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The Behavior of Stock Prices during Lent and Advent

Ramona DUMITRIU^{1*}, Razvan STEFANESCU²

Abstract

The religious practices generate some important calendar effects on the stock markets evolutions. This paper explores the impact on stock markets of two periods from the Catholic Church Calendar, Advent and Lent, for the period January 2009 – May 2017. We employ as data the closing daily values of stock exchanges indexes from five countries where the main religion is the Roman Catholicism: Argentina, Brazil, Chile, Hungary and Mexico. The sample of data used in the investigation is divided in two sub – samples: the first, from January 2009 to December 2012, covers a period when international stock market recovered after the 2007 – 2008 crisis, while the second sub – sample, from January 2013 to May 2017, corresponds, at a global scale, to a relative normal period. We employ GARCH models to reveal the impact of the Advent and Lent on the prices returns and volatility. For the first sub-sample we found no effect on returns but a decline in volatility during Advent for all the five indexes and during Lent only for the stock market from Brazil. For the second sub-sample the results indicate a decline in returns during Advent, for the stock markets from Argentina and Chile, but no impact on volatility. Such results could be explained by the circumstances specific to the religious practices but also by the inference of other calendar effects.

Keywords: *Stock markets, Volatility, Returns, Calendar effects, Religious practices.*

1. Introduction

In the last decades, several researches on the financial markets revealed various forms of the seasonality affecting returns and volatility of the assets' prices. For the investors' perspective, the knowledge on the

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seasonality of a financial market's returns, identified by the analysis of the historical prices, could be exploited in building successful investment strategies. However, the profitability of such strategies contradicts the spirit of Fama [35] Efficient Market Hypothesis (EMH) which proclaimed that the historical prices are useless in predicting the future returns. From its apparition, EMH had many opponents, especially from the partisans of the Behavioral Finance (BF) which revealed many so-called "anomalies" to the markets' efficiency. An important category of these anomalies are the calendar effects (or calendar anomalies) which are referring to the possibility that an investor could beat a market using his or her knowledge on the returns' seasonality. However, the reliability of such investment strategies depends on the persistence in time of the calendar effect [36, 65]. Many empirical researchers found that some anomalies tend to change in time [37, 54]. Dimson and Marsh [30] formulated a Murphy's Law for the financial markets' seasonality stipulating that, after have been identified, a calendar anomalies tend to disappear or even to go to reverse.

The time varying of the calendar effects induce a significant complexity to their identification. There are other factors that increase such complexity. In general, the financial market prices are very sensitive to a large category of external shocks [34]. It could not be excluded the inference between different forms of the financial markets' seasonality. A part of a year associated to a calendar anomaly could include periods of time associated to other calendar effects. In such circumstances the revealing of the calendar effects is very often marked by ambiguity [37, 51].

Very often, for the decision regarding the investment on the financial assets, the decision makers have to arbitrage between the potential returns and the risk associated to the investment. One of the main aspects used in the assessing of such risks is the volatility of the returns. In the last decades, the development of the Engle [32] and Bollerslev [20] GARCH models offered new perspectives for the study of the volatility. The equations of such model could reveal the most important aspects of the volatility including its seasonality [4, 33, 56].

A special category of calendar anomalies are those related to the religious practices. Many important religions established their calendars with specific days of fasting and celebration which could influence, through the investors' mood, the financial markets' behavior. In the specialized literature there could be found several explanations of the calendar effects related to religious practices. Since some religions considered the stock market speculations as immoral, it is understandable that some of their believers would avoid such operations during the sacred days [8, 24, 42, 44, 55]. The liquidity constraints become more pregnant before a festivity period [1, 38,

64]. The holidays that usually occur near religious events influence the investors risk aversion [10, 17, 53, 59, 42, 46, 50, 57]. The refrain from consuming food and drinks, prescribed by some religions during the fasting, could influence the investors' mood by changing their metabolism [17, 66]. The heightening of religiosity could also affect the mood of the investors [9, 11, 17, 62]. Obviously, the magnitude of such effects depends on the intensity of the religious sentiments among the investors [40, 46].

In this paper we approach the stock markets behaviors during two important periods of the Catholic Church Calendar: Advent and Lent. The season of Advent starts in the fourth Sunday before Christmas and ends with December 25, when it is celebrated the birth of Jesus Christ. The Catholic Church recommends for this period the celebration of Jesus Christ Nativity by blessing, fasting and abstinence (in the last centuries, the requirements of the fasting and abstinence for the Catholic believers were gradually relaxed). There are some traditions (the Jesse tree, the Christ candle, the Christmas baking, the empty manger, the Advent wreath etc.) which strengthen the holiday spirit associated to the Advent. Usually, in the last days of Advent, the shopping activities intensify [16, 19].

