The month-of-the-year effect on Bucharest Stock Exchange

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Abstract

This study investigates the presence of month-of-the-year effect on Bucharest Stock Exchange using a both a linear regression and a GARCH-M model with dummy variables for both the mean and the variance equation. We have collected monthly returns for five Romanian official exchange indices and for one MSCI Barra country index during May 2007-March 2013, thereby including both the 2007-2009 financial crisis and the recovery that followed during 2009-2013. Our results show that none of the coefficients of the two models are statistically significant, which lead us to conclude that we can not confirm the presence of the January effect or of any other month-of-the-year effect on the Romanian capital market.

Keywords: *stock returns, volatility, seasonal anomalies, frontier markets, GARCH models*

JEL classification: G01, G14, G15

1. Introduction

The January effect is one of the most well-known calendar effects documented for the financial assets returns. Together with the day-of-the-week effect, the January effect is a frequent subject of discussion among individual investors, investment fund managers and economic researchers. All the previously mentioned financial market participants and observers are interested and intrigued by such inefficiencies that might be used or speculated in order to achieve excess returns in comparison with the risks assumed. According with most authors (both researchers and capital market professionals), during the month of January stock markets witness exceptional volatility and higher than average positive returns.

Calendar effects, which are also known as seasonal effects, are cyclical anomalies in market returns, determined by the calendar period. Apart from day-of-the-week and the January effect, other popular types of anomalies mentioned in the financial literature are the day-of-the-month effect (the hypothesis that the turn of the month is associated with returns higher than the average), the Friday effect (also higher than the average returns on Fridays), or the Thursday effect on some Asian markets, the pre-holiday effect (where average returns are higher before a holiday period in comparison with other periods), January barometer (where positive or negative returns on January are supposed to predict positive or negative returns for the whole year) and sell-in-May-and-go-away phenomenon (according to which the summer period is generally negative or stable, thus investors prefer to stay on the side-lines).

Many recent studies concluded that these effects are dependent on the development level of the market (being more present on large stock markets and less visible on emerging or frontier markets), and on the market cycle (during down trends such excess positive returns on January are less detectable, but in general they can be spotted during the years of up market trends). Also, many authors found that such cyclical anomalies are more likely to be found on market indices, or on large and well diversified portfolios, than on individual assets.

This research represents a continuation of our interest in the study of the presence of seasonal anomalies on Bucharest Stock Exchange (Panait et. all, 2013) and is focused on a wide range of indices from the Romanian capital market, which is considered by investors and international institutions to be part of the frontier markets category. The time period envisaged includes both up and down significant and consistent trends.

The rest of the paper is organized as follows: section 2 presents the most relevant Romanian and international related studies; section 3 describes the data and the methodology that we have used; section 4 presents the results obtained; finally section 5 summarizes the most important conclusions and proposes further studies in this field.

2. Literature review

Fields (1931) was one of the first researchers who investigated the presence of out-of-ordinary patterns in the intra-week financial assets returns. Fields didn't used statistical tests, but his work opened the door for many followers interested in the same field of research. A few decades later, Cross (1973) studied 40 years of daily returns for Dow-Jones and other USA indices and sustained Fields' conclusions. French (1980) continued this direction of research and was the first author to employ statistical methods in order to test for the existence of the calendar effects.

Ariss, Rezvanian and Mehdian (2011), examined the calendar anomalies in Gulf Cooperation Council (GCC) capital markets and found a statistically significant positive December effect, in contrast to the January effect documented for the Western markets.

Henker and Paul (2012) separated tax implications and market capitalization and argued that retail investors are not the cause of the January effect and other market anomalies.

Doran, Jiang and Peterson (2012) showed that the New Year's gambling preference of retail investors has an impact on prices and returns of assets with lottery features. As a result, the January call options (especially the out-of-the-money calls), are faced with higher retail demand and become the most expensive and actively traded. Also, the authors conclude that lottery-type stocks outperform their counterparts in January and at the same time tend to underperform during the other 11 months. At the same time, the authors argue that retail sentiment is (in general) more bullish in lottery-type stocks during January than in other months.

The presence of calendar anomalies was also investigated on Romanian stock market. Among others, Balint and Gică (2012) used a GARCH(1,1) model and searched for the presence of January effects both on returns and volatility of 30 individual stocks (clustered in 3 portfolios according with their capitalization) traded on Bucharest Stock Exchange during 2003-2010. The authors argued that the January effect occurred before the 2007-2009 financial crisis, but afterwards (because the share prices and liquidity decreased dramatically) the results became inconclusive.

