THE DAY OF THE WEEK EFFECT IN SOUTH EASTERN EUROPE STOCK MARKETS

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Abstract

The main aim of this research is to examine existence of day of the week effect on the stock market indices in five countries from South Eastern Europe (SEE): Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia and Serbia in the most recent period which is characterized by the bear market (from 2006 to 2011). The methodology used the regression with dummy variables, or so called Analysis of Variance (ANOVA) model. In addition Wald test is applied. The results imply that the mean daily return of the all five SEE indices is negative on Monday. The day of the week effect is found only in Croatian and Bulgarian Stock Market. In both stock markets, the mean daily returns of the leading indices are lower on Monday than the other days of the week and the results are statistically significant. The lower Monday mean daily returns are found also in Macedonian stock exchange index, but the results are not statistically significant. The mean daily returns of BELEX15 and BIFX indices in Tuesday are lower than mean daily return on Monday, but also without statistical significance.

Key words: *calendar anomalies, the day of the week effect, daily returns, SEE.*

JEL Classifications: *C32, G10*

1.Introduction

The economics effects related to the calendar, that influence the movement of the returns in any stock market are called 'calendar effects'. Many of the effects show different behavior of the returns on different days of the week, different times of the month, or different times of the year. They therefore are sometimes referred as 'seasonal effects', and also may be examined in a period longer than one year. Most of the prompted effects are cyclical anomalies in the term of returns, where the cycle is based on the calendar. The significance of such anomalies is a wide field of analysis of the researches, which develop different methods and patterns to fit the values of the indexes and prices on the different stock markets.

There are various calendar effects such as the day of the week effect, the half month effect, the turn of the month effect or the month of the year effect. This paper focuses on the day of the week effect, which is also known as the weekend effect. The returns on Monday should be measure of the result of the investment for 72 hours - from the closing the stock market on Friday tills the opening on Monday. Therefore they should be higher than the 24 hours returns in the other days in the week. However, many studies of the stock markets in different countries showed that the average returns on Monday are lower than the other days in the week and even negative. There are different explanations for the weekend effect. Abraham and Ikenberry (1994) argue that the investors have the tendency to sell on Monday after the revision of their portfolios during the weekend. Chen and Singal (2003) shows that the investors closed the short positions (buy) on Fridays and open them again on Mondays (sell). Taylor (2008) comments that not satisfactory explanation has yet been given for the weekend effect.

The goal of this paper is to analyze the occurrence of the day of the week effect on the stock market indices in five countries from South Eastern Europe (SEE): Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia and Serbia for the most recent period (from 2006 to 2011). This period is characterized with the bear market with started from the middle of 2007.

The paper provides evidence that the mean daily return of the all five SEE indices is negative on Monday in the analyzed period. The day of the week effect is found only in Croatian and Bulgarian Stock Market. In both stock markets, the mean daily returns of the leading indices are lower on Monday than the other days of the week and the

results are statistically significant. The lower Monday mean daily returns are found also in Macedonian stock exchange index, but the results are not statistically significant. The mean daily returns of BELEX15 and BIFX indices in Tuesday are lower than mean daily return on Monday, but also without statistical significance.

The structure of the paper is as follows. Section 2 surveys the literature. Section 3 presents the data. The methodology and the empirical results are discussed in the Section 4 and Section 5, respectively. Section 6 concludes.

2. Literature Review

Since the seminal work of Fama (1965) numerous research papers can be found that have examined calendar effects. Cross (1973) was amongst the first authors that have ever studied the day of the week effect, but without the usage of statistical models. He studied the returns on the S&P 500 Index on the U. S. market, over the period of 1953-1970. His conclusions are that the mean return on Friday (0.12 percent) is higher than the one on Monday (-0.18 percent). Similar conclusions were driven out by French (1980) who studying the S&P 500 for the period of 1953-1977 and found out that the Monday returns are lower than the other days by 0.2 % in average, and the average returns on Monday are negative for 20 out of 25 years. Gibbons and Hess (1981) analyzed the Dow Jones Industrial Index and found negative Monday returns.

