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IMPACT OF SENTIMENT INDICATORS ON THE CAPITAL MARKET DYNAMICS AND DEFAULT PROBABILITY

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Abstract

This paper examines the impact of sentiment indicators on the financial market dynamics and default probability. First, we use GARCH models and Granger Causality Test in order to test the relationship between sentiment indicators and capital market dynamics of eight Southeastern European countries. Second, we employ GARCH models and Granger Causality Test to examine the influence of sentiment indicators on the sovereign credit risk in Bulgaria. The analyzed period is from January 2005 to November 2015. The results reveal that the consumer sentiment information and inflation expectations have influence on the financial market dynamics of SEE stock indices. Test results present that sentiment variables may explain CDS spread changes efficiently. We observe bilateral relations, which may be accepted as proves that turmoil periods may be led by panic and fear of investors without any enormous change in other factors.

Keywords: capital markets, sentiment indicators, credit default swap, GARCH models

JEL Codes: C22; G01; G12

1. Introduction

Capital markets in different countries or regions may show a diversified degree of integration based on investors' assessments and expectations. Rational investors should arbitrage between prices of the

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stock assets which actually resulting in more integrated markets. The occurrence of the global financial crisis and its reflection on European financial markets' stability has put credit default swaps (CDS) into a focus of attention. Sovereign credit default swap spreads may be accepted as credit risk indicators that depend on investors' expectations. In addition, the countries in the same geographic region and also with the same group of investors are likely to have correlated capital markets. Consequently, the issues of the co-movement of the SEE capital markets, the investors' expectations are important for the local investors and companies in the region that are making capital budgeting decisions. **The aim** of this paper is to examine the impact of sentiment indicators on the financial market dynamics and default probability in eight SEE countries. Important contribution of this research is testing the investors' influence and accounting information on the Bulgarian capital markets and their relations with credit default swap spreads. We reveal the role of investors' expectations on the capital markets dynamics and sovereign credit risk in Bulgaria. For the financial environment in Bulgaria, we observe a confirmation of the multiple-equilibria theory, namely that financial markets may take optimal behaviors sometimes during a period of turmoil and this leads to self-fulfilling liquidity crisis and self-fulfilling prophecies.

The aim will be accomplished by creating an empirical model, based on the theoretical ones, including non-linear approaches and causality relations.

Methodological and theoretical basis of the research can be formulated in the following sequence:

1. Theoretical analysis based on previous theoretical and empirical researches;
2. Development and implementation of practical econometric models. The analysis which reflects the quantitative results of the application of econometric methodology is based on the GARCH models.
3. Restrictive conditions of this research are determined in the following aspects:
4. Time range-this research is restricted in the time interval from 2005- 2015;
5. Methodological restrictions –they are set by the statistical properties of the researched data imposing the application of specific econometric tests and models giving opportunity for the reflection. The proposed and used methodology does not claim to

be the only possible and applicable when inspecting and proving the research thesis of this study.

6. Place restrictions – the analysis and the inspection of the research thesis are concentrated on Southeast European Capital Markets
7. Due to the aforementioned facts, conclusions drawn of this research do not engage processes and circumstances of other markets of the category of Southeast European Capital Markets

The paper is organized in the following way. The first section initiates with the introduction. Section 2 summarizes the literature review. Section 3 discusses the data and the research methods employed. Section 4 shows the main estimation results. The final section provides summary and conclusions.

2. Studies on the Impact of Sentiment Indicators on the Capital Market Dynamics and Default Probability

Sentiment indicators and CDS spreads are in the focus of attention of many researchers. Tang and Jan (2010) reveal that the relationship between the probability of default and investor sentiment depends on the state of the market, namely if it is bullish or bearish. They assume that Conference Board Consumer Confidence Index as a proxy for changes of risk aversion. Tang and Jan (2010) prove that the investor sentiment may be considered as a good and effective instrument for Credit spread prediction. We should mention the investor inattention theory (Easley, O'hara, and Srinivas, 1998; Della Vigna and Pollet, 2009; Cohen and Frazzini, 2008; Barber and Odean, 2008; Duffie and Lando, 2001). The theory claims that limits of human attention affect market prices. DellaVigna and Pollet (2009) prove that reduced investor attention causes less immediate responses to earnings announcements. This measure is based on the assumption that investors with limited attention tend to neglect information about cash profitability, and focus on accounting profitability. They find that this inattention measure significantly predicts long-run stock returns. Hilscher, Pollet, and Wilson (2015) reveal that CDS traders are liquidity traders and are inattentive to news development, in comparison to the informed traders in the equity market. It is proved that credit traders respond faster during the salient news events, such as earnings announcements (Lamont and Frazzini, 2007; Greatrex, 2009).