The Lent season starts on the Ash Wednesday (which occurs between February 4 and March 10) and ends, after 46 days, on the Easter Sunday which celebrates the resurrection of Jesus Christ. The Catholic believers are expected to spend this period in fasting, praying, meditating to the passions of Messiah. As in the case of Advent, a significant holiday spirit is associated to Lent [14, 16].

We study the behavior of capital markets during Advent and Lent, using the data of closing values of stock exchanges indexes from five countries, where the dominant religion is the Roman Catholicism: Argentina, Brazil, Chile, Hungary and Mexico. All of them are emerging markets which are supposed to be not very integrated to the global markets [15]. We use closing daily values of the indexes for a period of time that begins in January 2009 and ends in May 2017. We investigate the behavior of five stock markets for two parts of this period:

- the first part, from January 2009 to December 2012, was a period when the international stock markets were recovering after the 2007 – 2008 crisis, but they remained very sensitive to external impulses;
- the second part, from January 2013 to May 2017, was, at a global scale, a relative normal period.

In order to capture the impact of Advent and Lent on the returns and stock markets volatility, we employ GARCH models with dummy variables associated to the two periods of the Catholic Church calendar.

The remainder of the paper is organized as it follows: the second part formulates the problem statement, the third part approaches the research questions and the aims of the research, the fourth part describes the research methods, the fifth part presents the findings of the research, the sixth part discusses these findings and the seventh part concludes.

2. Problem Statement

Some categories of the calendar anomalies related to the religious practices were approached in the financial markets literature. Lakonishok and Smidt [48] found significant changes in United States capital markets evolution during the days preceding the Christian Holy Days. A recent study approached the behavior of Romanian capital market during the two main periods of fasting stipulated by the calendar of the Eastern Orthodox Church: Great Lent and Nativity Fasting [63].

In their study on the seasonality of the Malaysian stock market, Wong et al. [68] revealed the strong impact of Chinese New Year. Other researches on the Asian capital markets confirmed the significant effects of such celebration [3, 25, 39, 69, 71].

Husain [44] studied the behavior of Pakistani equity market during Ramadan, the holy month of fasting in the Islamic Calendar. The results of his investigation indicated a decline in the stock returns volatility in this period. Other researchers found significant impact of the Ramadan on other Muslim countries [8, 18, 55, 60-62].

Frieder and Subrahmanyam [38] analyzed the influence on United States capital market of some religious celebrations, especially the Christian St. Patrick's Day and the Jewish High Holy Days of Rosh Hashanah and Yom Kippur. They found that the volume of transactions tended to decrease during the two Jewish Holy Days. The returns were also sensitive to the investigated Holy Days: they were higher than the average in the days preceding St. Patrick's Day and Rosh Hashanah but tended to decrease after Yom Kippur. The study of Yaktrakis & Williams [70], who investigated the impact of Jewish religious Holy Days on New York Stock Exchange between 1907 and 2008, confirmed the efficiency of old trading strategies, consisting in selling before Rosh Hashanah and buying before Yom Kippur.

In a research of the calendar effects on the capital markets from India, Patel [58] found a significant impact of the celebration of Diwali Festival, the beginning of a New Year in Hindu religion. Later, Agrawal et al. [2] and Maheta [53] identified significant influence over the Bombay Stock Exchange of Diwali and other Hindu festivals.

To our knowledge, until now, there were no studies approaching the seasonality of the returns and volatility, associated to the Lent and Advent, for the emerging stock markets from countries where the dominant religion is the Roman Catholicism. Obviously, the results of this investigation for only five countries couldn't be generalized for the whole community of the Catholic states. However, they could provide some evidences about the way in which the religion practices could influence the financial markets behavior.

3. Research Questions/Aims of the research

The main goal of this paper is to find out if the Lent and the Advent have a significant impact on the stock markets from the five countries. To achieve this goal we formulate three specific objectives:

- to investigate the impact of the two periods of fasting on the returns of the five stock markets;
- to investigate the impact of the two periods of fasting on the volatility of the five stock markets;
- to analyze, if calendar anomalies associated to the two periods of fasting are identified, their persistence in time.

