AN ANALYSIS OF MACROECONOMIC VARIABLES AFFECTING REAL SECTOR CONFIDENCE INDEX: THE CASE OF TURKEY

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Abstract

Traditional finance theories are not sufficient to explain investor's sentiment and psychology. This situation leads to emergence of Behavioural Finance. The aim of this paper is to analyse the macroeconomic factors affecting Real Sector Confidence Index (RSCI) of Central Bank of the Republic of Turkey (CBRT). Within this scope, monthly data for the period between 2007:01 and 2017:03 is analysed by using Johansen Cointegration Test and Granger Causality Test. According to the results of the analysis, CBRT Composite Leading Indicators Index, Capacity Utilization Rate of Manufacturing Industry (CURMI), Turkish Lira Reference Interest Rate (TRLIBOR) and BIST100 Return Index affect RSCI.

Keywords: *Behavioural Finance, Real Sector Confidence Index, Johansen Cointegration Test, Granger Causality Test*

JEL Codes: *G20, G02*

1. Introduction

Traditional finance theories indicate that investors are rational and they consider all the information on the market in the decision-making process. Within this scope, many finance theories have been developed and models have been generated. However, the studies show that investors do not behave rationally as stated in the theories (Kıyılar and Akkaya, 2016, p. 110).

The basis of the Expected Utility Theory is suggested by Bernoulli (1738) and then developed by Von Neumann and Morgenstein (1945). The theory is based on the maximization of expected utility and the assumption that people behave rationally.

Samuelson (1965) proves in his study that that the future spot prices would walk randomly. The result of his study briefly indicates that today's best guess of tomorrow's forecast is simply today's forecast (Sheffrin, 1996, p. 109). The Random Walk Theory has taken its place in the finance literature by this study.

Fama (1970) reveals the Efficient Market Hypothesis by developing the Random Walk Theory. He shows that stock prices follow a random walk. The presence of an effective market can be mentioned when market prices of securities are always available and reflect full information. According to him, investors are rational and the transactions made by irrational investors do not affect the prices in the market. Yet, the Efficient Market Hypothesis excluding behavioral factors has not explained the fluctuations and crises seen in financial markets in recent years.

The Prospect Theory developed by Kahneman and Tversky (1979), which is the basis of Behavioral Finance, suggests that individuals give different weight to income and loss at different probability levels. The Prospect Theory, in contrast to the Expected Utility Theory, takes psychological factors into account (Köse and Akkaya, 2016, p. 4).

Investors' sensitivity is quite effective in financial markets. Investors do not pay attention only to the economic or financial indicators when they decide on financial markets. Investors' sensitivity refers to important information about the intentions and future expectations for economy. Thus, surveys are used to measure future expectations of

economic agents. Through these surveys, confidence and sensitivity indicators are identified and they are significant for the assessment of the economic situation.

Furthermore, consumer behaviors play an important role in the future expectations of economic-decision-maker. Consumer demand is one of the important determinants of investment, production and employment in an economy. Besides consumers, another economic factors is the real sector. The measurement of real sector confidence provides benefit for the interpretation of the future expectation of the economy. It is assumed that there is a strong relationship between confidence indices and macroeconomic variables.

Confidence indices are needful to determine the tendency of economic agents. In parallel to this aspect, the present study aims to identify the determinants of Real Sector Confidence Index (RSCI) in Turkey. Accordingly, the sample period runs from the first month of 2007 to the third month of 2017. Additionally, cointegration and causality tests are applied so as to achieve this objective. As a result of the analysis, it will be possible to understand the macroeconomic variables influencing RSCI in Turkey.

2. Literature Review

The relationship between investor psychology and stock returns on financial markets has been an attractive subject for researchers. Since investor psychology and sensitivity is a socio-psychological phenomenon and not directly observable, various indices such as business confidence index and consumer confidence index are created. There are several studies in the literature to analyze and measure confidence indices. Some of them are given in Table 1.