Rogalski (1984) was the first to use the OLS regression method, F and t-statistics, revealed that stock returns on Monday are negative, but not statistically significant. He made a distinction between the trading days' returns and non-trading days' returns. By doing that he found out that the negative return on Monday is contained in the average Friday close and Mondays open return. In addition, Dyl and Maberly (1988) explain that firms have a tendency of reporting mostly bad news on Fridays. That delay of declaring bad news, might be related to the negative returns on Monday. Chang et al. (1993) confirmed the significance of the weekend effect. Aggarwal and Tandon (1994) by the usage of OLS dummy regression tested the day of the week effect and concluded that Monday stock returns are negative in thirteen countries and significant in only seven. They also revealed that Friday returns are positive and significant in the majority of the countries.

The more recent studies show us that the calendar effects are starting to diminish. Rubinstein (2001), Schwert (2001) and Steely (2001) discovered during their international studies that calendar effects are becoming weaker, especially in developed markets. Sullivan, Timmerman and White (2001) state that calendar effects are no longer statistically significant. Chukwuogor-Ndu (2006) after analyzing the day of the week effect on stock market returns in 15 European countries, found that merely 7 markets show confirmative evidence.

One of the most famous month of the year effect is the January effect. Most of the researches have shown that stock returns tend to be higher in January than any month in the year. One of the first studies on this subject was performed by Rozeff and Kinney(1976). Their study was based on the New York Stock Exchange during the period of 1904-1974 and showed that the average returns were higher in January(3,5%) compared to those for the other months of the year(0,5%). Dyl (1977) found out that there is an abnormally high volume of stocks that decline in price in December, and that the same stocks record abnormally high returns in January. Brown et al. (1983) found a similar pattern in Australian stock returns. Keim(1983) checked out the relationship of size effect and seasonality. He concluded that the small firm returns in January are significantly higher than the ones of large firms. However, Easterday and Stephan (2006) re-examined the small firm January effect proposed by Keim (1983) by dividing three subperiods: 1943-1962,1963-1979 and 1980-2004. They found out that pre and post Keim period returns of small firms were remarkably lower in January than the ones examined in the period of 1963-1979.

A more recent study of Balaban (1995) was conducted with the aim of researching the month of the year effect on the Turkish stock exchange. His study showed that not only January, but June and September also had significantly higher returns than other months. Among these, January had a return of 22% which was about 4 times greater than the global return of all months. Using the OLS estimation with dummy independent variables each of which representing the day belonging in the specific month, Arsad and Coutts (1997) revealed that the average returns in January are significantly positive for FTSE-100 index and this followed the introduction of capital gains tax in 1965. Also, Fountas and Segredakis (2002) after studying eighteen equity market over the period of 1987-1995 concluded that the stock returns for January are significantly higher than the ones for the rest of the year in only five markets: Chile, Greece, Korea, Taiwan and Turkey. Bildik (2004) confirmed the presence of the January effect in the daily stock returns derived from an Index of the Istanbul Stock Exchange over the period 1988-1999.

However, there are studies that show the presence of an April effect. Gultekin and Gultekin (1983) after studying the UK stock market between 1959 and 1979 using both nonparametric and parametric methods, found out that April had the highest returns. Kumari and Mahendra (2006) studied the month of the year effect on the Indian Stock Market during the period of 1979-1998. They also found that the returns in April are significantly higher than the other months. Researching the stock returns in Ghana between 1994-2004, Alagidede and Panagiotidis (2009) also confirmed the existence of the April effect.

In the region of SEE there are few studies, as the best knowledge of authors. Georgantopoulos et al. (2011) investigates five calendar anomalies (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) for four emerging stock markets, Romania, Bulgaria, Croatia and Turkey

and their mature counterpart in the Balkan region, Greece, during the period 2000-2008. They provide evidence for the existence of three calendar effects (day of the week, turn of the month, time of the month) for Greece and Turkey, while the effects for the three emerging Balkan markets are limited and exist only in volatility. Georgantopoulos and Tsamis (2011) results indicate that only two calendar effects (day of the week and January effects) are present in the Macedonian stock market during the period 2002-2008, while the half month effect, the turn of the month effect and the time of the month effect are not. Georgantopoulos and Tsamis (2012) investigate also the calendar anomalies for Bulgaria and Greece during the period 2002–2008. They found that most of the tested calendar effects exist for Greece and the effects for Bulgaria are limited and exist only in variance. Karadzic and Backovic Vulic (2011) report absence of three calendar anomalies: the January effect, the turn-of the-month effect and the holiday effect for the Montenegrin capital market during the period 2004 - 2010.