Associated to these objectives are three null hypotheses to be tested:

- H_{01} : There is no significant difference between the returns from the day of Lent and of Advent and the other days' returns;
- H_{02} : There is no significant difference between the volatility from the day of the Lent and the Advent and the other days' volatility;
- H_{03} : The calendar anomalies associated to Lent and to Advent are not persistent in time.

The validity of these hypotheses will be analyzed through the coefficients of the dummy variables included in the two equations of GARCH models.

4. Research Methods

4.1. Data

In this investigation about the stock markets behavior during Lent and Advent we employ the closing values of five indexes from the five emerging markets written before: Bovespa from Brasil, BUX from Hungary, IPC from Mexico, IPSA from Chile, and Merval from Argentina (the stock exchanges where the five indexes are computed and the sources of data used in that investigation are displayed in the Table 1).

As we mentioned before, we use a sample of data that covers the period January 2009 – May 2017, divided into two sub-samples:

- the first sub-sample, from January 2009 to December 2012;
- the second sub-sample, from January 2013 to May 2017.

Table 1. The five indexes employed in the investigation on the stock markets behavior during Advent and Lent

Index	Stock Exchange	Source of data
Bovespa	Bolsa de Valores do Estado de São Paulo	http://finance.yahoo.com
BUX	Budapesti Értéktőzsde	https://www.bse.hu
IPC	Bolsa Mexicana de Valores	http://finance.yahoo.com
IPSA	Bolsa de Comercio de Santiago	http://finance.yahoo.com
Merval	Buenos Aires Mercado de Valores	http://finance.yahoo.com

In the period of investigation the closed-values of the five indexes experienced different evolutions (Figure 1). While IPC and Merval had a significant ascendant trend, for the other three indexes, there were some relevant descendant evolutions.

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

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

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

For the returns of each index we determine the main indicators of the descriptive statistics. We also analyze their normality using the Jarque-Bera test. The null hypothesis of this test presumes that the sample data are not significantly different than a normal distribution. We consider that this hypothesis can be rejected if the p-value associated to the test is larger than 5%.

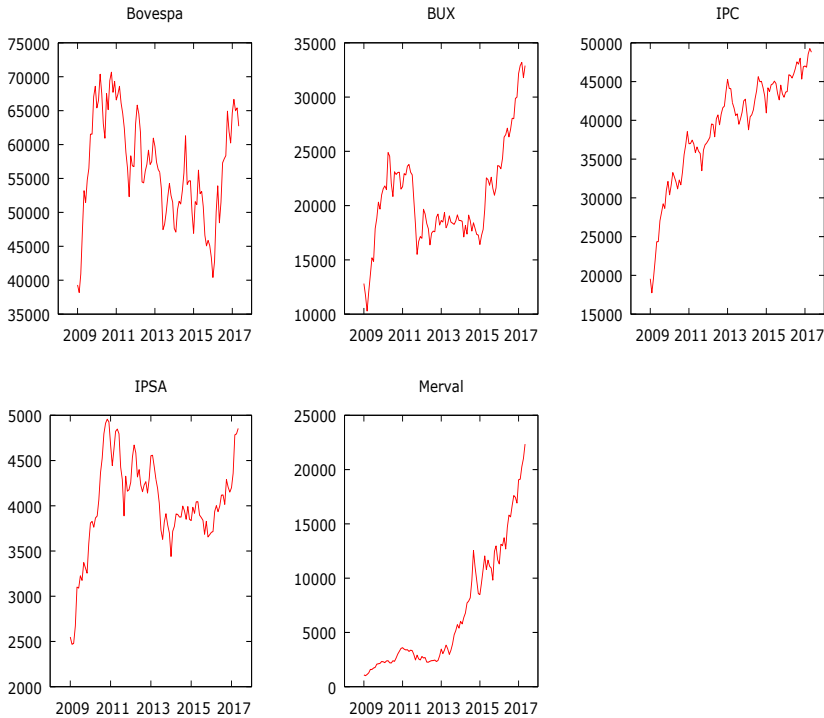


Figure 1. Evolution of the monthly adjusted – closed values of the five indexes between January 2009 and May 2017

4.2. Augmented Dickey – Fuller unit root test

In order to avoid spurious regressions we investigate the stationarity of the indexes returns by employing Augmented Dickey – Fuller (ADF) unit root test [27, 28]. In the regressions associated with this test we use intercept as deterministic term, while the number of lags are chosen by Akaike Information Criteria [5-7]. An ADF test takes the null hypothesis that the variable investigated is non-stationary and has a unit root. If the p-value associated to the test is smaller than 5% we could reject the null hypothesis and consider the variable as stationary.