Table 1: A Summary of Literature

Authors	Method	Scope	Result
Darling (1955)	Regression	USA	There is a statistically significant co-variance between stock market price and business confidence index.
Santero and Westerlund (1996)	Correlation, Granger Causality	11 OECD Countries	There is a statistically significant relationship between business confidence and GDP, industrial production, and real business investment.
Otoo (1999)	Regression, Granger Causality	USA	A strong relationship between consumer confidence index and stock prices when an increase in equity values boost sentiment.
Kershoff (2000)	-	South Africa	There is a relationship between Business Confidence Index and GDP growth rate.
Özsağır (2007)	Correlation	Turkey	RSCI has a positive impact on GDP growth rate.
Korkmaz and Çevik (2009)	EGARCH, Dynamic Causality	Turkey	An increase in IMKB 100 Index positively affects RSCI.

Arısoy (2012)	VAR	Turkey	RSCI has an impact on Industry Production Index and IMKB Index.
Mariana (2012)	Granger Causality	Romania, France, Italy, Germany	Industrial Confidence Index is statistically associated with Industrial Production Index.
Sum and Chorlian (2013)	Regression	USA	Consumer confidence and business confidence jointly affect to stock market risk premium.
Sum (2014)	Regression	31 different countries	Consumer confidence has a stronger influence on stock returns than business confidence.
Ayuningtyas and Koesrindartoto (2014)	Regression	Indonesia	A positive relationship between change in business confidence and JCI, LQ45, JII, and Sectors Index.
Nguyen et. al. (2015)	Regression	Vietnam	Consumer confidence has an impact on the stock market risk premium greater than business confidence.
Köse and Akkaya (2016)	Regression, VAR	Turkey	There is a statistically significant relationship between RSCI and BIST100 Return Index.
Kale and Akkaya (2016)	VAR	Turkey	There is a two-way causality between RSCI and BIST100 Return Index.
Koy and Akkaya (2017)	MS-VAR	Turkey	The shocks of BIST100 have a stronger impact on consumer indices despite there is a bi-directional interaction between them.

First part of the literature covers studies related to the relationship between confidence indices and stock market. One of the previous studies is carried out by Paul G. Darling. Darling (1955) firstly aims to propose a statistical technique for measuring business confidence, and second, to investigate the relationship between business confidence and stock price in USA. He analyzes a sample of 125 industrial common stocks including quarterly data for the period 1935-1953 by using Regression Analysis and concludes that Business Confidence Index exhibits a statistically significant co-variation with stock market prices. Afterwards, Katona (1968) measures consumer spending by using Michigan University Confidence Index designed by him. The contemporary popularity of this subject stems from Otoo's study (1999). He analyzes monthly data from 1980 to 1990 by using Regression Analysis. It has found that the increase in stock market price augments Consumer Confidence Index.Sum and Chorlian (2013) investigate the relationship between confidence indicators and stock market risk premium in USA. They determine that business confidence and consumer confidence together explain around 7.42% of the variation of stock market risk premium. They reach a conclusion that consumer confidence has an impact on the stock market risk premiums greater than business confidence. Nguyen et. al. (2015) confirm similar results supporting Sum and Chorlian's study by using same method in Vietnam.

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Sum (2014) examines the impacts of business and consumer confidence on stock returns. For 31 countries 7206 monthly data sets are analyzed by using Regression Model. According to result of the analysis, there is a cross-sectional evidence of the effects of consumer and business confidence on stock returns. In addition to this study, Korkmaz and Çevik (2009), Köse and Akkaya (2016) and Kale and Akkaya (2016) have also conclude that there is a significant relationship between confidence indices and stock market return.

Ayuningtyas and Koesrindartoto (2014) examine the effects of business confidence on Jakarta Composite Index (JCI), LQ45 , Jakarta Islamic Index (JII), and Sector Index consisting of ten sectors in Indonesia. The study covers 2000:Q1-2013:Q4 period which includes 54 data for each index as dependent variables. They observe that a change in business confidence has significant and positive effect on JCI, LQ45, JII, and all sectors index.

