

## THE IMPACT OF BOND, CURRENCY AND OIL MARKETS ON INVESTORS FROM THE BUCHAREST STOCK EXCHANGE

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### ABSTRACT

*The purpose of this research is to study the impact of bond, currency and oil markets on the Bucharest Stock Exchange. To achieve our objective, we studied the cointegration between variable-long-term causality relationships, functions impulse-response and Granger causality test. The empirical findings from the Johansen test confirmed the absence of a long-term between the Romanian capital market and bond, currency and oil markets. From our empirical results we can observe that the local capital market is more influenced by external factors from other economies, than from internal ones. We also noticed a bidirectional relationship between the BET index and S&P 500 index. Our findings should be of interest to researchers and investors.*

**KEYWORDS:** *bond, capital market, causality, oil prices, impulse-response function*

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### 1. INTRODUCTION

The capital market identified as an institution can contribute to the socio-economic growth and development of the emerging and developed countries. This is possible through its vital role in the intermediation process in those economies. Some see the capital market as the engine of any economy for growth and development, as it is essential for long-term capital formation.

Financial markets have become judges of national and world economies in recent decades. In fact, nothing escapes the attention of these markets: internal macroeconomic performance is affecting the money market; government policies are evaluated on the government securities markets, and the performances of private companies and the sectors to which they belong are often judged on the stock markets through transactions with shares and bonds.

The Bucharest Stock Exchange (BSE) is still in the category of border markets, especially due to the reduced liquidity, an aspect that works in this case for the benefit of the investors, limiting to a certain extent the price movements. At the same time, the Romanian institutional investors hold a significant share of the traded capital, which offers a balance to the market.

The paper is structured as follows: literature review, the data and the methodology, results and conclusions.

### 2. LITERATURE REVIEW

Olugbenga (2012) examined the empirical relationship in Nigeria between exchange rate and stock market performance in the Nigerian Stock Exchange (NSE) using quarterly data that span from 1985 to 2009 using the Johansen tests. The causality test confirmed a unidirectional relationship from exchange rate to stock market.

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Stefanescu and Dumitriu (2013) conducted a study regarding the influence of Brent oil price on the Bucharest Stock Exchange (BETC) using a GARCH model, during 2000-2013 period. During 2000-2006 and 2008-2013 was found a positive influence of oil price over stock market returns. Another research was done by Panait and Lupu (2009) in which employed a study of the Romanian capital market during 2007-2009 period. The empirical findings revealed a negative effect of the financial crisis toward Romanian capital market with a much stronger impact than other countries from the region. That's probably due to lack of maturity of capital market.

Khalfaoui, Boutahar and Boubaker (2015) investigated the effects of volatility and shocks between oil prices and G-7 stock markets, using multivariate GARCH models (models that allow the analysis of the effects of volatility propagation at different scales) and wavelet analysis. The database consisted of daily observations from June 2003 - February 2012 for oil and stock indices. The empirical results provided strong evidence regarding the variability in time of volatility across all markets studied. However, the proposed approach shows that oil prices and stock prices are directly affected by their own news and volatility and are indirectly affected by the volatility of other prices. In addition, in order to make optimum portfolio allocation decisions based on the behavior of different investor groups and market traders, risk hedging rates at different time horizons must be calculated. It was also noted in the study that investors and financial market participants should have a lower share in tradable shares and more in oil. This can be explained by the fact that G-7 stock prices are more volatile than WTI oil prices.

Huo, Abdullahi and Ahmed (2017) study provides a comprehensive analysis of the returns and volatility behaviors of the Shanghai and Hong Kong stock markets (July 2014-April 2015), using cointegration tests, Granger causality tests, the VAR model, impulse-response functions to examine the dynamics of markets returns in Shanghai and Hong Kong. Regarding the volatility of the two stock markets, univariate and multivariate GARCH models were applied (GJR GARCH and BEKK GARCH). A significant long-term co-integration relationship was identified between the stock markets of Shanghai and Hong Kong during the Post-Shanghai-Hong Kong Stock Connect period, but not before this program. The effect of spreading returns from the Shanghai Stock Exchange to the Hong Kong Stock Exchange is faster and stronger than the reverse in the Post-Stock Connect period. The impulse-response functions show that the Hong Kong equity market tends to respond more to the shocks on the Shanghai stock market during the Post-Stock Connect period. According to the VAR BEKK model, there is an increased spillover effect in terms of profitability and volatility from the Shanghai to Hong Kong stock markets. Empirical results suggest that mainland Chinese stock markets would have a significant effect on the Hong Kong capital market through volatility propagation effects. The authors believe that the implementation of the Shanghai-Hong Kong Stock Connect program has increased the volatility of both exchanges, as it attracts foreign investors and individual and institutional investors to participate in both the Shanghai and Hong Kong stock markets.