4.3. GARCH technique

As we mentioned before, the impact of Lent and Advent on the returns and volatility of the five indexes are to be revealed by GARCH models with two dummy variables:

- $Lent_t$ is a dummy variable which takes value 1 for every day of the period of Lent and zero otherwise;

- Adv_t is a dummy variable which takes value 1 for every day of the period of Advent and zero otherwise.

We introduce the dummy variables in the two equations of a GARCH model:

- the conditional mean equation;
- the conditional variance equation.

The conditional mean equation, employed to capture the impact of Lent and Advent on returns mean, is associated to the expression:

$$r_t = \mu_0 + \mu_1 \times Lent_t + \mu_2 \times Adv_t + \sum_{k=1}^n (\xi_k \times r_{t-k}) + \varepsilon_t \quad (2)$$

where:

- μ_0 is a constant reflecting the returns from the days without Lent and Advent periods;
- μ_1 is a coefficient which captures the differences between the returns from the days of Lent fasting and those from the days without the two fasting periods;
- μ_2 is a coefficient which reflects the differences between the returns from the days of Advent and those from the days without the two fasting periods;
- ξ_k is a coefficient of the k-order lagged returns;
- n represents the number of lagged returns;
- ε_t is the error term.

The impact of the Lent and Advent on returns is assessed by the z-test calculated for the coefficients μ_1 and μ_2 . For each of them we formulate the null hypothesis that it does not differ significantly from 0. If the p-value associated to a coefficient is smaller than 10% we could reject the null hypothesis and consider that the period of fasting to which it refers has a significant impact on returns.

The conditional variance equation, used to reveal the influence of Lent and Advent on the volatility of the returns, has the form:

$$\sigma_t^2 = \omega + \nu_1 \times Lent_t + \nu_2 \times Adv_t + \sum_{k=1}^q \alpha_k \times \varepsilon_{t-k}^2 + \sum_{l=1}^p (\beta_l \times \sigma_{t-l}^2) \quad (3)$$

where:

- σ_t^2 is the conditional variance of the returns;

- ω is a constant term reflecting the volatility of the indexes from the days without Lent and Advent periods;
- v_1 is a coefficient which captures Lent effects on the indexes volatility;
- v_2 is a coefficient which captures Advent effects on the indexes volatility;
- α_k ($k = 1, 2, \dots, q$) are the coefficients associated to the squared values of the lagged values of error term from the conditional mean equation;
- q is the number of lagged values of the error term;
- β_l ($l = 1, 2, \dots, p$) are coefficients associated to the lagged values of the conditional variance;
- p is the number of lagged values of conditional variance.

We find the values of k , p and q by employing Ljung and Box methodology [22, 49].

For the coefficients v_1 and v_2 there are calculated z-tests with the null hypothesis that their values don't significantly differ from 0. If the p-value associated to a coefficient is smaller than 10%, we could reject the null hypothesis and consider that period of fasting to which it refers has a significant impact on the stock market volatility.

5. Findings

5.1. Descriptive Statistics

The descriptive statistics of the five indexes returns for the two sub-samples reflect their different evolution during the analyzed period (Table 2). For two indexes (Bovespa and IPSA) the mean of returns decreased from the first to the second sub-sample. The volatility evolution is reflected by three indicators: Standard Deviation, Coefficient of variation and Inter Quartile Range. From the first to the second sub-sample the volatility increased sharply for Bovespa, but decreased significantly for BUX. The skewness was negative except BUX for the first sub-sample and IPSA for the second sub-sample. The values of Excess Kurtosis suggest leptokurtic distributions of all the five indexes returns, for both sub-samples. Jarque-Bera tests indicate, for both sub-samples, that returns of all the five indexes were not normally distributed.

Table 2. Descriptive statistics of the five indexes returns

Index	Bovespa	BUX	IPC	IPSA	Merval
First sub-sample					
Mean	0.0420	0.0348	0.0629	0.0570	0.0944