One of the current studies about consumer confidence belongs to Koy and Akkaya (2017). They first examine whether there is a mutual regime switching behavior between the consumer indices and equity index, and second, investigate their dynamics in response to each other in different regimes. They apply the Markov Regime Switching Model to the monthly data for the period between 2007:01 and 2016:06. The result of the analysis indicates that the shocks of BIST100 have a strong influence on consumer indices.

Second part of the literature is related to the effects of macroeconomic variables on confidence indices. Santero and Westerlund (1996) examine the relationship between economic confidence indicators based on consumer and business surveys and the economic situation of the 11 OECD Countries. They specify that there are low, middle and high correlation between business confidence and GDP, industrial production and real business investment. Moreover, the result of Granger Causality Test shows that the relationship between business confidence and these three macroeconomic variables is statistically significant in some OECD Countries.

Mariana (2012) studies the relationship between the industrial confidence indicator and Industrial Production Index in four member states of the European Union: Romania, Germany, France, and Italy. According to the results of Granger Causality Test, it is possible to say that there is a statistically significant relationship between the Industrial Confidence Index and the Industrial Production Index. However, this relationship is quite weak for Romania and Germany.

Kershoff (2000) states that there is a relationship between the Business Confidence Index and GDP growth rate. Similarly, Özsağır (2007) analyzes whether there is a relationship between RSCI and GDP growth rate by using Correlation Analysis. The study consists of 18 annual observations made between the years 1988 and 2005. The correlation coefficient is found to be 0.9. It is crucial to state that this high value means the existence of a positive relationship between RSCI and GDP growth rate.

With creating two different VAR models, the impact of confidence indices on stock market, consumption expenditures and employment is analyzed by Arısoy (2012). He observes that RSCI statistically affects the IMKB Index and the Industrial Production Index.

To sum up, there is a great deal of research on the relationship between confidence indices and stock market. However, only a very limited number of these studies examine the effects of macroeconomic indicators on these indices. Thus the present study, considering the lack of the research on the topic, attempts to contribute to the relevant literature by focusing on the impact of macroeconomic variables on business and consumer confidence.

3. Literature Review

3.1. Data Set and Methodology

This study includes 21 macroeconomic variables in order to determine which one has an influence on the RSCI (See Table 2) and 123 monthly data for the periods between 2007:01 and 2017:03. It analyzes the raw data obtained in 2017 from the websites of the Turkish Statistical Institute, Central Bank of the Republic of Turkey and Republic of Turkey Prime Ministry Undersecretariat of Treasury.

Additionally, Johansen Cointegration Test is applied to examine the long-run relationship between the RSCI and macroeconomic variables. Afterwards, Granger Causality Test is used in order to determine macroeconomic variables affecting RSCI.

3.2. Results

It is necessary to test the stability of the series as the spurious regressions can occur despite the high R^2 and significant t-statistical values in the studies conducted with non-stationary time series (Gujarati, 1999, p. 709).

In the analysis process, first, it is tested whether the 22 variables are stationary or not by using Augmented Dickey Fuller (ADF) Unit Root Test. Details of the ADF Test are given in Table 2.