The presence of the January effect on Bucharest Stock Exchange was also studied by Stancu and Geambașu (2012). They analyzed the monthly excess returns (after excluding the CAPM risk adjusted expected returns) obtained during 2002-2010 by three portfolios, of ten stocks each, first clustered according with size and second with trading volumes. For both methods of computing portfolios (capitalization or trading volume), the authors found evidence of higher excess returns during January (in comparison with the other 11 months), sustaining the hypothesis of the existence of calendar anomalies.

Diaconașu, Mehdian and Stoica (2012) researched the-day-of-the week and the-month-of-the-year effects on Bucharest Stock Exchange during 2000 and 2011 and observed the presence of Thursday effect but didn't found the presence of the traditional Monday or January effect for the whole sample period. The January effect was detected only during the pre-crisis period.

3. Data and methodology

This research was conducted on the most popular 5 official Bucharest Stock Exchange indices: BET, BET-C, BET-FI, BET-XT and BET-NG. Also, it included the standard Romanian country index (large + mid cap) from MSCI Barra. We used monthly prices for all the six indices during the period May 1st 2007 – March 15th 2013, courtesy of the Bucharest Stock Exchange Trading Department and MSCI Barra.

To eliminate the obvious non-stationarity from the data, we have transformed the price time series into return time series for all the 6 assets. According to Strong (1992), "there are both theoretical and empirical reasons for preferring logarithmic returns. Theoretically, logarithmic returns are analytically more tractable when linking together sub-period returns to form returns over long intervals. Empirically, logarithmic returns are more likely to be normally distributed and so conform to the assumptions of the standard statistical techniques." For these reasons we have decided to use logarithmic returns in our study. The computation formula of the logarithmic returns is as follows:

$$R_{i,t} = \mathrm{Ln}\left(\frac{P_{i,t}}{P_{i,t-1}}\right)$$

where Ri,t is the return of asset i in period t; Pi,t is the price of asset i in period t and Pi,t-1 is the price of asset i in period t-1.

As a result of this initial data gathering we obtained a data base with 6 time series of log-returns, each with 71 monthly observations.

This article builds upon the foundations laid by our previous research (Panait and Slavescu, 2012) showing that "GARCH-in-mean was well fitted on the weekly and monthly time series but behaved less well on the daily time series" for 3 Romanian stock market indices and the most liquid 7 individual stocks during 1997-2012. Also, we have previously studied the presence the day-of-the-week effect (another frequently documented calendar anomaly) on Bucharest Stock Exchange during the same period (Panait, Uzlău and Ene, 2013) but didn't found clear enough and sufficient statistically significant arguments to confirm it.

Because the conclusions many authors that were interested by seasonal anomalies state that GARCH family models often better succeed in extracting most autocorrelation and heteroscedasticity from residuals than simple linear regression models, we decided to use a GARCH-M model with dummy variables in both the mean and the variance equations:

$$R_{i,t} = \mu + \gamma_0\sigma_t^2 + \gamma_1 D_{Jan} + \gamma_2 D_{Feb} + \gamma_3 D_{Mar} + \gamma_4 D_{Apr} + \gamma_5 D_{May} + \gamma_6 D_{Jun} + \gamma_7 D_{Jul} + \gamma_8 D_{Aug} + \gamma_9 D_{Sep} + \gamma_{10} D_{Oct} + \gamma_{11} D_{Nov}$$

$$\sigma_{i,t}^2 = \omega + \alpha\varepsilon_{t-1}^2 + \beta\sigma_{t-1}^2 + \gamma_{12} D_{Jan} + \gamma_{13} D_{Feb} + \gamma_{14} D_{Mar} + \gamma_{15} D_{Apr} + \gamma_{16} D_{May} + \gamma_{17} D_{Jun} + \gamma_{18} D_{Jul} + \gamma_{19} D_{Aug} + \gamma_{20} D_{Sep} + \gamma_{21} D_{Oct} + \gamma_{22} D_{Nov}$$

where Ri,t is the return of asset i in period t; σi,t is the standard deviation of asset i in period t; μ is the average return for asset i during the investigated period; ω, α and β are the usual coefficients of the variance equation of a GARCH(1,1) model; γ_0 represents the variance coefficient from the mean equation of the model; D_{Jan} – D_{Nov} represent the dummy variables (for example D_{Jan} has a value of 1 only in the months of January and a value of 0 during the rest of the monthly observations); and γ_1- γ_{22} represent the coefficient of the dummy variable from both the mean and the variance equation of the model

Before estimating the GARCH-in-mean model, we investigated all the data series and observed that that the values for standard deviation are in all cases significantly larger than mean values. All the time series present negative skewness, excess kurtosis and "fat tails". Also, none of the 6 time series studied are normally distributed as proven by values for the Jarque-Bera tests (see Table 1 for details, at the end of this article).