The connection between sentiment indicators and capital markets dynamics are examined in many studies. Görmüş and Güneş (2010) analyze the effect of Consumer Confidence Index (CCI) on real exchange rate and stock market in Turkey for the period 2002-2008 using

econometric techniques. The results from GARCH-M and OLS model show that CCI affect real exchange rate and stock prices. Oprea and Brad (2014) investigate the relationship between the consumer confidence index and the Romanian stock market for the period 2002-2011. They argue that there is a positive correlation between changes in consumer confidence and stock market returns, displaying that individual investor sentiment affects stock prices. In the study conducted by Miljković and Radović (2006) evidence that the Serbian stock market does not show efficiency even in the weak-form of EMH is presented. They find statistically significant levels of autocorrelation in returns with high kurtosis distribution, considerably different from the normal one. Borges (2010) studies stock markets of France, Germany, UK, Greece, Portugal and Spain to check for the presence of random walk for the period from January 1993 to December 2007. Using both parametric and nonparametric tests, he finds evidence of random walk in all six countries for monthly return. Moreover, the hypothesis of random walk was rejected for Portugal and Greece for the daily return. Aga and Kocaman (2011) test the weak form of efficiency for return index-20 in Istanbul Stock Exchange (ISE) for the period 1986-2005. They lead to the conclusion that there is a weak form of efficiency in ISE, which means that the market is weakly efficient if the current time cannot be explained with the past values. Investigating calendar anomalies for five SEE stock markets (Bulgaria, Croatia, Greece, Romania and Turkey) during the period 2000-2008, Georgantopoulos, Kenourgios and Tsamis (2011) find evidence for the existence of three calendar effects (day of the week, turn of the month, time of the month) in both mean and volatility equations for Greece and Turkey, which is consistent to the findings of previous studies. On the other hand, the effects for the three emerging SEE markets are limited and exist only in volatility. Samitas, Kenourgios and Paltalidis (2011) study long-run relationships among five Balkan emerging stock markets (Turkey, Romania, Bulgaria, Croatia, and Serbia), the US and three developed European markets (UK, Germany and Greece) during the period 2000-2006. The results indicate that both domestic and external factors affect the Balkan stock markets, shaping their longrun equilibrium. Overall, they show evidence in favor of significant long-run relations between the Balkan emerging markets within the region and globally. Armeanu and Cioaca (2014) test the EMH in the case of Romania for 01.01.2002 -15.05.2014 using four methods, including GARCH model. They find out that the Romanian capital market is not weak-form efficient. Dragota and Oprea (2014) investigate the Romanian stock market's informational efficiency and find out that

the predictability of returns suggest that the Romanian stock market has a low level of efficiency. Furthermore, the impact of new information is more intense before and after its release.

Mateev and Marinova (2017) explore the relationship between credit risk and market prices of Markit iTraxx Europe index companies. They prove that CDS spreads and stock prices are cointegrated. This long run relationship is considered as an evidence for a possible transmission of shocks and influence between the two segments of the European financial market- CDS and stock market.

Corredor et al. (2015) examine the effect of investor sentiment on stock returns in three Central European markets: the Czech Republic, Hungary and Poland. The results show that sentiment is a key variable in the prices of stocks traded on these markets and its impact is stronger here than in more developed European markets.

Makela (2017) reveals that during the times of low investor risk appetite, the sovereign yield spreads to Germany increase. This finding holds for both pre- and post-crisis periods and also when the identification assumption of constant fundamental based risk premium to Germany is relaxed by controlling the differences in CDS prices.

Coudert and Gex (2006**)** test the possibility whether the main indexes for risk measurement are able to predict the occurrence of a crisis. They think that the "risk appetite" decreases before crisis. They still mark that the reverse reaction is possible. Crisis may be preceded by a period of strong "risk appetite" during which investors are too optimistic and in this way they create "speculative balloons" at prices of risk assets. The recent mortgage crisis started with the collapse of Bear Stearns is an example of such reaction. The results of their research state that indicators related to risk avoidance foresee the coming of crisis. That may explain the fact that in this paper we have included some variables which may be accepted as measurements of investors' behavior. The why the effect of these variables on sovereign CDS spreads is tested, is because of the more accurate determination in CDS variations. Fontana and Scheicher (2008) have already revealed the influence of investors' risk appetite on CDS variation. According to them the risk appetite variable should have negative influence on the credibility of CDS spreads as a sovereign risk indicator. According to Fontana and Scheicher (2008) the investors risk appetite influences the size of the CDS spreads, because it affects the demand of the CDS so an increasing investors' risk appetite means that they are more willing to bear their exposure to credit risk themselves. This means that they are less interested in insuring their risks and this leads to decreasing CDS spreads demand. Spyrou (2013)

has reported that investor sentiment may be an important bond yield determinant for the following period: 2008-2010. Later Spyrou, Galariotis and Makrichoti (2016) have used Economic Sentiment Indicator and ZEW Economic Sentiment Indicator to reveal the investor sentiment influence on credit default swaps spread. They found out that sentiment may play a role in CDS spread determination, albeit limiting. This is why in addition we also employ variables that proxy for behavioral determinants because they may represent investors and economic sentiment.

3. Research Methodology

In the current research we apply the following approaches:

3.1. Augmented Dickey –Fuller (ADF) test

Before proceeding to the election of the econometric method, it is necessary to apply a test to establish the stationarity of the explored variables. The null hypothesis of the Augmented Dickey and Fuller (ADF) is non-stationary. The Augmented Dickey-Fuller unit root tests is performed on each series. The tests reject the non-stationary null hypothesis for the stock price index at 1 %, 5 % and 10% significance level for all monthly stock returns at level.

The Augmented Dickey-Fuller (ADF) test constructs a parametric correction for higher-order correlation by assuming that the y series follows an AR (p) process and adding p lagged difference terms of the dependent variable y to the right-hand side of the test regression:

$$\Delta y_t = \alpha y_{t-1} + x_t^{'}\delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + ... + \beta_p \Delta y_{t-p} + \nu_t \qquad (1)$$

Before analyzing the relationship between public expectations, financial market dynamics and sovereign credit default swaps (SCDS), the Augmented Dickey-Fuller (ADF) test is applied to examine the stationary properties of the return series. The null hypothesis of ADF test is that the series has a unit root (non-stationary process). It is proved that the series **are stationary at level**.