Table 2: ADF Unit Root Test

Variables	Original Level		The First Difference Level	
	t-Statistic	P Value	t-Statistic	P Value
Banking Sector-Domestic Credit Volume	5.457133	1.0000	-4.82721	0.0001
Consumer Price Index	3.373936	1.0000	-6.819191	0.0000
Domestic Debt Stock	0.560806	0.9881	-8.183673	0.0000
Gold Price (A Gram)	0.370612	0.9809	-9.5978	0.0000
CBRT Composite Leading Indicators Index	0.071783	0.9623	-13.1791	0.0000
BIST100 Return Index	-0.897622	0.7862	-10.64375	0.0000
Real Exchange Rate	-1.692528	0.4325	-8.306395	0.0000
Net International Reserves	-1.972161	0.2988	-9.215989	0.0000
Turkish Lira Reference Interest Rate	-2.280489	0.1800	-7.758362	0.0000
Real Sector Confidence Index	-2.587347	0.0984	-8.520689	0.0000
Export	-2.659556	0.0842	-12.87062	0.0000
Import	-2.695782	0.0777	-15.11522	0.0000
Trade Balance	-2.915367	0.0465	-14.87883	0.0000
Direct Investment	-2.961053	0.0416	-11.67977	0.0000
Capacity Utilization Rate of Manufacturing Industry	-3.296201	0.0172	-9.407381	0.0000
Current Account Deficit	-4.798598	0.0001		
Portfolio Investment	-7.525596	0.0000		
Net Errors and Omissions	-9.183809	0.0000		
Budget Deficit	-12.96285	0.0000		
Primary Balance	-14.02173	0.0000		
Industrial Production Index	-0.190891	0.9352	-2.450142	0.1307

Unemployment Rate	-2.71737	0.0743	-2.33205	0.1639

Table 2 shows that the level value of 17 variables is greater than 0.01 and the level value of 5 variables is less than 0.01. As a consequence, these 5 variables cannot be included in the model. In other words, 17 variables are not stationary at original level value. Therefore, it is looked at the first differences of the relevant variables and 15 variables are stationary at the first difference level. The Industrial Production Index and Unemployment Rate can also not be included in the study since they are not stationary at the first difference level. Thus, the study is conducted with 15 variables.

The data used in the study during the review period is stationary at the same level and this fact demonstrates that the first step required for the cointegration test is provided. The appropriate lag length for the Johansen Cointegration Test should be determined by VAR model.

Table 3: Calculation of Optimal Lag Length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-12155.12	NA	7.28e+71	208.0363	208.3904	208.1800
1	-10525.62	2813.322	2.79e+61	184.0278	189.6938*	186.3281*
2	-10294.37	339.9644	2.97e+61	183.9208	194.8987	188.3777
3	-10081.01	258.9445	5.84e+61	184.1199	200.4096	190.7333
4	-9812.996	256.5632	7.88e+61	183.3846	204.9862	192.1545
5	-9456.251	250.0267	6.40e+61	181.1325	208.0460	192.0590
6	-8802.393	**290.6037***	**2.55e+60***	**173.8016***	206.0269	186.8847
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						
Maximum lag interval was chosen as 6.						

FPE and AIC criteria give the minimum value for 6 lags and the LR criterion gives the maximum value for 6 lags (Table 3). Therefore, the appropriate lag length is defined as 6 for the Johansen Cointegration Test based on the FPE, AIC and LR criteria. Afterwards, in order to determine whether the established model is stable in the selected lag length, the autocorrelation is analyzed by the LM Test and the presence of the heteroscedasticity is investigated by White Test.

Table 4: Autocorrelation LM Test

Lags	LM Statistic Value	P Value
1	253.8802	0.0904
2	251.2919	0.1102
3	260.6259	0.0516
4	213.6853	0.6953
5	238.2509	0.2598
6	241.3655	0.2163

The result of the Autocorrelation LM Test demonstrates that the probability value is greater than 0.05 at 6 lags and it is clear that there is no autocorrelation (Table 4).

Table 5: White Test

Chi-sq (χ2)	Df	P Value
7260.000	7200	0.3071

As a result of the White Test applied for 6 lags, the probability value is greater than 0.05 and there is no heteroscedasticity (Table 5).