Also, we investigated the heteroscedasticity of the 6 time series, by calculating the autocorrelation (AC) and partial autocorrelation (PAC) functions, and by performing the Ljung-Box Q-statistics. In all our calculations we used a 20 period lag. We observed the presence of serial correlation in the daily squared returns for all the 6 indices but only for the first few lags, the level of autocorrelation decreasing and becoming statistically insignificant for more than 5 lags (see Table 2 for details, at the end of this article). This represents a warning that GARCH models might not be well suited for modeling the volatility of the monthly returns for the 6 indices included in our study.

4. Results

Table 3 included at the end of this article presents the values obtained for the coefficients of the GARCH-M model used to test the presence of the January effect in Romanian stock market indices. In all our estimates of the model we have used the hypothesis that the errors are normally distributed.

For all the coefficients from the two equations of the model we have obtained p-values of the Z-statistic larger than 0.10 which means that none of the coefficients of the model are statistically different from 0. This observation is valid for all the 6 indices included in our research. Also, the model's R^2 values are below 0.05 and the adjusted R^2 values are negative for all the 6 indices. The direct implication of this finding is that we cannot confirm the presence of any month-of-the-year effect in none of the 6 Romanian stock market indices that we have investigated.

5. Conclusions

In this paper investigated the January effect on monthly returns for 6 Romanian stock market indices during May 1st 2007 – March 15th 2013 using a GARCH-M model with eleven dummy variables both in the mean and in the variance equations.

Our results cannot confirm a statistically significant presence of the January effect or of any other month-of-the-year effect on the Romanian capital market indices during the investigated period. Thus, our paper confirms the conclusions of two other related studies mentioned in the literature review section, according to which although during particular periods of time the January effect might be temporary present, in the long term the Romanian stock market doesn't exhibit this kind of calendar anomaly in the monthly returns of the main indices.

The research of the calendar effects should be continued with the use other models (inclusively models from the GARCH family, especially asymmetrical models) and also by investigating the presence of other kind of anomalies such as the day-of-the-month effect, the Friday effect, the pre-holiday effect, the January barometer and the sell-in-May-and-go-away phenomenon.

6. Bibliography

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Table 1: Descriptive statistics

	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
BET	-0.00582	0.107276	-0.958486	5.126044	24.24307	0.000005
BET_C	-0.009064	0.103395	-1.0697	5.573978	33.14042	0
BET_FI	-0.012316	0.174439	-1.154278	9.450241	138.8495	0
BET_NG	-0.008159	0.103776	-1.942292	10.78877	224.1086	0
BET_XT	-0.009916	0.124629	-0.964889	6.357639	44.36844	0
MSCI_RO	-0.010582	0.132422	-1.535069	7.610886	90.77944	0

Source of data: Bucharest Stock Exchange, MSCI Barra; calculations of the author

Table 2: Estimation of the autocorrelation (AC), partial autocorrelation (PAC) and Q-statistic with 20 lags for the squared returns

	AC	PAC	Q test	p-value
RO_MSCI	-0.075	-0.014	16.003	0.716
BET	-0.063	-0.093	27.333	0.126
BET-XT	-0.043	-0.074	21.421	0.373
BET-NG	-0.016	-0.028	5.2801	1.000
BET-FI	-0.040	-0.040	14.627	0.797
BET-C	-0.052	-0.111	24.278	0.230

Source of data: Bucharest Stock Exchange, MSCI Barra; calculations of the author

Table 3: Estimated values for the coefficients of the GARCH-M model used to test the presence of the January effect