Johansson and Ljungwall (2008) explored the links between three stock markets in the Greater China region (China, Hong Kong and Taiwan) using the prices of the Hang Seng (Hong Kong), Dow Jones China 88 (includes the main shares listed on the Shanghai and Shenzhen exchanges) and Taiwan Weighted Index from 1994-2005. Due to the asymmetric trends in the volatility of the Hong Kong and Taiwan markets, a multivariate volatility model is used. Empirical results do not indicate any indication of long-term relationships between markets, but short-term spillover effects have been identified in terms of profitability and volatility in the region. Both China and Hong Kong are affected by the spillover effects in Taiwan. Volatility in the Hong Kong market is shifting to that of Taiwan, which in turn affects the volatility in the Chinese mainland. Overall, the study shows significant interdependencies between the three markets, a result that has important implications for both policy makers and investors in the region.

Antonakakis, Chatziantoniou and Filis (2014) investigated the relationship between oil prices and the index of economic policy uncertainty, using monthly data from 1997-2013 for Canada, China, India, Europe and the USA, as well as for individual European countries, respectively Germany, France, Italy, Spain and the United Kingdom. The methodology proposed by Diebold and Yilmaz (2009, 2012) approached the contagion index, using structural decomposition, rather than Choleski decomposition (Diebold and Yilmaz, 2009). In order to obtain more detailed information, the authors disaggregated oil price shocks according to their origin, as well as Kilian and Park (2009), thus investigating the spillover effects between these disaggregated shocks and indications of economic policy uncertainty. It is found that the uncertainty of the economic policy responds negatively to the aggregate shocks of the oil price. In addition, during the economic crisis, the level of contagion increased considerably, reaching unprecedented highs.

Baig and Goldfajn (1998) investigated contagion evidence between financial markets in Thailand, Malaysia, Indonesia, Korea and the Philippines, using daily data (1995-1998). Among the main methods of analysis are the study of the correlation between foreign exchange rate, equity, interest rates and sovereign debt of selected countries, VAR (autoregression vector) methodology was also applied to estimate the impulse responses to shocks on each of the currencies and stock markets. The results confirm the existence of contagion patterns during East Asian crises. Asian crises suggest that in a time of financial market instability, market participants tend to behave in the same way in a number of countries. Shocks from one market are easily transferred to other markets, thus becoming a source of substantial instability.

### 3. DATA AND METHODOLOGY

The goal of this study is to research the influence of bond, currency and oil markets on the Romanian stock market. Therefore, we selected some variables for all the above mentioned such as: The Romanian 10Y Government Bond, EURO/USD and YJP/USD exchange rates and Brent oil price. For the Romanian capital market, we decided to use the BET index, which is the most representative of all Romanian capital market indices. Because the effects of American economy can have a great impact above the others market around the world, the S&P 500 index was selected to study how it influence the evolution of our local stock market. The research is based on daily data from January 2002 to August 2019. Data sources are Thomson Reuters.

**Table 1. Description**

Variants	Description	Time	Source
<b>BET</b>	BET is the first index developed by BSE .	January 2002- August 2019	Thomson Reuters
<b>S&amp;P 500</b>	The S&P 500 is a stock market index that contains 500 large public companies, most of them American. The index is made by Standard & Poor's, a division of McGraw-Hill.	January 2002- August 2019	Thomson Reuters
<b>Crude Oil BFO</b>	A benchmark price	January 2002- August 2019	Thomson Reuters
<b>EURO/USD</b>	Exchange rate EURO/USD	January 2002- August 2019	Thomson Reuters
<b>YJP/EURO</b>	Exchange rate YJP/EURO	January 2002- August 2019	Thomson Reuters
<b>GVT ZERO 10Y</b>	The Romanian 10Y Government Bond	January 2002- August 2019	Thomson Reuters

Source: Thomson Reuters, BSE

Before starting our analysis, we should check the unit roots of the series. In order to verify the stationarity of the variables we will employ the ADF to test the non-stationary assumption. The estimation equation for the ADF can be written as:

$$\Delta y_t = \alpha + \beta t + \rho y_t + \sum_{j=1}^k \gamma_j \Delta y_{t-j} + \varepsilon_t, t=1, \dots, T$$

where t represent the time and T is the length.

