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The Relation between Confidence Climate and Stock Returns: The Case of Turkey

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Abstract

This study examines the relations between consumer confidence, reel sector confidence and five different stock indices (aggregate, financial, industrial, service and technological) with VAR models. Michigan University Sentiment Index, VIX volatility index and GFK Germany Consumer Climate Index are also associated into the models to investigate international effects.The results suggest that, there is no causality relation from consumer confidence towards stock returns, however, stock returns found to positively affect consumer confidence. On the other hand, two-way causality exists between reel sector confidence index and stock returns, each one effects the other with certain lag of time. Michigan University Consumer Sentiment Index and VIX volatility index have explanatory power on almost all stock indices of Turkey, but GFK Germany Consumer Climate Index has no effect on any stock returns in all models. This may indicate that, globalization takes part in domestic markets, and rather than Germany, USA confidence climate is more felt in Turkey.

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Keywords: Consumer confidence; investor confidence; sentiment and stock returns

1. Introduction

Financial markets, decisions and subjects have always attracted researchers. Prediction of risk, price and returns of financial instruments are mostly studied subjects. Numerous financial theories have been discussed, developed and introduced.

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Conventional financial approach is based on the assumption that individuals act rationally, markets are fully efficient and prices possess random walk behavior. Efficient Market Hypothesis (EMH) introduced by Eugene Fama in the 1960s and reached its height of dominance the 1970s has become important in the last quarter of the 20th century. According the theory, security prices always reflect all available randomly appearing information and it is not possible to beat the market. Higher returns may only result from taking higher risks. Participants are rational and none has power to effect the prices. Transaction costs are negligible and transaction volumes are not serious to affect the operations (Fama, 1970).

Studies carried out over the later years showed that EMH and pricing models based of EMH are unable to explain all price behaviors of stock markets. Some anomalies observed in financial markets, especially in stock markets were evident of deviations from efficiency theory. The studies of behavioral finance to explain the deviations have arisen from the examination of the impacts of human behaviors (Barberis and Thaler, 2003). Suspicions about the efficient market hypothesis have led to a borrow some concepts of other social disciplines such as such as psychology, sociology, neurology, to understand the behavior of securities.

Kahneman and Tversky (1979) developed the Prospect Theory, the foundation of behavioral finance, which claims that people are loss averse, i.e. losses are felt much more, about 2.5 times, intensely than gains. Second, people judge good and bad things in relative to their current situation. And third, as diminishing marginal utility for gains, each successive unit of loss hurts less painfully than the previous one.

In the 1990s, some researchers shed light on developing models of human psychology in financial markets and focus shifted from econometric analyses of time series on prices, dividends and earnings, and behavioral finance emerged (Schiller ,2002). One of the two main elements of behavioral finance is concerned with the market. According to behavioral finance, different from conventional finance, the market is not fully efficient; the investors may not use the unlimited arbitrage possibilities and eliminate irrationality.

Another aspect of behavioral finance is related to investors. According to behavioral finance, investors are not rational, they should be considered as "normal". Investors make decision not only based on risk, return and utility maximization, they make decisions based on satisfaction also which is shaped by cognitive and emotional biases. Some of cognitive biases may be classified as anchoring and adjustment, mental accounting, framing, availability, self-attribution, outcome, recency, conservatism, confirmation, representativeness, illusion of control, hindsight, cognitive dissonance. On the other hand, some of emotional biases are loss aversion, overconfidence, self-control, status quo, endowment, regret aversion, and affinity. Cognitive biases are related to tendency to cling to one's previously held or recently established beliefs irrationally or illogically, and process information either illogically or irrationally. Emotional biases, on the other hand, can cause people to make suboptimal decisions because of feelings (Pompian, 2012).

If consumers and investors make decisions based on psychological motivations and these decisions effect the financial markets, there should be close interaction between human behavior and macroeconomic parameters. That's why governments, central banks and other regulatory and supervisory bodies pay a special attention to manage expectations and perceptions. Consumer and investor sentiments are two important indicators that show expectations and perceptions.