3.2. GARCH- family models

First, we provide an introduction to GARCH type models used to analyze our datasets. Secondly, criteria used to select the best fitting models are given. We use the models of the GARCH- family models (GARCH (p,q), EGARCH (p,q), TGARCH(p,q) and PGARCH(p,q)) *for examining the relationship between public expectations and financial market dynamics and sovereign credit default swaps (SCDS), including the additional variables in the models, such as consumer confidence*

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indicator (CCI), industrial confidence indicator (ICI), inflation expectations (InfExp) and SCDS. The appropriate GARCH model of GARCH-family models for each index is applied to examine the relationship between public expectations and capital market dynamics. Higher order GARCH models, denoted GARCH (*q*, *p*) can be estimated by choosing either *q* or *p* greater than 1 where *q* is the order of the autoregressive GARCH terms and *p* is the order of the moving average ARCH terms.

The representation of the GARCH (*q*, *p*) variance is:

$$\sigma_t^{\,2} = \omega + \sum_{j=1}^{q} \beta_j \sigma^{2}{}_{t-j} + \sum_{i=1}^{p} \beta_i \varepsilon_{t-i}^2 \qquad (2)$$

The EGARCH or Exponential GARCH model was proposed by Nelson (1991). The specification for the conditional variance is:

$$\log(\sigma_t^2) = \omega + \sum_{j=1}^{q} \beta_j \log(\sigma_{t-j}^2) + \sum_{i=1}^{p} \alpha_i \left| \frac{\varepsilon_{t-i}}{\sigma_{t-i}} \right| + \sum_{k=1}^{r} \gamma_k \frac{\varepsilon_{t-k}}{\sigma_{t-k}} \qquad (3)$$

Note that the left-hand side is the log of the conditional variance. This implies that the leverage effect is exponential, rather than quadratic, and that forecasts of the conditional variance are guaranteed to be nonnegative. The presence of leverage effects can be tested by the hypothesis that $\gamma_i < 0$. The impact is asymmetric if $\gamma_i \neq 0$.

The Threshold GARCH (TGARCH) Model - TARCH or Threshold ARCH and Threshold GARCH were introduced independently by Zakoïan (1994) and Glosten, Jaganathan, and Runkle (1993). The generalized specification for the conditional variance is given by:

$$\sigma_t^2 = \omega + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2 + \sum_{i=1}^{p} \alpha_i \varepsilon_{t-i}^2 + \sum_{k=1}^{r} \gamma_k \varepsilon_{t-k}^2 I_{t-k} \qquad (4)$$

where $I_t = 1$ if $\varepsilon_t < 0$ and 0 otherwise.

In this model, good news, $\varepsilon_{t-i} > 0$, and bad news $\varepsilon_{t-i} < 0$, have differential effects on the conditional variance; good news has an impact of α_i, while bad news has an impact of $\alpha_i + \gamma_i$. If $\gamma_i > 0$, bad news increases volatility, and we say that there is a *leverage effect* for the i-th order. If $\gamma_i \neq 0$, the news impact is asymmetric.

The Power GARCH (PGARCH) Model - Taylor (1986) and Schwert (1989) introduced the standard deviation GARCH model, where the standard deviation is modeled rather than the variance. This model, along with several other models, is generalized in Ding et al. (1993) with

the Power ARCH specification. In the Power ARCH model, the power parameter δ of the standard deviation can be estimated rather than imposed, and the optional γ parameters are added to capture asymmetry of up to order r :

$$\sigma_t^{\delta} = \omega + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^{\delta} + \sum_{i=1}^{p} \alpha_i (|\varepsilon_{t-i}| - \gamma_i \varepsilon_{t-i})^{\delta} \quad (5)$$

where $\delta > 0, |\gamma_i| \le 1$ for $i = 1,....,r, \gamma_i = 0$, for all $i > r$, and $r \le p.$.

The symmetric model sets $\gamma_i = 0$ for all i . Note that if $\delta = 2$ and $\gamma_i = 0$ for all i , the PARCH model is simply a standard GARCH specification. As in the previous models, the asymmetric effects are present if $\gamma \neq 0$.

All of the GARCH-type models were fitted by the method of maximum likelihood. Many of the fitted models are not nested. Discrimination among them was performed using various criteria: the Akaike information criterion due to Akaike (1974) and the Bayesian information criterion due to Schwarz (1978). *We choose the appropriate GARCH model by the use of information criteria – Akaike's information criteria (AIC) and Schwarz information criterion (SIC).* The Akaike Information Criterion and the Schwarz information criterion (SIC) are tools to select the best model, and we chose the one from GARCH family that minimizes the AIC and the SIC value. As a best model, we accept the one, in which AIC and SIC's statistics possess lowest values.

3.3. Granger Causality Test

To determine the direction of the causality relationship between explored variables; if it is one-way or bidirectional, we used Granger causality test. We analyze the relationship between the explored variables using the concept of Granger- causality.

The Granger (1969) approach to the question of whether x causes y is to see how much of the current y can be explained by past values of y and then to see whether adding lagged values of x can improve the explanation. y is said to be Granger-caused by x if x helps in the prediction of y , or equivalently if the coefficients on the lagged x's are statistically significant. Note that two-way causation is frequently the case; x Granger causes y and y Granger causes x.

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It is important to note that the statement "x Granger causes y" does not imply that y is the effect or the result of x. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term.