We will consider a VAR:

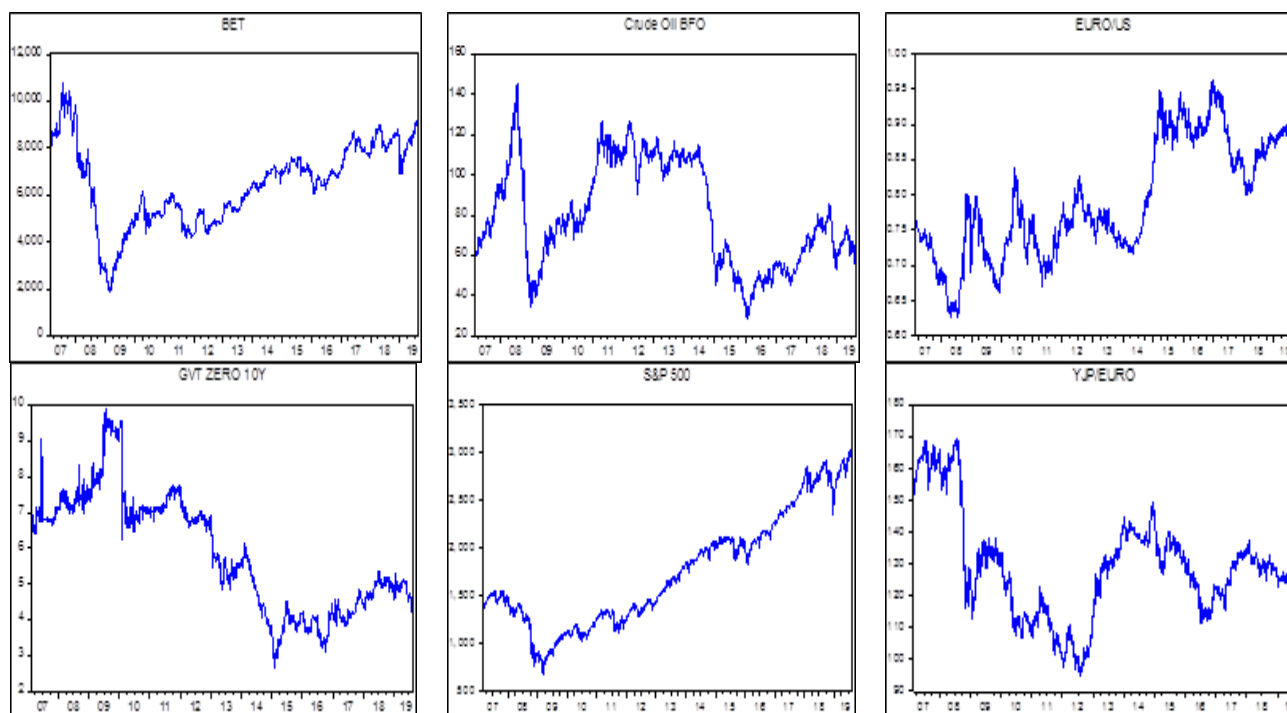
$$x_t = A_1 x_{t-1} + \dots + A_p x_{t-p} + Bm_t + \epsilon_t$$

The above equation can be rewrite as:

$$\Delta x_t = Cx_{t-1} + \sum_{i=1}^{p-1} D_i \Delta x_{t-i} + Bm_t + \epsilon_t$$

Where:  $C = \sum_{i=1}^p A_i - I$  and  $D_i = -\sum_{j=i+1}^p A_j$ .

We will use the impulse-response function to verify how the Romanian capital market it will react to shocks regarding the evolution of government bonds, oil and exchange rates.



**Figure 1. Variables evolution**  
 Source: Authors' work, Thomson Reuters

Figure 1 shows the evolution of the data series from 2002 to 2019. It can be easily observed that they are not stationary with a volatile evolution. However, with the help of the ADF unit test we will confirm their non-stationarity. During the analyzed period 2002-2019 our selected indicators had a mixed speed being marked by various economic phenomena.

#### 4. RESULTS

Before presenting empirical results regarding the impact of bond, currency and oil markets on the Romanian stock market, we present summary statistics of the macroeconomic indicators included in the analysis. Table 2 presents descriptive statistics for indicators.