The purpose of this study is to analyze the interaction between consumer and investor sentiments and financial markets, which indicator effects the other, the time and magnitude of the effect. The study may give us also whether consumer and/or investment sentiment can be a leading indicator as we expect consumers to consume more and investors to invest more with increasing confidence, and then macroeconomic indicators and stock prices may be positively affected or vice versa.

This study may be distinguished from its peers first by the included period. The study is conducted with 2004:01-2015:06 data which is the most comprehensive period compared to others. Second, not only consumer confidence,

but also the reel sector confidence change is introduced to the analyzed models. Third, since the consumer and investor sentiment may differently effect alternative stock types, relation with five various stock indices are handled. Finally, to investigate the effect of international confidence on internal markets, The University of Michigan Consumer Sentiment Index, The Gfk German Consumer Climate Index and Chicago Board Options Exchange Volatility Index (VIX) are associated into study.

In the next section, the literature about consumer/investor sentiment and stock prices is investigated. Then, variables, data and method is presented. Next section is results and analysis, and final section includes conclusions.

2. Literature Review

Factors effecting the stock prices and prediction of prices has always been an attractive subject of finance. It has been thought that there may be some relations between people's expectations and economic parameters. There have been several studies, especially in USA, examining the consumer confidence. These studies largely focused on confidence index and stock returns.

The first study on consumer confidence is conducted by George Katona in the late 1940s (Katona, 1968). Katona, designed a survey to measure consumer spending to empirically measure the consumer expectations, and later this survey is associated into consumption and saving models of Michigan University.

To investigate about how people make financial decisions in economic life, sentiment and confidence indices are measured based on surveys. In researches related to consumer confidence, either consumer surveys or market indicators, or in addition to surveys a combination of a few parameters is used as a proxy of confidence.

Chen, Chong & Duan (2010) indicate that usefulness of the investor sentiment indicator in the stock market has received increasing attention in recent years, and various measures of investor sentiment have been proposed. Early studies in 1990s use closed-end fund discounts as a proxy for market sentiment as a proxy of individual investors. Some of the later studies use Michigan consumer confidence index and other parameters derived from market movements and small investors' buy-sell imbalances.

Guneş and Çelik (2010) classify consumer confidence literature into three categories. All these focus on the explanatory power of consumer confidence, and treats consumer index as an exogenous variable. In the first category, researches argue that there is a significant and strong link between consumer sentiment and consumption expenditures, and consumer index has power to predict the future of economy. The second approach indicates that the link between consumer expectations and future consumer activity is rather weak. And the third group uses unconventional methods like analyzing the forecast errors regarding the consumer confidence index, the possible relationship between the Blue Chip economic indicators and the consumer sentiment.

According to Garner (1991), confidence indices are not reliable stand-alone indicators under ordinary circumstances, and therefore they should not be used as primary forecasting variables. They may be useful in situations where unanticipated macroeconomic events occur. When used in a forecasting process with other macroeconomic variables, confidence measures have little complementary value.

Otoo (1999) examined the relationship between Michigan consumer confidence index and the stock prices, and he found a strong positive relationship where an increase in equity values boosts sentiment. He argues that people use movements in equity prices as a leading indicator of increase in spending, but this increase does not stem from wealth effect.

Jensen and Nahuis (2003) investigated the short-run relationship between stock market movements and consumer confidence in eleven European countries, and they found a positive correlation in nine countries. In addition, they indicated that stock returns generally Granger-cause consumer confidence at very short period, but not vice versa.

The relation between stock-market and confidence is mainly determined by macroeconomic conditions. And, confidence channel is not part of the conventional wealth effect as Otoo stated. They did not find a long-run relationship between stock prices and consumer sentiment

Fisher and Statman (2003) examined the relationship between stock returns and consumer confidence. They found a strong and positive correlation between S&P500 index and consumer confidence indices, and they argue that consumer confidence has power to predict some stock returns.

Brown and Cliff (2004) investigate investor sentiment and its relation to near-term stock market returns using vector auto regression. They showed that sentiment measures have little explanatory power for near-term future stock returns. However, past market returns found to be an important determinant of sentiment.