Index	Bovespa	BUX	IPC	IPSA	Merval
Median	0.0619	0.0271	0.1000	0.0740	0.0939
Minimum	-8.4308	-7.5730	-5.9853	-7.2363	-11.3521
Maximum	6.3792	10.6743	6.1778	5.7322	6.9183
Std. Dev.	1.5551	1.7862	1.2006	0.9906	1.8623
C.V.	37.0102	51.2771	19.0883	17.3774	19.7247
Skewness	-0.0797	0.1827	-0.1653	-0.3892	-0.3191
Ex. kurtosis	2.0792	2.3351	3.8788	6.3930	2.8122
IQ range	1.7480	1.9029	1.1629	0.9827	1.9456
Jarque-Bera test	179.0130	233.2170	633.9690	1722.9700	335.7590
p-value for JB test	0.0000	0.0000	0.0000	0.0000	0.0000
Second sub-sample					
Mean	0.0026	0.0575	0.0099	0.0100	0.1897
Median	0.0000	0.0747	0.0180	0.0003	0.2171
Minimum	-9.2107	-6.2585	-4.6789	-3.1052	-10.6400
Maximum	6.3887	4.9690	3.5251	3.3759	8.3199
Std. Dev.	1.4991	1.0634	0.8698	0.7528	2.1586
C.V.	584.3710	18.4865	87.6786	75.2065	11.3796
Skewness	-0.0723	-0.2432	-0.1641	0.0704	-0.3729
Ex. kurtosis	1.8156	2.3852	1.6927	1.6293	2.0069
IQ range	1.7882	1.2494	1.0280	0.8690	2.3476
Jarque-Bera test	153.2810	271.3400	137.3780	122.6830	203.7880
p-value for JB test	0.0000	0.0000	0.0000	0.0000	0.0000

5.2. Stationarity of the returns

The results of ADF tests for the returns, presented in the Table 3, indicate that returns of all the five indexes were stationary for both sub-samples.

Table 3. Results of ADF tests for the returns of the five indexes

Index	First sub-sample		Second sub-sample	
	Number of lags	Test statistics	Number of lags	Test statistics
Bovespa	1	-22.6796***	1	-23.4175***
BUX	15	-6.85978***	13	-7.96419***
IPC	1	-21.9197***	1	-23.1768***
IPSA	13	-7.3253***	1	-22.2072***
Merval	11	-7.8576***	6	-12.0183***

Note: *** means significant at 0.01 level.

5.3. GARCH equations

The Table 4 reports the conditional mean equation for the first sub-sample. For all the five indexes we found no coefficient of Lent or Adv variables that differs significantly from zero.

Table 4. Conditional mean equation for the first sub-sample

Index	Bovespa	BUX	IPC	IPSA	Merval
Constant term	0.0194 (0.0473)	0.0142 (0.0571)	0.0329 (0.0321)	0.0421 (0.0273)	0.0462*** (0.0002)
Coeff. of Lent _t variable	0.0473 (0.0897)	0.1032 (0.1171)	0.0518 (0.0669)	0.0217 (0.0592)	-0.0100 (0.2157)
Coeff. of Adv _t variable	0.1289 (0.1551)	0.0699 (0.1301)	0.0627 (0.1501)	0.0588 (0.0719)	0.1472 (0.4131)
First order lagged returns	x	x	x	0.1622*** (0.0323)	x

Notes: Standard errors in round brackets; *** means significant at 0.01 level.

The conditional variance equation for the first sub-sample is presented in the Table 5. For all the five indexes we found significant

negative values of Adv variable coefficient. We also found, for Bovespa index, a significant negative value of Lent variable coefficient.

Table 5. Conditional variance equation for the first sub-sample

Index	Bovespa	BUX	IPC	IPSA	Merval
Constant term	0.0694** (0.0293)	0.0563 (0.0371)	0.0202*** (0.0070)	0.0266** (0.0117)	0.0727*** (0.0018)
Coeff. of Lent _t variable	-0.0446* (0.0248)	-0.0073 (0.0399)	-0.0115 (0.0107)	-0.0099 (0.0108)	-0.0324 (0.0321)
Coeff. of Adv _t variable	-0.0931*** (0.0276)	-0.1140*** (0.0404)	-0.0455*** (0.0115)	-0.0246* (0.0141)	-0.1383** (0.0541)
alpha	0.0702*** (0.0214)	0.0746*** (0.0268)	0.0628*** (0.0158)	0.1063*** (0.0294)	0.0519*** (0.0023)
beta	0.9046*** (0.0268)	0.9098*** (0.0322)	0.9232*** (0.0164)	0.8659*** (0.0342)	0.9301*** (0.0038)

Notes: Standard errors in round brackets; ***, ** and * mean significant at 0.01, 0.05, and 0.1 levels, respectively.

The Table 6 reports the conditional mean equation for the second sub-sample. We found significant negative values of Adv variable for two indexes: IPSA and Merval.