**Table 2. Descriptive statistics of the variables**

	<b>BET</b>	<b>CRUDE OIL BFO</b>	<b>EURO/USD</b>	<b>GVT ZERO 10Y</b>	<b>S&amp;P 500</b>	<b>YJP/EURO</b>
<b>Mean</b>	6449.838	80.20044	0.791281	5.872320	175.5198	129.0282
<b>Median</b>	6565.115	75.79500	0.770845	5.683400	1614.690	128.8340
<b>Maximum</b>	10813.59	1456.100	0.963580	9.889900	3025.860	169.4774
<b>Minimum</b>	1887.140	27.82000	0.625840	2.688900	676.5300	94.52888
<b>Std. Dev.</b>	1720.895	25.83005	0.082216	1.621574	587.8708	16.63320
<b>Skewness</b>	-0.166703	0.159613	0.204115	0.209631	0.406794	0.476184
<b>Kurtosis</b>	2.647853	1.808556	1.933613	2.101156	2.078393	2.986416
<b>Jarque-Bera</b>	31.88483	206.2825	176.7781	133.3735	204.9050	122.9997
<b>Probability</b>	0	0	0	0	0	0

*Source: own calculations*

All the variables have positive skewed data (with the exception of BET index), which means that the distribution has the tail on the right longer. Regarding our analysis, the data have a Kurtosis near 3 for all three stock market indices, they presenting a leptokurtic distribution.

To avoid spurious regression results, we first study the time-series characteristics of the variables. The outcomes of ADF results confirmed that the variables are I (1).

**Table 3. ADF test**

<b>Variables</b>	<b>Level</b>	<b>First Difference</b>
<b>BET</b>	-1.394755***	-53.78681*
<b>S&amp;P 500</b>	0.244132***	-59.94037*
<b>Crude Oil BFO</b>	-1.551177***	-54.40998*
<b>EURO/USD</b>	-1.428317***	-56.50987*
<b>YJP/EURO</b>	-2.111725***	-56.86737*
<b>GVT ZERO 10Y</b>	-1.249396***	-34.06291*

*Source: Authors' calculations. Notes: \*, \*\*, \*\*\* indicates the rejection of the Null Hypothesis: series has a unit root at the 1%, 5%, 10% level of significance.*

*Source: Own calculations*

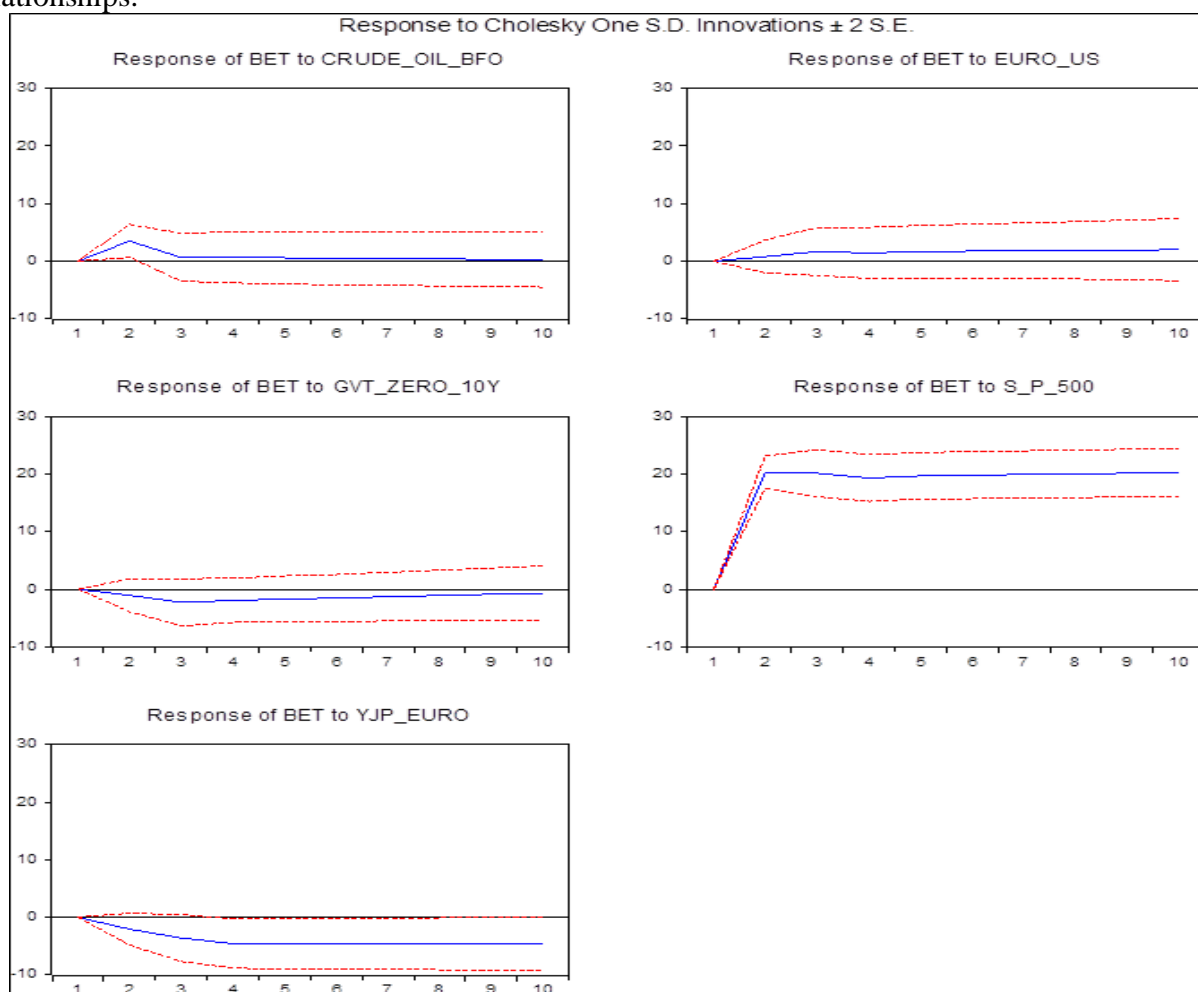
Cointegration is the basis of VEC models, which include both the long-term relationship and the error correction mechanism.