Baker and Wurgler (2007) examined the effects of sentiments on different types stocks to explain which stocks are mostly affected by sentiment. They indicated that, younger, smaller, more volatile, unprofitable, non-dividend paying, distressed stocks or stocks with extreme growth potential, or having analogous characteristics are most sensitive to investor sentiment. On the other hand, "bond-like" stocks are less effected by sentiment. They also list the indicators that can be used as proxy of sentiment as surveys, mood proxies, retail investor trades, mutual fund flows, trading volume, dividend premium, closed-end fund discounts, option implied volatility, first-day returns on initial public offerings, volume of initial public offerings, new equity issues, and insider trading.

Bremmer's study (2008) focused on the short-run and long-run relationship between stock indices and consumer sentiment. Results can be listed as first there is no long-run relationship between different stock indices and the University of Michigan's measure of consumer confidence. Second looking short run, Granger-causality tests indicated that stock prices affect consumer confidence, but consumer confidence does not affect stock prices. Third, expected changes in consumer confidence have no effect on stock prices, but unexpected changes directly affect stock prices.

Schmeling (2009) examined whether consumer confidence affects expected stock returns in 8 industrialized countries. He found that sentiment negatively forecasts aggregate stock market returns on average across countries. When sentiment was high, future stock returns tend to be lower and vice versa. This relation was also valid for returns of value stocks, growth stocks, small stocks, and for different forecasting horizons. Finally, he stated that the impact of sentiment on stock returns was higher for countries which have less market integrity and which were culturally more prone to herd-like behavior and overreaction.

Aarle & Kappler (2012) examined whether economic sentiment explains business cycle fluctuations in Euro Area countries. By employing VAR model they concluded that sentiment shocks have an impact on important macroeconomic variables such as output, retail sales, and unemployment. Also, there is furthermore significant evidence that economic conditions and shocks affect economic sentiment.

Considering Turkish markets, Kandır (2006) investigated the forecasting ability of consumer confidence index for Istanbul Stock Exchange financial sector stock returns, and he come up with the result that consumer confidence index is a significant factor for majority of the financial sector stocks.

Korkmaz & Çevik (2009) analyzed the causality relation between Istanbul Stock Exchange-100 index return and real sector confidence index in two stages. They argued that there was a feed-back effect between index return and confidence index, and they simultaneously affect each other.

Topuz (2011) studied the relation between consumer confidence and stock price. He identified one-direction causality from stock prices towards consumer confidence.

To sum up the literature, we can conclude that first, different indicators are used as proxy to represent consumer

and/or investor sentiments. Second, the effect of sentiment on stock prices is limited, or only for certain type of stocks and for a short period of time the causality exists. Third, generally, instead of from sentiment to stock prices, the direction of causality is from stock returns towards sentiments. The highlights of the studies are summarized in Appendix A.

3. Methodology, Data, and Analysis of Variables

There are two consumer confidence indices in Turkey, CNBC-e Consumer Confidence Index and Turkey Statistical Institute Consumer Confidence Index (TSICCI). CNBC-e CCI has a change in name as Bloomberg HT confidence index after November 2015. The CNBC-e measures the consumer sentiment based on a monthly telephone survey, and the index has been announced on a monthly basis since January 2002. The methodology used to compile and to calculate the index has been adopted from the Michigan University index of consumer sentiment. TSI also measures the consumer confidence index from the results of the consumer tendency survey carried out in cooperation with the Central Bank of the Republic of Turkey (CBRT). The purpose of tendency survey is to measure present situation assessments and future period expectations of consumers' on personal financial standing and general economic course and to determine consumers' expenditure and saving tendencies for near future. CCI is calculated based on following sub-items: Financial situation expectation of household over the next 12 months, general economic situation expectation over the next 12 months, number of people unemployed expectation over the next 12 months, the probability of saving over the next 12 months. For our research period the correlation between two indices is 67%, we will use TSI CCI in our study.

For investor sentiment Real Sector Confidence Index (RSCI), measured and announced by CBRT will be used. CBRTRSCI is a general indicator which is measured by the joint evaluation of responses given to different questions of The Business Tendency Survey (BTS) of the Central Bank to track the general views of the real sector about general economic outlook. CBRTRSCI is calculated based on the responses given to BTS questions regarding total volume of sales orders, stocks of finished goods, exports, production, employment and fixed capital investment expenditures.