EViews runs bivariate regressions of the form:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + ... + \alpha_1 y_{t-1} + \beta_1 x_{t-1} + ... + \beta_1 x_{-1} + \varepsilon_t \quad (6)$$

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + ... + \alpha_1 x_{t-1} + \beta_1 y_{t-1} + ... + \beta_1 y_{-1} + u_t \quad (7)$$

for all possible pairs of (x, y) series in the group.

4. Data Research

We use the values of the returns of the indices, sentiment indicators and Credit Default Swaps (CDS) with a monthly frequency. We analyze the linkages between financial market dynamics and public expectations of eight capital markets of South East Europe (SEE) - Bulgaria, Croatia, Greece, Slovenia, Turkey, Romania, Montenegro and Macedonia (Table 1). We can divide the stock exchanges of SEE into two groups in the context of their development, using the stock market capitalization as a criterion. The first group contains the emerging markets – Bulgaria, Romania, Montenegro, Macedonia, Slovenia and the second one – developed markets – Croatia, Turkey and Greece (Table 2 and Table 3). Daily closing prices of eleven SEE market indices were available on the Stock Exchanges' websites of the investigated countries. The data range is from 1st January 2005 to 4th November 2015.

Table 1. Analyzed stock exchanges, indices and a number of observations

Country	Stock exchange	Index	Number of observations
Bulgaria	Bulgarian Stock Exchange	SOFIX	2693
Greece	Athens Stock Exchange	Athex Composite Share Price	2704
Macedonia	Macedonian Stock Exchange	MBI10	2640
Romania	Bucharest Stock Exchange	BET	2717
Croatia	Zagreb Stock Exchange	CROBEX	2704
Slovenia	Ljubljana Stock Exchange	SBI TOP	2395
Turkey	Borsa Istanbul	BIST100	2727
Montenegro	Montenegro Stock Exchange	MONEX	2675

Notes for Table 1.: Southeast Europe includes 10 countries: Bulgaria, Greece, Macedonia, Romania, Croatia, Slovenia, Turkey and Montenegro.
Source: Author's calculations.

Table 2. Market capitalization of SEE capital markets for 2011

SEE capital markets	Market capitalization (US$)
Country	**2011 (billion)**
Bulgaria	8,253.25 US$
Croatia	22,558.38 US$
Greece	33,778.89 US$
Montenegro	3,509.11 US$
Romania	14,023.92 US$
Slovenia	6,325.86 US$
Turkey	197,074.46 US$
Macedonia	580.36 US$

Notes for Table 2: The total market capitalization of each capital market is for 2011 (approximately in the middle of the examined period 2005-2015).
Source: The websites of the SEE stock exchanges.

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Table 3. Developing and developed capital markets (according to the market capitalization)

Developing SEE capital markets	Developed SEE capital markets
Bulgaria	Greece
Slovenia	Croatia
Macedonia	Turkey
Montenegro	
Romania	

Notes for Table 3: Median market capitalization is US $ 6,325.86 billion. Source: Author's calculations.

We calculate the percentage change between the opening value of the index on the first working day of month (Vt) and the opening value on the first working day of next month (Vt+1), or:

$$R_t = \frac{V_{t+1} - V_t}{V_t} \quad (8)$$

The CDS spread of Bulgaria is denoted in Euro, and it is obtained from Data Stream. All data for the values of the consumer confidence indicator (CCI), industrial confidence indicator (ICI) and inflation expectations (InfExp) is available in the database of the Eurostat Statistical Service. Consumer and industrial confidence indicators are indices composed of questions about general conditions for households and firms, respectively.

Consumer confidence (or sentiment) surveys began in the 1950s in the US backed up by the idea that asking the general public about their overall consumption and price expectations, together with purchasing intents, can serve as a viable leading indicator for economic fluctuations. This holds especially true for more developed economies where consumption can take three quarters of total output or even beyond. And it is indeed the case that sentiment data has forecasting capabilities well above and beyond that of standard macroeconomic indicators (Curtin, 2007).

The industrial confidence indicator including key components such as capacity, backlog, orders, and so on, which are then summarized into an overall index.

Inflation expectations data is a question asking the general public if they expect prices to rise faster, rise at the same rate, rise slower, remain the same, or decrease.

5. Empirical Results for the Impact of Sentiment Indicators on the Capital Market Dynamics and Default Probability

- ***The impact of consumer sentiment on the capital market dynamics***

Table 4. Estimating results of GARCH models for the influence of the consumer confidence indicator on the capital market dynamics

Index	**The most appropriate GARCH model**	***CCI* *(Prob)***
SOFIX	*PGARCH (1,2) -t*	***0.125358 (0.0113)***
CROBEX	*PGARCH (2,1)-t*	-0.010476 (0.6703)
ACSP	*EGARCH (2,1)-t*	-0.011788 (0.8629)
MBI10	*EGARCH (1,1)-t*	***-0.008110 (0.0117)***
BET	*EGARCH (2,2)-t*	***-0.102886 (0.0047)***
SBITOP	*EGARCH (1,2)-t*	***-0.053161 (0.0008)***
BIST100	*EGARCH (2,2)-t*	0.001895 (0.9213)

Notes for Table 4.: The data of the consumer confidence indicator is included in the equation of EGARCH (p,q) or PGARCH (p,q) model.
Source: Author's calculations.