Table 6. Conditional mean equation for the second sub-sample

Index	Bovespa	BUX	IPC	IPSA	Merval
Constant term	0.0166 (0.0428)	0.0639 (0.0542)	0.0136 (0.0279)	0.0202 (0.0217)	0.2639*** (0.0765)
Coeff. of Lent _t variable	0.0373 (0.1011)	0.0128 (0.0532)	0.0778 (0.0747)	0.0701 (0.0571)	0.0256 (0.2154)
Coeff. of Adv _t variable	-0.1644 (0.2121)	-0.0775 (0.0716)	-0.0964 (0.1376)	-0.2093** (0.0868)	-0.6337** (0.2504)
First order lagged returns	x	x	x	0.1690*** (0.0330)	x

Notes: Standard errors in round brackets; *** and ** mean significant at 0.01 and 0.05 levels, respectively.

The conditional mean equation for the first sub-sample is presented in the Table 7. We found, for all the five indexes, no coefficient of Lent or Adv variables that differs significantly from zero.

Table 7. Conditional variance equation for the second sub-sample

Index	Bovespa	BUX	IPC	IPSA	Merval
Constant	0.0500** (0.0199)	0.0801 (0.0805)	0.0221** (0.0104)	0.0141** (0.0070)	0.3246 (0.2254)
Coeff. of	-0.0111 (0.0230)	0.0266 (0.0380)	-0.0062 (0.0088)	0.0043 (0.0085)	-0.1175 (0.0950)
Lent _t variable					
Coeff. of	-0.0669 (0.0606)	0.0061 (0.0423)	0.0310 (0.0342)	0.0144 (0.0136)	0.1005 (0.2681)
Adv _t variable					
alpha	0.0446*** (0.0112)	0.0683*** (0.0252)	0.0649*** (0.0199)	0.0768*** (0.0196)	0.1439*** (0.0494)
beta	0.9367*** (0.0142)	0.8575*** (0.0891)	0.9052*** (0.0278)	0.8953*** (0.0276)	0.7928*** (0.0925)

Notes: Standard errors in round brackets; *** and ** mean significant at 0.01 and 0.05 levels, respectively.

6. Discussions

The results of this investigation on the impact of Lent and Advent on the stock markets revealed some differences between the two sub-samples of data. For the first sub-sample we identified no major effect on returns but significant decline of volatility during Advent for all the five indexes and during Lent only for Bovespa. Instead, for the second sub-sample we found a significant decline of returns for IPSA and Merval during Advent.

Such results suggest that the impact of Advent was more consistent comparing to Lent. In general, the holiday spirit is more intense in Advent than in Lent. We also have to take into consideration the possible interference of other calendar effects. The part of the year associated the Lent and to Advent includes periods associated to other calendar effects. Empirical researches identified significant differences between the stock returns for some months of the year [12, 48]. Usually, in the proximity of Christmas and Easter Sunday, many investors go in holidays and the stock markets' activity declines [13, 21, 26, 47, 52]. Some circumstances specific to the end of the year could also affect the stock markets behavior [23, 29].

Kamstra et al. [45] identified a significant impact of the SAD cycle on the stock markets. The weather conditions during Lent and Advent (Hungary belongs to the Northern Hemisphere, while the other four countries belong to the Southern one) could also affect stock markets behavior [31, 41, 67].

The differences among the five countries regarding the impact of Lent and Advent could be explained by the different traditions for the two periods of fasting. Another explanation could be the different intensity of the religious sentiments among the investors from the five countries.

The changes from the first to the second sub-sample could be associated to the different circumstances that affected the stock markets from the five countries. It could also be taken into consideration the possibility of an increasing integration to the international financial markets.

7. Conclusions

The research questions of this paper approached the impact of Lent and Advent on returns and volatility of the stock markets from the five countries. The first null hypothesis of no effects on returns couldn't be ruled out for the first sub-sample but rejected, for the second sub-sample, in the case of Advent, for two countries. The second null hypothesis of no effects on the volatility was rejected, in the case of Advent, for all five countries and, in the case of Lent, only for Brazil. For the second sub-sample no impact on volatility was found. However, in the analysis of such effects we can't exclude the possibility of other calendar effects interference.

The third null hypothesis referred to the persistence in time of Lent and Advent impact on the stock market. If such effects could be considered as significant, they varied in time.

As we mentioned before, the results obtained for only five countries couldn't be generalized for all the Catholic states. In these circumstances, this study could be extended to other countries where the main religion is the Roman Catholicism.

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