As a result of international convergence and integration, consumer confidences in advanced economies gained importance in domestic markets. Therefore, we decided to associate the University of Michigan Consumer Sentiment Index (MCSI), Gfk German Consumer Climate Index (GFKGCCI) and the Chicago Board Options Exchange Volatility Index (VIX). VIX measures the expected 30-day volatility of the S&P500 options contracts with different maturities. VIX is considered as an indicator of the risk perception and fear in the international markets; therefore, it was used as an indicator of investor confidence in the study. Unlike other confidence indicators, rise in VIX means increase in the volatility (so decrease in confidence), and vice versa. The increase in the index is evaluated as negative and also the decrease is as positive with other confidence indicators.

Borsa Istanbul indices are used to represent return of different stock groups. BIST100 is used for overall stock return indicator, BISTFIN for financial stocks, BISTIND for industrial stocks, BISTSERV for service sector, and BISTTECH for technological companies.

Considering historical data limitations, we used monthly data of 2004:01-2015:06 periods which includes 138 observations. In the research period of 11.5 years, average monthly stock return is realized as 1.27, in comparison to average FX rate change of 0.44%, consumer price index change of 0.66% and benchmark treasury bond’s return of 1.07%. The volatility of the financial sector is observed as the highest among the others. Logarithmic returns of variables are used for monthly change as follows.

$$r_t = 100 \times \ln\left(\frac{P_t}{P_{t-1}}\right) \tag{1}$$

r_t represents return as percentage, P_t price or index value at time t, P_{t-1} price or index value at time $t-1$. Variables and descriptive statistics are presented in Table 1.

In this period, average monthly consumer confidence change is 0.20% in the United States where global financial crisis was more intensely experienced, 0.65% in Germany, but interestingly it is -0.29% in Turkey where it has been thought that macroeconomic stability exists and effect of global crisis is minimal relative to other parts of the world ad previous periods.

In this study, the vector autoregression (VAR) model is preferred as the method of analysis to able to analyze all interactions between variables, to observe the lagged dynamic effects of variables, to identify the causality effect between indicators, in parallel with Otoo (1999), Bremmer (2008), Aarle and Kappler (2012), Güneş and Çelik (2010) and Arısoy's (2012) studies. Econometric model VAR reveals the linear interdependencies among multiple time series where all variables are treated symmetrically in a structural sense. In VAR analysis, all variables are described simultaneously by its own delays and lagged values of other variables. One of the advantages of The VAR model is that, it does not impose a priori causality relation between variables allowing extensive possibility of relations.

Table 1. Variables and descriptive statistics.

Variable	Mean	Maximum	Minimum	Std. Dev.	Source
TSICCI	-0.285	9.273	-10.094	3.233	TSI
CBRTRSCI	-0.123	22.108	-28.529	5.080	CBRT
MCSI	0.027	12.762	-19.925	5.930	Bloomberg
GFKGCCI	0.653	26.101	-63.599	11.592	Bloomberg
VIX	0.003	45.233	-64.580	19.047	Bloomberg
BIST100	1.269	21.324	-27.189	8.077	BIST
BISTFIN	1.171	28.273	-29.713	9.604	BIST
BISTIND	1.476	14.039	-26.553	7.061	BIST
BISTSER	1.486	13.059	-20.876	6.285	BIST
BISTTECH	1.329	21.699	-29.508	9.288	BIST

Unit root tests, Augmented Dickey-Fuller (ADF) and Phillips-Perron, show that time series data of all variables are stationary at their level within 1% significance

4. Results and Analysis

There are five types of indices to reflect different characteristics of stocks. BIST100 reflects overall returns of stocks in Borsa Istanbul, and BISTFIN is for financial stocks, BISTIND is for industrial sector, BISTSER is for service sector, finally BISTTECH is for technological companies. We wonder whether the interaction of different stocks with consumer confidence and reel sector confidence, which can be assumed as a measure of investor sentiment, is different or not. Therefore, the VAR analysis is conducted under five different models.