	Coeff value	Std. error	Z ststistic	p-val		Coeff value	Std. error	Z ststistic	p-val
	Mean equation					Variance equation			
MSCI Barra Romania country index									
γ_0	0.506623	2.342104	0.216311	0.8287	ω	0.013272	0.016435	0.807535	0.4194
μ	0.023236	0.161179	0.144160	0.8854	α	0.187198	0.167850	1.115270	0.2647
γ_1	-0.083400	0.173461	-0.480800	0.6307	β	0.582358	0.325559	1.788794	0.0736
γ_2	0.026351	0.194047	0.135796	0.8920	γ_{12}	0.007946	0.036645	0.216850	0.8283
γ_3	0.021464	0.163444	0.131323	0.8955	γ_{13}	-0.028754	0.020734	-1.386804	0.1655
γ_4	0.001418	0.160829	0.008816	0.9930	γ_{14}	-0.015247	0.017082	-0.892545	0.3721
γ_5	-0.100793	0.166335	-0.605962	0.5445	γ_{15}	-0.014178	0.016581	-0.855106	0.3925
γ_6	-0.035533	0.161974	-0.219374	0.8264	γ_{16}	-0.005219	0.020216	-0.258152	0.7963
γ_7	-0.015981	0.159901	-0.099944	0.9204	γ_{17}	-0.012896	0.019309	-0.667879	0.5042
γ_8	-0.055393	0.160111	-0.345965	0.7294	γ_{18}	-0.015186	0.017449	-0.870269	0.3842
γ_9	-0.090992	0.162163	-0.561114	0.5747	γ_{19}	-0.011724	0.017604	-0.666006	0.5054
γ_{10}	-0.013209	0.170088	-0.077662	0.9381	γ_{20}	-0.006554	0.019751	-0.331834	0.7400
γ_{11}	-0.079936	0.156868	-0.509573	0.6104	γ_{21}	-0.015458	0.018733	-0.825144	0.4093
					γ_{22}	-0.012593	0.017635	-0.714075	0.4752
BET									
γ_0	0.870870	2.197086	0.396375	0.6918	ω	0.008496	0.011080	0.766781	0.4432
μ	0.025313	0.085633	0.295601	0.7675	α	0.241259	0.195690	1.232863	0.2176
γ_1	-0.022009	0.095794	-0.229752	0.8183	β	0.568417	0.247614	2.295582	0.0217
γ_2	0.011156	0.102492	0.108851	0.9133	γ_{12}	-0.001622	0.020720	-0.078270	0.9376
γ_3	0.008216	0.085755	0.095804	0.9237	γ_{13}	-0.016137	0.012796	-1.261118	0.2073
γ_4	-0.028502	0.091144	-0.312709	0.7545	γ_{14}	-0.008112	0.011437	-0.709266	0.4782
γ_5	-0.116014	0.092133	-1.259206	0.2080	γ_{15}	-0.008888	0.011080	-0.802163	0.4225
γ_6	-0.030093	0.094739	-0.317645	0.7508	γ_{16}	-0.004593	0.012658	-0.362868	0.7167
γ_7	-0.002702	0.094804	-0.028503	0.9773	γ_{17}	-0.008491	0.012173	-0.697539	0.4855
γ_8	-0.044884	0.095602	-0.469486	0.6387	γ_{18}	-0.008643	0.011811	-0.731744	0.4643
γ_9	-0.057371	0.091865	-0.624518	0.5323	γ_{19}	-0.007186	0.012457	-0.576919	0.5640
γ_{10}	-0.041904	0.137512	-0.304732	0.7606	γ_{20}	-0.006271	0.012622	-0.496842	0.6193
γ_{11}	-0.067589	0.082165	-0.822598	0.4107	γ_{21}	-0.002236	0.018052	-0.123861	0.9014
					γ_{22}	-0.012549	0.013640	-0.920010	0.3576
BET-C									
γ_0	-0.618761	2.667054	-0.232002	0.8165	ω	0.007979	0.009270	0.860733	0.3894
μ	0.033310	0.110407	0.301700	0.7629	α	0.231218	0.121363	1.905175	0.0568
γ_1	-0.019213	0.136508	-0.140746	0.8881	β	0.557357	0.067288	8.283125	0.0000