The Table 4 shows the values of the consumer confidence indicator (CCI) in the equation of EGARCH (p,q) or PGARCH(p,q) model. We should note that for four of the examined indices there are statistically significant values at 5% of CCI. Moreover, the absolute values of CCI are in the range from 0.008110 (MBI10) to 0.125358 (SOFIX). Remarkably, the highest value of CCI is registered for SOFIX, indicating that this sentiment indicator has a relatively significant influence on the dynamics of Bulgarian capital market. Here, we should specify that statistically significant consumer confidence indicators are calculated only for the emerging SEE capital markets – Bulgarian (0.125358), Slovenian (-0.053161), Macedonian (-0.008110) and Romanian (-0.102886). One of the possible explanation of the registered insignificant values of CCI for the developed markets (Greece, Turkey and Croatia) is that the customer expectations are already included in the pricing decisions of the market agents. Here we can make a conclusion that the consumer sentiment information has influence on the capital

market dynamics of Bulgaria, Macedonia, Slovenia, Romania, therefore on the prices of financial assets. Logically, we should make an assumption that the consumer expectations will have larger effect on the stocks of the companies especially dependent on consumption (e.g. consumer goods companies) than on the other stocks.

All things considered, we find an evidence that consumer sentiment has predictive capability, connecting with the financial market dynamics of the emerging SEE capital markets. This conclusion is similar to the one proposed by Baumohl (2012) i.e the happiness of the consumers is important as when consumers feel less confident of the economy they tend not to be willing to make major purchases such as houses and cars which may derail the economic activity. Additionally, falling confidence is not favorable towards equities as it is an indication of declining business sales.

➢ ***The impact of industrial sentiment on the capital market dynamics***

In Table 5, we reveal the results of GARCH models for the influence of the industrial confidence indicator on the stock market dynamics.

Table 5. Estimating results of GARCH models for the influence of the industrial confidence indicator on the stock market dynamics

Index	**The most appropriate GARCH model**	***ICI (prob)***
SOFIX	*PGARCH (1,2) -t*	6.15E-05 (0.9882)
CROBEX	*PGARCH (2,1)-t*	0.000679 (0.8019)
ACSP	*EGARCH (2,1)-t*	-0.000931 (0.8455)
MBI10	*EGARCH (1,1)-t*	0.000851 (0.2213)
BET	*EGARCH (2,2)-t*	0.000516 (0.7391)
SBITOP	*EGARCH (1,2)-t*	-1.32E-05 (0.9967)
BIST100	*EGARCH (2,2)-t*	0.001566 (0.4101)

Notes for Table .5: The data of the industrial confidence indicator is included in the equation of EGARCH (p,q) or PGARCH (p,q) model.
Source: Author's calculations.

When we add the industrial confidence indicator (ICI) in the GARCH model equation, the results are quite different – none of the eight values of ICI is statistically significant at 5%. Thus, there is not a linkage between industrial sentiment and the market dynamics of the SEE capital markets. Actually, these results are not unexpected, in view of the assumption that business expectations do not affect the movement of the indices.

➢ ***The impact of inflation expectations on the capital market dynamics***

Table 6. Estimating results of GARCH models for the influence of the inflation expectations on the stock market dynamics

Index	**The most appropriate GARCH model**	***InflExp (prob)***
SOFIX	*PGARCH(1,2) -t*	***0.060200 (0.0190)***
CROBEX	*PGARCH(2,1)-t*	***-0.000195 (0.0414)***
ACSP	*EGARCH(2,1)-t*	-0.000779 (0.5752)
MBI10	*EGARCH(1,1)-t*	***-0.007848 (0.0000)***
BET	*EGARCH(2,2)-t*	-0.004912 (0.3951)
SBITOP	*EGARCH(1,2)-t*	0.005638 (0.2260)
BIST100	*EGARCH(2,2)-t*	***0.010756 (0.0051)***
MONEX	*EGARCH(1, 2)-t*	-0.006195 (0.2610)

Notes for Table 6: The data of the inflation expectations is included in the equation of EGARCH (p,q) or PGARCH(p,q) model.
Source: Author's calculations.

The values of inflation expectations in the GARCH model equation are presented in Table 6. In macroeconomic theory the inflation expectations (InflExp) have a significant role in the formulation of the expectations-augmented Philips curve. In economics, the inflation expectations affect the overall production and through it indirectly influence financial market dynamics. Here we can make two important remarks. Firstly, statistically significant values of InflExp are registered for SEE indices – SOFIX (0.060200), CROBEX (-0.000195), MBI10 (-0.007848) and BIST100 (0.010756). Secondly, the absolute values of InflExp are in the range from 0.000195 (MBI10) to 0.060200 (SOFIX). Consequently, inflation expectations influence on the capital market dynamics of four SEE indices. Here we should note that the statistically significant values of inflation expectations are calculated for two developed financial markets – Turkey and Croatia and two developing markets – Bulgaria and Macedonia. It's necessary to compare these

results with the previous results revealing statistically significance of the CCI for Bulgarian and Macedonian indices. Consequently, the public expectations can be used for prediction purposes despite relatively illiquid trading on the markets and incomplete data surveys. Notably, inflation expectations are cointegrated with the real inflation and actually can be used to forecast it in the most of the examined countries.

To sum up, data for the inflation expectations have predictive power for the market performance of the stock indices, although relatively low values of InflExp (from 0.000195 to 0.060200).