In all VAR models, it seems reasonable to assume the MCSI, the consumer confidence index of USA, GFKGCCI, the consumer confidence index of Germany, and VIX as exogenous variables, since we think that their values are determined exogenously outside the VAR system.

As a first step, it is necessary to determine the ideal lag length before the VAR analysis. In all models lag lengths are determined based on multivariate information criterion of LR (sequential modified LR test statistic), FPE (Final

prediction error), AIC (Akaike information criterion), SC (Schwarz information criterion) and HQ (Hannan-Quinn information criterion).

4.1. Aggregate Stock Index and Confidence

In this VAR model, the linkages between BIST100 return index, TSICCI, CBRTRSCI are examined. As mentioned before MSCI, GFKGCCI and VIX are treated as exogenous. Based on AIC and FPE lag length is accepted as 3.

The VAR equation models are found to be as follows. The statistical significant coefficients at %5 level are represented as bold. The confidence level of all parameters and OLS statistics of all VAR models are presented in Appendix B.

BIST100 = **1.415** -0.026*BIST100(-1) + 0.068*BIST100(-2) - 0.108*BIST100(-3) - 0.008* CBRTRSCI(-1) + 0.158*CBRTRSCI(-2) + **0.351***CBRTRSCI(-3) + 0.062*TSICCI(-1) - 0.112*TSICCI(-2) + 0.0767*TSICCI(-3) + 0.204*MCSI - 0.0437*GFKGCCI + **0.145***VIX

CBRTRSCI = - 0.060 + **0.107***BIST100(-1) - **0.118***BIST100(-2) - 0.043*BIST100(-3) + **0.420***CBRTRSCI(-1) + 0.072*CBRTRSCI(-2) - 0.097*CBRTRSCI(-3) + 0.087*TSICCI(-1) - 0.073*TSICCI(-2) - 0.076*TSICCI(-3) + **0.147***MCSI + 0.021*GFKGCCI + 0.015*VIX

TSICCI = - 0.447 + **0.097***BIST100(-1) + 0.014*BIST100(-2) - 0.005*BIST100(-3) + 0.065* CBRTRSCI(-1) + 0.109*CBRTRSCI(-2) - **0.128***CBRTRSCI(-3) + 0.086*TSICCI(-1) - 0.147*TSICCI(-2) - 0.004*TSICCI(-3) + **0.184***MCSI - 0.001*GFKGCCI - 0.004*VIX

Granger Causality tests indicate that Reel Sector Confidence Index and overall stock returns indicated by BIST100 Granger cause each other (See Appendix C for Granger Causality in all VAR models). VAR equation model shows that the third lag of CBRTRSCI has positive causality on BIST100, while first and second lag of BIST100 increases the reel sector confidence. So, BIST100 seems to be effective in the shorter run. Interestingly, equation also suggests that external factors, MSCI and VIX, related to confidence can drive the internal markets. Please note that, causality does not necessarily mean movements in one variable to cause movements in another. Instead, it implies that series with Granger Causality chronologically follow each other.

CBRTRSCI and BIST100 have predictability power of consumer confidence. Both Granger Causality and VAR equation model supports this causality. Also, MSCI have positive effect on TSICCI. The findings are in parallel with the findings of majority of the studies. Again as the of other studies argue, Granger Causality test and VAR equations show that, consumer sentiment has no explanatory power of stock prices. The effects of external factors, such as Michigan University Consumer Sentiment Index and VIX, shows that the developed economies' confidence and volatility can be effective on and developing countries' stock markets and confidence. Germany's consumer climate doesn't seem to effect either stock prices or confidence of Turkey.

Impulse-response functions were determined to test dynamic relationships between variables The results obtained from impulse response functions in all VAR models are graphically shown in Appendix E. According to the impulse-response analysis, BIST100 gives an increasing response in shock caused by CBRTRSCI in second months. Response reaches its top in fourth months, then starts to decrease, and in seven months it disappears. CBRTRSCI and TSICCI gives the same response caused by BIST100. The effect in in positive direction first, then decreases, and in three months turns to negative.

