0.0024)	(0.0025)	(0.0024)	(0.0024)	(0.0024)	(0.0025)	(0.0024)	(0.0024)	(0.0024)	[0.6188]

Table 5
The January Effect in Volatility

Index	α	β	γ	δ_2	α_3	α_4	α_5	α_6	α_7	α_8	α_9	α_{10}	α_{11}	α_{12}	*Wald*
Greece	0.0001^{***}	0.1011^{***}	0.8977^{***}	-0.0016	-0.0050^{***}	-0.0003	-0.0011	-0.0026^{*}	-0.0004	-0.0020	-0.0023^{*}	-0.0006	-0.0003	-0.0005	2.2009^{**}
(ASE Index)	(0.0001)	(0.0095)	(0.0109)	(0.0012)	(0.0013)	(0.0014)	(0.0012)	(0.0012)	(0.0013)	(0.0013)	(0.0013)	(0.0012)	(0.0012)	(0.0012)	[0.0122]
Bulgaria	0.0025^{**}	0.1291^{***}	0.8852^{***}	-0.0022	-0.0004	-0.0002	0.0003	-0.0013	-0.0011	-0.0009	-0.0004	0.0016	-0.0007	0.0023	1.5532
(SOFIX Index)	(0.0035)	(0.0079)	(0.0055)	(0.0018)	(0.0003)	(0.0001)	(0.0002)	(0.0009)	(0.0006)	(0.0004)	(0.0001)	(0.0009)	(0.0009)	(0.0017)	[0.2101]

Table 6
The Half Month Effect in Mean

Index	γ_0	γ_1
Greece	-0.00045	0.00024
(ASE Index)	(0.00057)	(0.00085)
Bulgaria	0.0031***	-0.0029
(SOFIX Index)	(0.0081)	(0.0016)

Table 7
The Half Month Effect in Variance

Index	α	β	γ	δ
Greece	0.0009***	0.1167***	0.8875***	-0.0008
(ASE Index)	(0.0013)	(0.0012)	(0.0125)	(0.0005)
Bulgaria	0.0011	0.15001***	0.9491***	0.0009
(SOFIX Index)	(0.0008)	(0.0099)	(0.0056)	(0.0008)

Table 8
The TOM effect in mean

Index	λ_0	λ_1	λ_2	λ_3	λ_4	λ_5	λ_6	*Wald*
Greece	-0.0012**	0.0022	-0.0004	0.0041**	0.0036**	0.0032*	0.0016	2.0201*
(ASE Index)	(0.0005)	(0.0015)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0015)	[0.0624]
Bulgaria	0.0021*	0.0028	0.0059**	-0.0031	-0.0027	-0.0025	-0.0022	1.6411
(SOFIX Index)	(0.0007)	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0026)	[0.1799]

Table 9 presents the results of testing the turn of the month effect in variance using equation (8). These findings are in line with the mean model, since this anomaly strongly exists in Greece. The effect is present due to the fact that coefficients δ_1 and δ_6 where found negative and significantly lower than rest of the month days while coefficient δ_5 was found positive and significantly higher. On the other hand, the variance results for Bulgaria are in line once again with the mean findings, since we are obliged to accept the null hypothesis of equal variances.

Table 10 presents the results of testing the time of the month effect in mean (equation 9). As shown, this anomaly appears to be strongly present in Greece, due to the fact that the first third of the month appears to be significant and higher than the last third of the month. However, the findings for the SOFIX index indicate that there is no presence of this effect in Bulgaria.

Finally, Table 11 presents the estimation results for the variance model of equation (10). These findings appear to be in line with the mean model results. The

Table 9
The TOM Effect in Volatility

Index	α	β	γ	δ_1	α_2	α_3	α_4	α_5	α_6	*Wald*
Greece	0.0005***	0.1233***	0.8899***	-0.0005**	0.0003	0.0006	0.0005	0.0009*	-0.0006**	2.2755**
(ASE Index)	(0.0004)	(0.0123)	(0.0133)	(0.0005)	(0.0002)	(0.0002)	(0.0002)	(0.0004)	(0.0004)	[0.0402]
Bulgaria	0.0008**	0.1435***	0.8991***	0.0003	0.0007	-0.0009	0.0003	-0.0005	-0.0003	0.4399
(SOFIX Index)	(0.0007)	(0.0091)	(0.0062)	(0.0002)	(0.0003)	(0.0003)	(0.0002)	(0.0003)	(0.0002)	[0.8687]