The consumer sentiment information has influence on the capital market dynamics of Bulgaria, Macedonia, Slovenia, Romania, therefore on the prices of financial assets. Additionally, consumer expectations have predictive capability for the performance of the emerging SEE capital markets. In fact, these results are in agreement with results obtained by Gerunov (2014). Gerunov (2014) examines whether the stock market indices of twelve key EU economies are consistent with the implications of the Efficient Market Hypothesis (EMH) and if some publicly available information can be usefully utilized to forecast market movements. He finds enough evidence that the public expectations display predictive power for financial index dynamics in fully 6 (Germany, France, Poland, Bulgaria, Hungary and Greece) out of the 12 sampled countries. On the contrary, there is no linkage between industrial expectations and the dynamics of the SEE capital markets. Inflation expectations have impact on the performance of four SEE indices – Turkey, Croatia, Bulgaria and Macedonia. What is more, the inflation expectations information has predictive power for the market dynamics of the SEE stock exchanges. Our findings suggest that the public expectations impact the financial market dynamics in Bulgaria. Hence, macroeconomic indicators are important as they provide a tool for analyzing the current and future state of the Bulgarian economy. As the Bulgarian stock exchange is a concurrent part of our economy, indicators are used in order to evaluate stock market investments. Importantly, in Bulgarian emerging economy, the daily available source of information for households is the development of the financial market in Bulgaria. Generally, households in developing markets can only follow the economic outlook through the willingness to buy factor due to the fact that the level of income is close to subsistence.

➢ ***Granger Causality Test for establishing the relationship between the returns of stock market indices and the public expectations***

Table 7. Granger Causality Test for establishing the relationship between the returns of stock market indices and the public expectations *(2 lags)*

Country	Null hypothesis	F-Statistic	P value	Decision
Bulgaria	*CCI does not Granger Cause SOFIX* *SOFIX does not Granger Cause CCI**	1.23814 4.52609	0.2935 **0.0127**	***CCI ←SOFIX***
	ICI does not Granger Cause SOFIX *SOFIX does not Granger Cause ICI **	1.56678 6.67438	0.2129 **0.0018**	***ICI ←SOFIX***
	InflExp does not Granger Cause SOFIX *SOFIX does not Granger Cause InflExp*	1.41943 0.22141	0.2458 0.8017	***Accept both hypotheses***
Croatia	*CCI does not Granger Cause CROBEX** *CROBEX does not Granger Cause CCI*	4.95546 0.72313	**0.0086** 0.4873	***CCI →CROBEX***
	*ICI does not Granger Cause CROBEX** *CROBEX does not Granger Cause ICI*	9.67617 3.08037	**0.0002** 0.0512	***ICI →CROBEX***
	InflExp does not Granger Cause CROBEX *CROBEX does not Granger Cause InflExp*	1.41724 0.26326	0.2464 0.7690	***Accept both hypotheses***
Greece	*CCI does not Granger Cause ACSP** *ACSP does not Granger Cause CCI*	3.37128 0.27428	**0.0375** 0.7606	***CCI →ACSP***
	*ICI does not Granger Cause ACSP** *ACSP does not Granger Cause ICI*	6.43540 1.69538	**0.0022** 0.1878	***ICI →ACSP***
	InflExp does not Granger Cause ACSP *ACSP does not Granger Cause InflExp**	1.59078 3.16488	0.2079 **0.0457**	***InflExp←ACSP***
Macedonia	*CCI does not Granger Cause MBI10* *MBI10 does not Granger Cause CCI*	0.37549 0.49445	0.6897 0.6141	***Accept both hypotheses***
	ICI does not Granger Cause MBI10 *MBI10 does not Granger Cause ICI**	1.60372 **3.97993**	0.2073 **0.0224**	***ICI ←MBI10***
	InflExp does not Granger Cause MBI10 *MBI10 does not Granger Cause InflExp*	0.35589 2.44835	0.7031 0.1011	***Accept both hypotheses***
Montenegro	*InflExp does not Granger Cause MONEX* *MONEX does not Granger Cause InflExp*	0.37747 0.83245	0.6883 0.4434	***Accept both hypotheses***

Romania	*CCI does not Granger Cause BET* *BET does not Granger Cause CCI*	2.22823 1.18324	0.1120 0.3097	***Accept both hypotheses***
	ICI does not Granger Cause BET *BET does not Granger Cause ICI**	1.94334 5.30432	0.1476 **0.0062**	***ICI ←BET***
	InflExp does not Granger Cause BET *BET does not Granger Cause InflExp*	0.46343 2.38126	0.6302 0.0967	***Accept both hypotheses***
Slovenia	*CCI does not Granger Cause SBI TOP* *SBI TOP does not Granger Cause CCI**	0.85898 7.87640	0.4264 **0.0006**	***CCI ←SBI TOP***
	ICI does not Granger Cause SBI TOP *SBI TOP does not Granger Cause ICI**	0.94945 4.61392	0.3901 **0.0119**	***ICI ← SBI TOP***
	InflExp does not Granger Cause SBI TOP *SBI TOP does not Granger Cause InflExp*	0.95865 2.69685	0.3866 0.0719	***Accept both hypotheses***
Turkey	*CCI does not Granger Cause BIST100* *BIST100 does not Granger Cause CCI*	2.68363 0.18079	0.0735 0.8349	***Accept both hypotheses***
	*ICI does not Granger Cause BIST100** *BIST100 does not Granger Cause ICI*	7.68700 0.37275	**0.0008** 0.6898	***ICI →BIST100***
	InflExp does not Granger Cause BIST100 *BIST100 does not Granger Cause InflExp*	1.24282 2.13195	0.2932 0.1242	***Accept both hypotheses***

** Null Hypothesis rejection at 5% significance level and acceptance of the Alternative Hypothesis which determine informational influence of the relevant variable*
Source: Authors' calculations.