3. Methodology

The day of the week effect is analyzed using a model, originally proposed by French (1980) and used by Rogalski (1984), Jaffe and Westerfield (1989), Agrawal and Tandon (1994), Mills and Couts (1995). It is the regression with dummy variables, or so called Analysis of Variance (ANOVA) model:

$$R_t = \beta_1 + \beta_2 D_{2t} + \beta_3 D_{3t} + \beta_4 D_{4t} + \beta_5 D_{5t} + u_t$$

where R_t is the daily return on a selected stock market index, D_{2t} is dummy variable that takes value 1 for Tuesday and 0 for all other days, D_{3t} takes value 1 for Wednesday and 0 for all other days, D_{4t} takes value 1 for Thursday and 0 for all other days, D_{5t} is dummy variable that takes value 1 for Friday and 0 for all other days. Monday represents the control category. The coefficient β_1 indicates the mean daily return for Monday (control category), while β_2 to β_5 represents the difference between the mean daily return for Monday and the mean daily return for each of the other days in the week. The error term is noted as u_t and it is assumed to be identically and independently distributed (IID). Gujarati (2004) argue that ANOVA models are more general than the t test which can be used to compare the means of two groups or categories only.

If there are no differences among index returns across days of the week, the parameters of β_2 to β_5 are zero. Therefore, the null hypothesis of the relevant Wald test is the following

H_0: $\beta_i = 0$ 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 (Georgantopoulos and Tsamis, 2011).

4. Data

The data set is consisted of the daily returns of the leading indices of the Belgrade Stock Exchange (Serbia), Sarajevo Stock Exchange (Bosnia and Herzegovina), Zagreb Stock Exchange (Croatia), Macedonian Stock Exchange (Macedonia) and Bulgarian Stock Exchange (Bulgaria): BELEX15, BIFX, CROBEX, MBI10 and SOFIX, respectively.

The daily returns are continuously compounded. They are calculated as

$$R_t = \ln\left(\frac{P_t}{P_{t-1}}\right),$$

where the variable P_t denotes the closing stock price, while P_{t-1} expresses the closing stock price with one lag. The closing stock prices are taken from the official stock market websites.

Table 1. Descriptive statistics

Index	Number of observations (trading days)	Minimum daily return, in %	Maximum daily return, in %	Mean daily return, in %	Standard deviation of daily return
BELEX15	1511	-10.86	12.16	-0.0499	1.65371
BIFX	1501	-8.78	7.57	-0.0635	1.15435
CROBEX	1496	-10.76	14.78	-0.0092	1.55784
MBI10	1477	-10.28	6.66	-0.0101	1.58988
SOFIX	1491	-11.36	7.29	-0.0631	1.48082

Descriptive statistics of the analyzed indexes are provided in the Table 1. The number of observations which is equal to number of trading days in each stock market varies from 1477 in Macedonia to 1511 in Serbia. The time span is from the fist trading days in 2006 (2nd January for CROBEX, 3rd January for SOFIX, 4th January for BIFX and MBI10, and 9th January for BELEX15) to the last trading days in 2011 (29th December for MBI10 and 30th December for the other indices). The analyzed period is characterized by the bear market which starts from the middle of 2007 in all markets.

The mean daily returns of all five indices are negative. The reason for this is the bear market that started from the 2007 in the all analyzed markets as the result of the Global financial crisis. The highest standard deviation of daily returns is observed in BELEX15 (1.65371) and lowest in BIFX (1.15435). Minimum daily return of -11.36% is observed in SOFIX and maximum daily return of 14.78% in CROBEX.