Finally, we applied variance decomposition test to variables. The variance decomposition estimates the amount of information each variable contributes to the others in the autoregression. The variance decomposition determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other

variables. 10 months' variance decomposition results of the variables show that, an important part of the change (92.68%) in the error variance of BIST100 return index is explained by itself, CBRTRSCI explains 6.99%, while TSICCI explains only the 0.33%. BIST100 is more effective in CBRTRSCI with 17.5%. And finally, BIST100 and CBRTRSCI seem to be relatively more effective on TSICCI. Please note that, the ordering of the variables is important in the variance decomposition. But, as the forecasting horizon increases, the variable ordering becomes less important (Brooks, 2014). The variance decomposition in VAR models are presented in Appendix D.

4.2. Other Stock Indices and Confidence

In all VAR models MCSI, GFKGCCI and VIX are assumed as exogenous. In VAR-2 model, BISTFIN, TSICCI and CBRTRSCI are treated as endogenous, therefore, the interaction of confidence and financial sector is analyzed. In VAR-3, confidence-industrial sector; in VAR-4, confidence-service sector; and in VAR-4, confidence-technological companies' relations are handled. Instead of looking the all relation one by one, in this section, we prefer to shed light on all models for the sake of brevity, and derive general results.

Considering all models, VAR equations and Granger Causality tests, whose results are support each other, shows that Reel Sector Confidence Index have effect on almost all stock indices. The lag length can be traced from Appendix B. And vice versa, i.e. almost all stock returns also have effect on reel sector confidence. There is no causality relation from consumer confidence towards any type of stock indices, but almost all returns, calculated based on different stock indices, have positive effect on consumer confidence. This one-way effect is in parallel with findings of great majority of previous studies.

There seems to be a relation from Michigan University Consumer Sentiment Index and VIX volatility index towards different stock indices. But in all models, German GFK Germany Consumer Climate Index has no effect on any stock returns. This may indicate that, rather than Germany, USA confidence climate is more felt in Turkey.

Considering variance decomposition, the great part (about 97%) of the variance of stock indices are explained by their change, but for consumer and reel sector confidence about 80% change of variance is explained by themselves'

5. Conclusions

In this study we investigated the relations between consumer and investor confidence and five stock indices with five VAR models, as either consumer or investor sentiment may affect various stock types in a different way. Also, USA and Germany consumer confidences are associated into models as exogenous variables.

First of all, there is no causality relation from consumer confidence towards stock returns. Consumer confidence neither can be used to predict future stock returns and nor can be a leading indicator. However, stock returns found to positively affect consumer confidence. There is a two-way causality between reel sector confidence index and stock returns; reel sector expectations have effect on return of stocks traded in Borsa Istanbul, and then the stock returns Granger cause reel sector confidence to increase. This may provide a clue to policy developers for public management.

Michigan University Consumer Sentiment Index and VIX volatility index have explanatory power on almost all stock indices. On the other hand, German GFK Germany Consumer Climate Index has no effect on any stock returns in all models. This may suggest that, we live in a global village, but all countries do not necessarily effect the each other with the same dimension. This is an evidence of international convergence and integration as consumer confidences in an advanced economy is becoming more important in a developing economy. USA confidence indicators have more effect in Turkish markets compared to German confidence index. This may be due to the fact that, USA indicators drive all global markets, not only Turkey.

There seems to be a causality relation from Michigan University Consumer Sentiment Index and VIX volatility index towards different stock indices. But in all models, German GFK Germany Consumer Climate Index has no effect on any stock returns. This may indicate that, rather than Germany, USA confidence climate is more felt in Turkey.