Granger causality test is applied to test the relationship between capital market dynamics and public expectations - inflation expectations, consumer and business confidence. To determine the number of lags in our model, Akaike and Schwarz information criteria are applied. In our sample a lag of 2 is selected according to this criteria. The results of the test, presented in Table 7, show that there are interdependencies, both in the direction from public attitudes indicators to index returns and vice versa.

The results of the Granger Causality Test reveal that the hull hypothesis of no Granger causality from Consumer Confidence Indicator (CCI) to index return can be rejected at 5% significant level for two of the examined countries, namely Croatia and Greece. On the other hand, in Bulgaria and Slovenia, we prove that SOFIX and SBI TOP granger cause CCI. Therefore, only in the emerging capital markets of Bulgaria and Slovenia, index returns affect consumer expectations and attitudes. Analyzing the results, we observe one way casual determining

informational influence of stock market over the industrial confidence indicator (ICI) of the following countries: Bulgaria, Macedonia, Romania, Slovenia, leading to the conclusion that the hull hypothesis can be rejected. On the other hand, the relation "business confidence-capital market dynamics" is existed in the developed capital markets of Turkey, Greece and Croatia.

It is noteworthy that when there is a relation „business confidence - capital market", it refers only to the three developed capital markets. Consequently, we can define these markets as more developed than other markets considered. This would determine the capital markets of Turkey, Greece and Croatia as efficient. Additionally, we can consider the other financial markets as inefficient. Consumer confidence granger causes index return only in two of the developed capital markets - Greece and Croatia.

Due to the existing relation "capital market - business confidence" in the capital markets of Bulgaria, Macedonia, Romania, Slovenia we can assume that this is an indication for market inefficiency. However, the relation "capital market - business confidence" would also lead to a strengthening negative fluctuations of market returns. These results determine the capital markets of Bulgaria, Macedonia, Romania, Slovenia, except as less efficient.

Only in Greece - a country, considered by us as a developed one, we reveal that ACSP granger cause InflExp. In other words, the capital market dynamics of Greek market influence the inflation expectations.

- ***The impact of sentiment indicators on the sovereign credit risk in Bulgaria***

The results by applying GARCH methodology for the influence of sentiment indicators on the Bulgarian capital market dynamic and sovereign credit risk are exposed in Table 8.

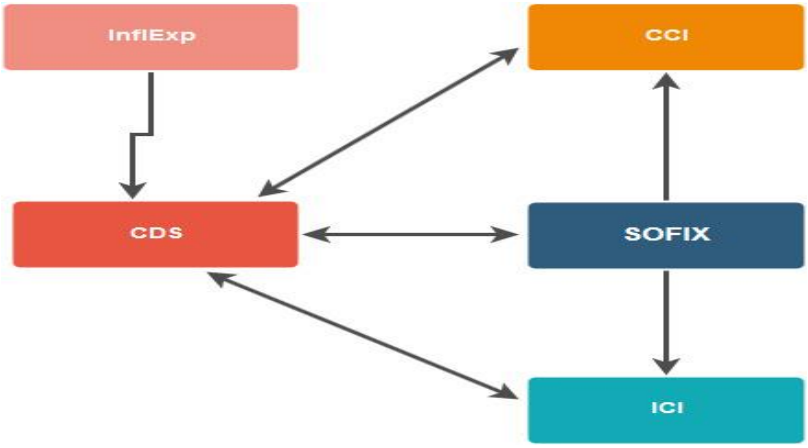
Table 8. Estimating results of GARCH models for the influence of the consumer confidence indicator on the capital market dynamics and credit default swap spreads of Bulgaria

Index	**The most appropriate GARCH model**	***CCI (Prob)***	***InflExp (Prob)***	***ICI (Prob)***	***Index***
SOFIX	*PGARCH (1,2) -t*	***0.125358 (0.0113)***	***0.060200 (0.0190)***	*6.15E-05 (0.9882)*	***SOFIX***
CDS	*TGARCH (1,2)-t*	***0.251523 (0.0015)***	***0.046284 (0.0328)***	***0.023518 (0.0085)***	***CDS***

Notes for Table 8:The data of the inflation expectations and consumer confidence indicator is included in the equation of PGARCH(p,q) or TGARCH(p,q) model.
Source: Authors' calculations.

We can make a conclusion that the consumer sentiment information has influence on the capital market dynamics of Bulgaria, but remarkably, consumer confidence indicator registers significant high value (0.251523) in the equation of CDS spread. By this results, we prove that the happiness of the consumers is important not only for capital markets but for sovereign credit risk. The consumer confidence is an indicator which may predict and provoke a turmoil of economic activity. As it was proved, falling confidence is not favorable towards equities as it is an indication of declining business sales. Consequently, in the case of Bulgaria, consumer confidence should be considered as an economic indicator which derives most of its information content from past and current economic outlook. This is especially true during the financial crisis of 2008 when the future is uncertain and risky. InflExp is one of the main variables importance in predicting default risk. Inflation may be used as an indicator for economic stability. Aizenman el al. (2013) has explored the macoreconomic influence on sovereign and government default probability and his results reveals that inflation effects on CDS spreads variation. Comparing the influence of CCI, InflExp and ICI, it is important to report that all of the variables are significant at 5% level. This confirms the hypothesis that sentiment indicators possesses a role of common or systematic risk factors of CDS spread changes. Inflation is considered as one of the main variables in determing default risk. Inflation expectations may be used as an indicator for economic stability, namely high levels of expected inflation indicate macroeconomic instability. The results obtained by Aizenman el al. (2013) are confirmed by the ones in Tables 8 and 9. The significant results may be considered as a confirmation of the multiple-equilibria theory, namely that financial markets may take optimal behaviors sometimes during a period of turmoil and this leads to self-fulfilling liquidity crisis and self-fulfilling prophecies. These conclusions are proved by the bilateral relationship between Bulgarian capital market and CDS and CCI and CDS.