5. Empirical Results

The results of the regressions are reported in table 2. The all estimated intercept coefficients (β_1) are negative, which imply that mean daily return of the five stock indexes on Monday is negative. The weekend effect is found only in Croatian and Bulgarian Stock Market. For the CROBEX index, the Wald test F-statistic is significant at 5% level and all estimated dummy variables are positive and statistically significant, which imply that mean daily return on Monday is lower than the mean returns in the rest of the days. So, the mean daily return in Tuesday is equal to 0.0281% (-0.2654+0.2935), in Wednesday 0.0673% (-0.2654+0.3326), in Thursday 0.0777% (-0.2654+0.3431) and on Friday 0.0428% (-0.2654+0.3081). The results imply that for this index only mean daily return on Monday is negative, while for other days in the week is positive. For the SOFIX index, the Wald test F-statistic is significant at 10% level and only dummy variable for Friday is significant which leads to conclusion that mean daily return on Friday is 0.2408% higher than the mean daily return on Monday. The mean daily return of the MBI10 index on Monday is lower than the other days in the week, but the results are not statistically significant. For the BIFX index, Tuesday and Thursday are found to have lower mean return than the Monday, but also the results are not statistically significant. The BELEX15 index have also Tuesday mean daily return lower than Monday and not statistically significant, where only the dummy variable for Thursday is significant which point that mean daily return in Thursday are higher than Monday.

Table 2. Estimated results of the regression models

Index	β_1	β_2	β_3	β_4	β_5	Wald test F-statistic
BELEX15	-0.139379 (0.1461)	-0.083148 (0.5370)	0.118105 (0.3802)	0.231493* (0.0855)	0.180584 (0.1830)	1.8649 (0.1141)
BIFX	-0.081515 (0.2256)	-0.089125 (0.3480)	0.041077 (0.6630)	-0.020148 (0.8310)	0.155272 (0.1002)	1.8437 (0.1180)
CROBEX	-0.265381*** (0.0034)	0.293529** (0.0209)	0.332634*** (0.0088)	0.343116*** (0.0072)	0.308140** (0.0163)	2.5525** (0.0375)
MBI10	-0.113245 (0.2264)	0.071995 (0.5843)	0.150294 (0.2515)	0.111784 (0.3944)	0.179348 (0.1742)	0.5632 (0.6857)
SOFIX	-0.172478** (0.0450)	-0.033540 (0.7820)	0.191085 (0.1141)	0.149625 (0.2170)	0.240845** (0.0485)	1.96688* (0.0968)

Notes: p-values are reported in brackets; *, **, *** denote significance at 0.1, 0.05 and 0.01, respectively.

6. Conclusion

The goal of this paper was to examine the presence of the weekend effect in the five stock markets from SEE. This calendar anomaly has two characteristics: (1) the mean returns on Monday are lower than the other trading days in the week, and (2) the mean returns on Monday are negative. There is no common explanation for the weekend effect. One explanation is that the investors have the tendency to sell on Monday after the revision of their portfolios during the weekend. Other that that the investors closed the short positions (buy) on Fridays and open them again on Mondays (sell).

The weekend effect is well documented for the stock markets of developed countries. However there are only few studies for SEE region. This paper analyzed daily returns of the BELEX15, BIFX, CROBEX, MBI10 and SOFIX. They are leading indices of the Belgrade Stock Exchange (Serbia), Sarajevo Stock Exchange (Bosnia and Herzegovina), Zagreb Stock Exchange (Croatia), Macedonian Stock Exchange (Macedonia) and Bulgarian Stock Exchange (Bulgaria), respectively. The analyzed period is from the first trading day of 2006 to the last trading day in 2011 (it depends from the stock exchange).

The analysis is based on the regression with dummy variables, or so called Analysis of Variance (ANOVA) model. It is often used to compare the difference in the mean values of two or more groups or categories. In this case groups are different trading days in the week.

The weekend effect is found only in Croatian and Bulgarian Stock Market. The mean daily return of the

MBI10 index on Monday is lower than the other days in the week, but the results are not statistically significant. The mean daily returns in Tuesday of BELEX15 and BIFX indices are lower than mean daily return on Monday, but also without statistical significance. In addition, it is found that mean daily return on Monday of the all five stock indices is negative. The investors could design trading strategies which take advantage of the documented calendar effect patterns.

The future research may extend the scope of examination. First, the analysis to be extended to other calendar anomalies: the half month effect, the turn of the month effect, the month of the year effect, or holiday effect. Second, the time span of the indices to be enlarged and to go from the start date of the leading SEE indices to the present. Third, the calendar anomalies to be analyzed in bull market and bear market separately.

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