Table 10
The Time of the Month Effect in Mean

Index	β_0	β_1	β_2	*Wald*
Greece	0.0014	0.0027***	-0.0008	5.7101***
(ASE Index)	(0.0009)	(0.0010)	(0.0013)	[0.0008]
Bulgaria	0.0048***	-0.0031	-0.0022	1.4533
(SOFIX Index)	(0.0067)	(0.0018)	(0.0017)	[0.5798]

anomaly is strongly present in Greece, while this effect shows no signs of existence in Bulgaria, and therefore we accept the hypothesis of equal variances.

Table 11
The Time of the Month Effect in Volatility

Index	α	β	γ	δ_1	δ_2	*Wald*
Greece	0.0005**	0.1038***	0.9126***	-0.0005**	-0.0003	7.2696***
(ASE Index)	(0.0003)	(0.0112)	(0.0121)	(0.0003)	(0.0003)	[0.0021]
Bulgaria	0.0005	0.1239***	0.9659***	-0.0008	0.0010	1.6961
(SOFIX Index)	(0.0004)	(0.0088)	(0.0062)	(0.0005)	(0.0009)	[0.1724]

5. SUMMARY AND CONCLUSIONS

This study investigates five calendar effects in mean stock returns and their variances for Bulgaria and its mature Balkan counterpart (Greece), using daily closing values of the SOFIX Index and ASE Index respectively covering the period (1/1/2002 - 31/07/2008) for both indices. We documented the existence / non-existence of the day of the week (Monday) effect, the January (monthly) effect, the half month effect, the turn of the month effect and the time of the month effect in mean stock returns (OLS) and their variances (GARCH).

The empirical analysis relating to the five calendar anomalies is summarized and tabulated in Table 12 for the mean model and in Table 13 for the variance model.

Our research concerning Greece found that using the mean equations, the day of the week effect, the turn of the month effect and the time of the month effect exist in ASE Index. Similar findings occurred using the variance equations with the difference that the January effect appears to be strongly present using the GARCH model and the turn of the month effect is present measuring this effect in variance at a higher level of confidence. These results are consistent with the previous work of many researchers, who all agree that calendar effects are present in ASE (Alexakis and Xanthakis, 1995; Mills *et al.*, 2000; Coutts *et al.*, 2000; Tsamis and Georgantopoulos, 2007; Kenourgios and Samitas, 2008).

On the other hand, our research concerning Bulgaria concluded that using mean equations the calendar effects are not present in this emerging equity market.

However, using the GARCH model we reached to the conclusion that the day of the week effect is strongly present. All other results are in line with the OLS findings, reaching to the conclusion of non – existence.

Table 12
Summary of Calendar Effects in mean

Index	*Day of the week effect*	*January Effect*	*Half Month Effect*	*Turn of the month effect*	*Time of the Month Effect*
Greece (ASE Index)	**Strong**	None	None	**Weak**	**Strong**
Bulgaria (SOFIX Index)	None	None	None	None	None

Table 13
Summary of Calendar Effects in Variance

Index	*Day of the week effect*	*January Effect*	*Half Month Effect*	*Turn of the month effect*	*Time of the Month Effect*
Greece (ASE Index)	**Strong**	**Strong**	None	**Strong**	**Strong**
Bulgaria (SOFIX Index)	**Strong**	None	None	None	None

Overall, it is important to add that different results were expected to be found. Historical researches around the world dealing with 'the calendar anomalies phenomenon' have come to the conclusion that a matured financial market eliminates market inefficiencies like calendar effects, and that this kind of 'flaws' are mostly reported in emerging markets. In our study we reached to the opposite conclusion. Our research concerning Greece (which is considered a matured financial market) reports findings of existence on four calendar effects (using mean and variance equations). On the contrary, Bulgaria, which is considered an emerging stock market, presents no existence of calendar effects in mean and only the day of the week effect appears statistically significant in variance model analysis.

Therefore, future research may examine the calendar anomalies on these markets to a severe bear market situation (under the 2008 global financial crisis) in order to test whether these controversial characteristics are still alive in these neighbouring and co – integrated equity markets.

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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