Table 6: Johansen Cointegration Test

Null Hypothesis	Alternative Hypothesis	Max-Eigen Statistic	0.05 Critical Value	P Value
r = 0	r ≥ 1	173.4998	NA	NA
r ≤ 1	r ≥ 2	159.3988	NA	NA
r ≤ 2	r ≥ 3	127.3507	NA	NA
r ≤ 3	r ≥ 4	116.3027	76.57843	0.0000
r ≤ 4	r ≥ 5	109.7985	70.53513	0.0000
r ≤ 5	r ≥ 6	82.34556	64.50472	0.0005
r ≤ 6	r ≥ 7	74.59541	58.43354	0.0007
r ≤ 7	r ≥ 8	63.57252	52.36261	0.0025
r ≤ 8	r ≥ 9	47.64607	46.23142	0.0350
r ≤ 9	r ≥ 10	40.14090	40.07757	0.0492
r ≤ 10	r ≥ 11	36.93445	33.87687	0.0209
r ≤ 11	r ≥ 12	27.52667	27.58434	0.0508

The results of the Johansen Cointegration Test on multiple relationships applied for 6 lags are given in Table 6. The null hypothesis (r ≤ 11), which means that there are at most 11 cointegrating relationships, is accepted against the alternative hypothesis (r ≥ 12). Thus, the result of the Johansen Cointegration Test indicates that RSCI and macroeconomic variables are in cointegrating relationships at the 0.05 level of probability value (Table 6).

Table 7: Granger Causality Results

The Direction of Causality	P Value	Is there a causality?
CBRT Composite Leading Indicators Index → RSCI	**6.E-06***	Yes
Capacity Utilization Rate of Manufacturing Industry → RSCI	**0.0035***	Yes
Turkish Lira Reference Interest Rate → RSCI	**0.0088***	Yes
BIST100 Return Index → RSCI	**0.0136***	Yes
Direct Investment → RSCI	0.0777	No
Real Exchange Rate → RSCI	0.1729	No
Import → RSCI	0.2153	No
Gold Price → RSCI	0.2836	No
Trade Balance → RSCI	0.3234	No
Export → RSCI	0.3772	No

Consumer Price Index → RSCI	0.5013	No
Domestic Debt Stock → RSCI	0.5223	No
Net International Reserves → RSCI	0.5329	No
Banking Sector-Domestic Credit Volume → RSCI	0.6441	No
Lag Length: 6		
"*" represents a statistical significance at 5% level.		

Table 7 shows the Granger Causality results. The probability values of the CBRT Composite Leading Indicators Index, Capacity Utilization Rate of Manufacturing Industry (CURMI), Turkish Lira Reference Interest Rate (TRLIBOR) and BIST100 Return Index are less than 0.05. This means that these numbers are statistically significant. Actually, there is a causality relationship between the RSCI and these four variables. The Direction of Causality is from these four variables to the RSCI. There is one-way causality. The CBRT Composite Leading Indicators Index, CURMI, TRLIBOR and BIST100 Return Index have effects on the RSCI.

Table 8: Granger Causality Results

The Direction of Causality	**P Value**	**Is there a causality?**
Capacity Utilization Rate of Manufacturing Industry ← RSCI	**9.E-10***	Yes
Import ← RSCI	**8.E-05***	Yes
Export ← RSCI	**0.0025***	Yes
Domestic Debt Stock ← RSCI	**0.0085***	Yes
Trade Balance ← RSCI	**0.0165***	Yes
Banking Sector-Domestic Credit Volume ← RSCI	**0.0278***	Yes
Turkish Lira Reference Interest Rate ← RSCI	0.0989	No
CBRT Composite Leading Indicators Index ← RSCI	0.1670	No
Direct Investment ← RSCI	0.2284	No
Gold Price ← RSCI	0.3205	No
BIST100 Return Index ← RSCI	0.5131	No
Net International Reserves ← RSCI	0.6124	No
Consumer Price Index ← RSCI	0.6746	No
Real Exchange Rate ← RSCI	0.9621	No
Lag Length: 6		
"*" represents a statistical significance at 5% level.		