**Table 4. The results of the Johansen test**

Variables	Unrestricted Cointegration Rank-Test	Trace- (Prob.)	Maximum Eigenvalue- (Prob.)
CRUDE_OIL_BFO	None	0.5660	0.7042
	At most 1	0.1790	0.1790
EURO_USD	None	0.2829	0.2990
	At most 1	0.2891	0.2891
GVT_ZERO_10Y	None	0.4455	0.4333
	At most 1	0.4023	0.4023
S&P_500	None	0.2244	0.1680
	At most 1	0.8052	0.8052
YJP_EURO	None	0.3689	0.4577
	At most 1	0.1934	0.1934

Source: Own calculations

In order to apply the Johansen test, the series must be non-stationary. The cointegration test shows that the Romanian capital market is not in a cointegrating relationship with bonds, exchange rates and the stock market in America. Therefore, between these variables, there are no long-lasting relationships.



**Figure 1. Impulse-response functions**  
 Source: Own calculations

The Romanian capital market is influenced by both internal and external factors. Many researchers believe that oil prices and exchange rate are among crucial economic factors that influence the capital market. Following the shocks received from some of the variables selected by us, it is observed that the Bucharest Stock Exchange Index reacts positively in the first periods estimated following the shocks received from Brent crude oil, the EURO/USD exchange rate and the representative index, S&P 500, for the capital market in America.

As a result of the shocks received from the Romanian 10 Y government bonds and of the JYP/EURO exchange rate, the Romanian capital market is declining, reacting negatively from the first periods. Hence, any changes in the yield of bond and the exchange rate will not give an instant and drastic impact towards the stock market index.

By adopting the Granger Causality test, this analysis tool is able to capture any causal relationship. The Granger Causality test indicates the causation effect between variables used in a study. The results show on whether one variable can affect and cause changes or movement of the other variables.

The Granger causality test indicates the presence of a unidirectional causality from the oil price, the American capital market, and the exchange rate to the Romanian capital market. In other words, the Romanian capital market is influenced by these external factors, and its estimation will be much better in the future if the evolution of the oil price, the exchange rate and the evolution of the American stock market index are taken into account. One result that surprised us is that between the capital market in Romania and in America there is a two-way causal relationship. More specifically, our results find causality between S&P 500 index and BET index that runs in both directions. However, there is no causal relationship between EURO/USD exchange rate and Romanian stock market during the period 2002 - August 2019.