γ_2	0.002327	0.132850	0.017514	0.9860	γ_{12}	0.003764	0.026751	0.140714	0.8881
γ_3	0.011161	0.113672	0.098189	0.9218	γ_{13}	-0.017683	0.014601	-1.211143	0.2258
γ_4	-0.035271	0.117530	-0.300099	0.7641	γ_{14}	-0.006766	0.009568	-0.707179	0.4795
γ_5	-0.106345	0.114232	-0.930961	0.3519	γ_{15}	-0.008351	0.009315	-0.896483	0.3700
γ_6	-0.044625	0.117888	-0.378536	0.7050	γ_{16}	-0.003870	0.011118	-0.348067	0.7278
γ_7	0.006618	0.118656	0.055775	0.9555	γ_{17}	-0.006679	0.011369	-0.587480	0.5569
γ_8	-0.039772	0.117299	-0.339064	0.7346	γ_{18}	-0.008844	0.010148	-0.871541	0.3835
γ_9	-0.044773	0.114973	-0.389424	0.6970	γ_{19}	-0.007181	0.010281	-0.698486	0.4849
γ_{10}	-0.058714	0.135234	-0.434168	0.6642	γ_{20}	-0.005201	0.010574	-0.491852	0.6228
γ_{11}	-0.062211	0.111017	-0.560376	0.5752	γ_{21}	-0.001222	0.014310	-0.085423	0.9319
					γ_{22}	-0.013533	0.010841	-1.248314	0.2119
BET-FI									
γ_0	0.426394	1.640796	0.259870	0.7950	ω	0.022196	0.035927	0.617813	0.5367
μ	0.008980	0.317340	0.028297	0.9774	α	0.224323	0.248666	0.902107	0.3670
γ_1	-0.004119	0.312486	-0.013183	0.9895	β	0.575569	0.394066	1.460593	0.1441
γ_2	0.037089	0.315914	0.117402	0.9065	γ_{12}	-0.023664	0.053338	-0.443661	0.6573
γ_3	0.031471	0.315526	0.099740	0.9206	γ_{13}	-0.030292	0.038264	-0.791654	0.4286
γ_4	0.011247	0.336733	0.033401	0.9734	γ_{14}	-0.020467	0.036229	-0.564941	0.5721
γ_5	-0.195858	0.309401	-0.633021	0.5267	γ_{15}	-0.011210	0.047814	-0.234445	0.8146
γ_6	0.002750	0.316486	0.008690	0.9931	γ_{16}	-0.015042	0.041377	-0.363539	0.7162
γ_7	0.008164	0.316898	0.025763	0.9794	γ_{17}	-0.032170	0.037317	-0.862074	0.3886
γ_8	-0.024301	0.315118	-0.077116	0.9385	γ_{18}	-0.016149	0.037890	-0.426201	0.6700
γ_9	-0.007105	0.313737	-0.022646	0.9819	γ_{19}	-0.017782	0.039795	-0.446843	0.6550
γ_{10}	-0.151450	0.353510	-0.428416	0.6683	γ_{20}	-0.022132	0.038741	-0.571282	0.5678
γ_{11}	-0.030108	0.308862	-0.097480	0.9223	γ_{21}	0.010660	0.054374	0.196051	0.8446
					γ_{22}	-0.038649	0.044831	-0.862109	0.3886
BET-XT									
γ_0	1.159623	1.824165	0.635701	0.5250	ω	0.011445	0.014243	0.803542	0.4217
μ	0.014562	0.147596	0.098664	0.9214	α	0.241834	0.258662	0.934945	0.3498
γ_1	-0.027521	0.150531	-0.182827	0.8549	β	0.568062	0.368241	1.542636	0.1229
γ_2	0.024046	0.154999	0.155139	0.8767	γ_{12}	-0.003768	0.024937	-0.151088	0.8799
γ_3	0.028528	0.148383	0.192258	0.8475	γ_{13}	-0.020689	0.016982	-1.218276	0.2231
γ_4	-0.025701	0.151198	-0.169984	0.8650	γ_{14}	-0.010965	0.014751	-0.743317	0.4573
γ_5	-0.144059	0.150648	-0.956263	0.3389	γ_{15}	-0.011824	0.014294	-0.827199	0.4081
γ_6	-0.015994	0.154828	-0.103301	0.9177	γ_{16}	-0.006587	0.016189	-0.406876	0.6841
γ_7	-0.003149	0.149970	-0.020997	0.9832	γ_{17}	-0.012324	0.015427	-0.798841	0.4244
γ_8	-0.043673	0.149992	-0.291169	0.7709	γ_{18}	-0.011745	0.014994	-0.783314	0.4334

γ_9	-0.044856	0.150904	-0.297249	0.7663	γ_{19}	-0.008090	0.016211	-0.499061	0.6177
γ_{10}	-0.048166	0.185745	-0.259313	0.7954	γ_{20}	-0.009799	0.016796	-0.583417	0.5596
γ_{11}	-0.059034	0.146537	-0.402858	0.6871	γ_{21}	-0.000145	0.021321	-0.006778	0.9946
					γ_{22}	-0.018586	0.017492	-1.062561	0.2880

Source of data: Bucharest Stock Exchange, MSCI Barra; calculations of the author