Table 8 indicates the direction of causality from RSCI to the variables used in this study. The probability values of CURMI, Import, Export, Domestic Debt Stock, Trade Balance and Banking Sector-Domestic Credit Volume are less than 0.05. This situation refers to that these numbers are statistically significant. In other words, there is a causality relationship between the RSCI and these six variables from RSCI to them.

4. Discussion and Conclusion

The anomalies and irrational behaviour in financial markets affect asset prices, financial decisions and markets. Traditional finance theories and the Efficient Market Hypothesis are not powerful to explain the anomalies in the market. Behavioural Finance is in an effort to fill this gap. Behavioural Finance is based on investors' sentiment and psychology.

Nowadays, confidence indicators are important to assess conjuncture in the short term. These sensitivity indicators provide important information about the intentions and future expectations of economic decision-makers. Moreover, there is a strong correlation between macroeconomic variables and confidence indices. In this study, the relationship between the confidence indices, which reflect investors' anticipation about the future of the economy, and the general indicators of the economic situation has been analysed.

According to Johansen Cointegration Test result, RSCI and the 14 macroeconomic variables are at most 11 cointegrating relationships. Also, Granger Causality Test indicates that the CBRT Composite Leading Indicators Index, CURMI, TRLIBOR and BIST100 Return Index have an impact on the RSCI and meanwhile, RSCI affects these six variables: CURMI, Import, Export, Domestic Debt Stock, Trade Balance and Banking Sector-Domestic Credit Volume. There is only a two-way causality relationship between the RSCI and the CURMI.

RSCI seems to be influential in the stock market. The real sector managers closely monitor the financial market and instantly evaluate current economic situations. Furthermore, their prospects for the future are efficient for the company's returns. Similar results are found in the studies conducted in Turkey and abroad. Korkmaz and Çevik (2009), Arısoy (2012), Sum (2014), Ayuningtyas and Koesrindartoto (2014), Köse and Akkaya (2016) and Kale and Akkaya (2016) report that stock return has a significant effect on RSCI.

The manufacturing industry is generally considered as the sub-sector with the largest share of the industrial sector. Thus, it would not be wrong to say that the manufacturing industry has a key role in the real sector. The CURMI is determined by the Business Tendency Survey applied by the Central Bank to the businesses operating in the manufacturing industry sector. RSCI is also calculated by using the Business Tendency Survey. Therefore, it is clear that there is a relationship between the RSCI and CURMI.

The main objective of CBRT Composite Leading Indicators Index is to predetermine the return points in the economy. Electricity Production Amount, Interest Rate Weighted Treasury Auction with Sales Quantity, Import of intermediate goods and four questions from Business Tendency Survey are used to calculate this index. Actually, it can be said that it is closely associated with real sector. Hence, it is one of the influencing factors of RSCI.

TRLIBOR shows the interest rate that a bank can borrow at certain maturities from another bank or financial institution. Financial institutions use this ratio as the reference interest rate for many financial transactions such as government and private sector debt securities, credit cards, student loans, lending, swap transactions and forward rate agreements. Moreover, TRLIBOR-indexed pricing is started to be used by real sector for long-term loans. The increase or decrease in TRLIBOR can help us to interpret the future economy anticipation. Real sector managers also decide for investment by looking at interest rates, because low interest rates lead to consumption and a good financial situation for investments such as low credit rates and bond financing. Shortly, TRLIBOR is influential on investors' decisions to invest or not and consumers' decisions to buy or not. For these reasons, it can be said that TRLIBOR closely influences RSCI.

There are also some limitations in the study. Firstly, it is useful to interpret CURMI and CBRT Composite Leading Indicators Index together with the Industrial Production Index. Furthermore, it is thought that there is a relationship between RSCI and Industrial Production Index. ADF results show that it cannot be included into study because it is stationary at level value. Secondly, there is a relationship between RSCI and GDP growth rate. But, GDP growth rate cannot be included into the study because GDP is a quarterly-announced variable. Despite these limitations, it is believed this research will light the future studies.

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