**Table 5. The results of the Granger causality test**

<b>Null Hypothesis:</b>	<b>Obs.</b>	<b>F-Statistic</b>	<b>Prob.</b>
DCRUDE_OIL_BFO does not Granger Cause DBET	3250	3.79373	<b>0.0099</b>
DBET does not Granger Cause DCRUDE_OIL_BFO		1.29672	0.2738
DEURO_US does not Granger Cause DBET	3250	1.75194	0.1542
DBET does not Granger Cause DEURO_US		0.60474	0.6119
DGVT_ZERO_10Y does not Granger Cause DBET	3250	0.54754	0.6498
DBET does not Granger Cause DGVT_ZERO_10Y		3.14814	<b>0.0241</b>
DS_P_500 does not Granger Cause DBET	3250	76.9340	<b>5.E-48</b>
DBET does not Granger Cause DS_P_500		4.68188	<b>0.0029</b>
DYJP_EURO does not Granger Cause DBET	3250	6.73636	<b>0.0002</b>
DBET does not Granger Cause DYJP_EURO		0.47710	0.6982

*Source:* Own calculations

## 5. CONCLUSIONS

Stock market activities play a major role in determining the level of economic activities in both emerging and developed economies.

In recent decades, the integration of financial markets has increased considerably globally, and the boundaries of financial markets have become less detectable with international markets. As a result of these integrations, the exposure of domestic financial markets to the crisis risks of the international financial market has increased significantly.

The principal objective of this research is to study the effect of bond, currency and oil markets on the Romanian stock market. Specifically, the influence of 10 years Romanian bonds, US Dollar/Yen exchange rate, EURO/US dollar exchange rate, Brent crude oil on the Romanian capital market. Crude oil has an essential position in the expanding global economy, as it is the main source of energy used for industrial activities, transport, heating, etc. Thus, oil prices have direct or indirect effects on the economic activities of a country. The effects of crude oil on economies may vary, such as an importing or exporting country of oil, a developed or developing country or if other alternative sources of energy are present. Factors such as globalization, international trade, technology and cross-border financial integration are the main reasons for the direct and indirect effects of oil. A recession or a downturn in an economy boosts the investor's run to the safety of bonds, a fact that affects the stock returns.

According to the specialized literature, regarding the effect of the bonds, the decrease of the prices of bonds, associated with the increase of the yields of the bonds, was associated with the increase of the prices to the shares, whereas stronger economic fundamentals have led investors to equities and a slow economic growth has the opposite effect.

The variables selected for in the study are The Romanian 10Y Government Bond, EURO/USD and YJP/USD exchange rates and Brent oil price. The Romanian capital market is represented by the BET index, which is the most representative of all Romanian capital market indices. Because the effects of American economy can spread to other markets around the world, the S&P 500 index was selected to study how it influence the evolution of our local market. The quantitative study is based on daily data from January 2002 to August 2019. Data sources are Thomson Reuters.

The results of our research offers information on how the capital market in Romania reacts or is influenced both to internal and external factors. The cointegration test shows that the Romanian capital market is not in a cointegrating relationship with bonds, exchange rates and the stock market in America. Therefore, between these variables, there are no long-lasting relationships.

From impulse response functions, we found out that the Bucharest Stock Exchange Index reacts positively after the shocks received from Brent crude oil, EURO/USD and S&P 500 index. As a result of the shocks received from the Romanian 10Y government bonds and of the JYP/ EURO exchange rate, the Romanian capital market is declining, reacting negatively from the first periods. The causality test indicates the presence of a unidirectional causality from Brent oil price, S&P 500 and the exchange rate to Romanian capital market. Consequently, the local capital market is influenced by external factors from other economies, than from internal ones (in our case we selected GOV10Y, but it is found that the capital market causes Granger the Romanian bonds and not vice versa). In other words, the Romanian capital market is influenced by these external factors, and its estimation will be much better in the future if the evolution of the oil price, the exchange rate and the evolution of the American stock market index are taken into account. One result that surprised us is that between the capital market in Romania and in America, there is a bidirectional causal relationship.

The results of the impact of bond, currency and oil markets on the Romanian stock market contribute to the existing literature both through the selected study period and through the diversity of the selected variables. We strongly believe that this study can be a starting point in the detailed analysis of this research topic, of assistance to researchers or investors who want to make an opinion on how capital markets is influenced by various factors, whether internal or external.



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