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Appendix A. Summary of some studies about confidence and stock returns

Year	Author(s)	CNT	Objective(s)	(Independent) Variable(s)	(Dependent) Variable(s)	Method(s)	Conclusion(s)
1999	Otoo	USA	• Whether changes in equity prices have an important influence on CC • The relationship between movements in CC and stock prices	• MCSI • CB (Conference Board index of CC)	• Wilshire 5000 index	• Regression • Ganger C.	• People use movements in equity prices as a leading indicator. • Stock index is a leading indicator of future income, not wealth effect.
2004	Brown & Cliff	USA	• Investigate IS and its relation to near-term stock market returns	• Investor sentiment • Consumer sentiment	• Large stocks portfolio • Small stocks portfolio	• Regression • VAR	• Market returns clearly cause future changes in sentiment. • Bur, very little evidence suggests sentiment causes subsequent market returns. • Strongest relations exist between institutional sentiment and large stocks
2006	Kandır	TR	• CC predictability on ISE financial index	• Consumer sentiment • Difference btw small and big companies' returns • Diff. btw return of companies with high and low B/M. • BIST bond index returns	• ISE Financial Index	• Regression	• Consumer CI is an important factor for majority of financial stocks.
2008	Bremmer	USA	• The short-run and long-run relationship between stock indices and CC	• MCSI	• 9 indices	• Johansen cointegration • Granger C. • VAR • Regression	• CC and 9 stock indices are nonstationary time series • There is no long-run relationship btw indices and MCSI • In the short-run, stock prices affect consumer confidence, but consumer confidence does not affect stock prices. • Expected changes in CCI have no effect on stock prices, but, unexpected changes directly affect stock prices. • Stock indices affect consumer confidence, but not the reverse
2009	Korkmaz & Çevik	TR	• Investigate the relationship between RSCI and BIST100.	• CBRT Reel Sector Consumer Index	• BIST100	• EGARCH • Dyn. C. Test	• Both, stock index and confidence index, effects each other simultaneously.
2009	Schmeling	18 C	• Whether CC affects expected stock returns internationally in 18 countries	• Sentiment	• Market returns • Value stocks ret. • Growth stocks re	• Regression	• Sentiment negatively forecasts aggregate stock market returns on average
2010	Guneş & Çelik	TR	• CC and financial market variables	• Consumer Sentiment Index	• ISE1000 • ISEFIN • ISETECH	• Cointegration • VECM	• CCI is an endogenous variable sensitive to financial market variables rather than the future outlook of the economy
2011	Topuz	TR	• The causality relation btw CC and stock prices	• Consumer Confidence Index	• ISE100	• Granger Causality	• One-direction causality from stock prices towards consumer confidence is identified
2012	Aarle & Kappler	EU	• Whether economic sentiment explains business cycle fluctuations.	• EC's Economic Sentiment Indicator	• Industrial prod. • Retail sales • Unemployment	• VAR	• Sentiment shocks have an impact on important macro variables such as output, retail sales, and unemployment. • There is furthermore significant evidence that economic conditions and shocks affect economic sentiment.

Appendix B. Equation parameters in different VAR models

VAR MODEL-1

BIST100=		
Variable	Coeff.	Prob.
c	1.415	**0.044**
BIST100(-1)	-0.026	0.768
BIST100(-2)	0.068	0.459
BIST100(-3)	-0.108	0.239
CBRTRSCI(-1)	-0.008	0.962
CBRTRSCI(-2)	0.158	0.370
CBRTRSCI(-3)	0.351	**0.027**
TSICCI(-1)	0.062	0.792
TSICCI(-2)	-0.112	0.629
TSICCI(-3)	0.077	0.745
GFKGCCI	-0.043	0.465
MCSI	0.204	*0.073*
VIX	0.145	**0.000**
R2	0.224	
Adj. R2	0.148	

CBRTRSCI=		
c	-0.060	0.884
BIST100(-1)	0.107	**0.038**
BIST100(-2)	-0.118	**0.029**
BIST100(-3)	-0.043	0.427
CBRTRSCI(-1)	0.420	**0.000**
CBRTRSCI(-2)	0.072	0.487
CBRTRSCI(-3)	-0.097	0.297
TSICCI(-1)	0.087	0.527
TSICCI(-2)	-0.073	0.595
TSICCI(-3)	-0.076	0.581
GFKGCCI	0.021	0.547
MCSI	0.147	**0.028**
VIX	0.015	0.471
R2	0.332	
Adj. R2	0.266	