Granger causality test is applied to test the relationship between capital market dynamics and public expectations - inflation expectations, consumer and business confidence. On the other hand it is applied to reveal the relationship between public expectations and the public sector.



Graph 1: Significant Relations between Sentiment Indicators, Credit Default Swaps and Bulgarian Capital Market

➢ ***Granger Causality Test for establishing the relationship between the returns of SOFIX, the public expectations and credit default swaps (CDS)***

Table 9. Granger Causality Test for establishing the relationship between the returns of SOFIX, the public expectations and credit default swaps (CDS) ***(2 lags)***

Null hypothesis	F-Statistic	P- value	Decision
CCI does not Granger Cause SOFIX *SOFIX does not Granger Cause CCI**	1.23814 **4.52609**	0.2935 **0.0127**	**CCI ←SOFIX**
ICI does not Granger Cause SOFIX *SOFIX does not Granger Cause ICI **	1.56678 **6.67438**	0.2129 **0.0018**	**ICI ←SOFIX**
InflExp does not Granger Cause SOFIX *SOFIX does not Granger Cause InflExp*	1.41943 0.22141	0.2458 0.8017	**Accept both hypotheses**
*CDS does not Granger Cause SOFIX** *SOFIX does not Granger Cause CDS**	**4.19547** **6.28103**	**0.0015** **0.0007**	**CDS →SOFIX** **CDS ←SOFIX**
CCI does not Granger Cause CDS *CDS does not Granger Cause CCI**	**2.84151** **3.01218**	**0.0135** **0.0147**	**CCI →CDS** **CDS ←CCI**
InflExp does not Granger Cause CDS *CDS does not Granger Cause InflExp*	**5.07147** 1.26184	**0.0009** 0.2914	**InflExp →CDS**
ICI does not Granger Cause CDS *CDS does not Granger Cause ICI**	**4.31521** **5.15026**	**0.0215** **0.0017**	**ICI →CDS** **CDS ←ICI**

** Null Hypothesis rejection at 5% significance level and acceptance of the Alternative Hypothesis which determine informational influence of the relevant variable*

Source: Authors' calculations.

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Based on the results in Graph 1 and Table 9, we may conclude that sentiment variables may explain CDS spread changes efficiently. We observe bilateral relations, which may be accepted as proves that turmoil periods may be led by panic and fear of investors without any enormous change in other factors. The increasing default probability of Bulgaria tends to lead to increase in investors' fear and panic. We accept this as a proof of the realization of the "snowball effect". The bilateral relationship between SOFIX and CDS reveals a transmission channel between "private sector" and "public sector". The exposed results confirm the ones of Scheicher (2008), namely the investors risk appetite influences the size of the CDS spreads.

6. Conclusions

We can make a conclusion that there is empirically more evidence of a linkage between business confidence and capital markets, regardless of its direction, than between consumer confidence and capital markets. In just four countries, there is a relation between capital markets and consumer confidence, but when it is replaced by business confidence, statistically significant links are found for all of the examined countries. Four of the SEE countries - Bulgaria, Macedonia, Romania, Slovenia registered a statistically significant relation "capital market - business confidence". In markets with the highest values of market capitalization is available line of influence "business confidence - capital market". This determines the capital markets of Turkey, Greece and Croatia as effective. Analyzing the relationship between consumer confidence and capital markets we can make a conclusion that its direction is determined by the degree of development of the capital market. In the developed Croatian and Greek markets, the influence is from consumer confidence towards capital market, while in the developing Bulgarian and Slovenian markets it is opposite – from capital market towards consumer confidence**.** The capital market dynamics of Greek market influence the inflation expectations. We prove that the happiness of the consumers is important not only for capital markets but for sovereign credit risk. The consumer confidence is an indicator which may predict and provoke turmoil of economic activity. As it was proved, falling confidence is not favorable towards equities as it is an indication of declining business sales. Consequently, in the case of Bulgaria, consumer confidence should be considered as an economic indicator which derives most of its information content from past and current economic outlook. This is especially true during the financial crisis of 2008 when the future is

uncertain and risky. This confirms the hypothesis that a sentiment indicator possesses a role of common or systematic risk factors of CDS spread changes. The significant results may be considered as a confirmation of the multiple-equilibria theory, namely that financial markets may take optimal behaviors sometimes during a period of turmoil and this leads to self-fulfilling liquidity crisis and self-fulfilling prophecies. The explored sentiment variables may explain CDS spread changes efficiently. We observe bilateral relations, which may be accepted as proves that turmoil periods may be led by panic and fear of investors without any enormous change in other factors. The increasing default probability of Bulgaria tends to lead to increase in investors' fear and panic. We accept this as prove of the realization of the "snowball effect". The bilateral relationship between SOFIX and CDS reveals a transmission channel between "private sector" and "public sector".

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