TSICCI=		
c	-0.447	0.103
BIST100(-1)	0.097	**0.005**
BIST100(-2)	0.014	0.695
BIST100(-3)	-0.005	0.896
CBRTRSCI(-1)	0.065	0.318
CBRTRSCI(-2)	0.109	0.113
CBRTRSCI(-3)	-0.128	**0.038**
TSICCI(-1)	0.086	0.348
TSICCI(-2)	-0.147	0.106
TSICCI(-3)	-0.004	0.963
GFKGCCI	-0.001	0.977
MCSI	0.184	**0.000**
VIX	-0.004	0.770
R2	0.274	
Adj. R2	0.203	

Note:Lag=3, n=135

VAR MODEL-2

BISTFIN=		
Variable	Coeff.	Prob.
c	1.485	*0.071*
BISTFIN(-1)	-0.031	0.723
BISTFIN(-2)	0.032	0.732
BISTFIN(-3)	-0.124	0.180
CBRTRSCI(-1)	-0.101	0.611
CBRTRSCI(-2)	0.256	0.225
CBRTRSCI(-3)	0.432	**0.023**
TSICCI(-1)	0.164	0.559
TSICCI(-2)	-0.062	0.825
TSICCI(-3)	0.117	0.679
GFKGCCI	-0.075	0.288
MCSI	0.273	**0.045**
VIX	0.153	**0.000**
R2	0.221	
Adj. R2	0.144	

CBRTRSCI=		
c	-0.011	0.978
BISTFIN(-1)	0.088	**0.041**
BISTFIN(-2)	-0.121	**0.007**
BISTFIN(-3)	-0.054	0.226
CBRTRSCI(-1)	0.414	**0.000**
CBRTRSCI(-2)	0.095	0.353
CBRTRSCI(-3)	-0.108	0.240
TSICCI(-1)	0.097	0.474
TSICCI(-2)	-0.051	0.708
TSICCI(-3)	-0.066	0.628
GFKGCCI	0.024	0.488
MCSI	0.149	**0.024**
VIX	0.011	0.576
R2	0.348	
Adj. R2	0.284	

TSICCI=		
c	-0.408	0.129
BISTFIN(-1)	0.085	**0.004**
BISTFIN(-2)	0.003	0.914
BISTFIN(-3)	-0.007	0.806
CBRTRSCI(-1)	0.065	0.318
CBRTRSCI(-2)	0.123	*0.075*
CBRTRSCI(-3)	-0.134	**0.030**
TSICCI(-1)	0.082	0.369
TSICCI(-2)	-0.146	0.109
TSICCI(-3)	-0.008	0.929
GFKGCCI	0.000	0.993
MCSI	0.186	**0.000**
VIX	-0.005	0.691
R2	0.278	
Adj. R2	0.207	

Note:Lag=3, n=135

VAR MODEL-3

BISTIND=		
Variable	Coeff.	Prob.
c	1.497	**0.009**
BISTIND(-1)	0.046	0.592
CBRTRSCI(-1)	0.259	**0.041**
TSICCI(-1)	-0.027	0.889
GFKGCCI	-0.001	0.977
MCSI	0.141	0.139
VIX	0.134	**0.000**
R2	0.207	
Adj. R2	0.170	

CBRTRSCI=		
c	-0.267	0.496
BISTIND(-1)	0.144	**0.014**
CBRTRSCI(-1)	0.362	**0.000**
TSICCI(-1)	0.026	0.843
GFKGCCI	0.001	0.983
MCSI	0.127	*0.052*
VIX	0.026	0.200
R2	0.284	
Adj. R2	0.251	

TSICCI=		
c	-0.346	0.190
BISTIND(-1)	0.076	*0.056*
CBRTRSCI(-1)	0.086	0.141
TSICCI(-1)	0.098	0.269
GFKGCCI	-0.005	0.812
MCSI	0.168	**0.000**
VIX	-0.002	0.908
R2	0.201	
Adj. R2	0.164	

Note:Lag=1, n=137

VAR MODEL-4

BISTSER=		
Variable	Coeff.	Prob.
c	1.736	**0.001**
BISTSER(-1)	-0.137	0.103
CBRTRSCI(-1)	0.029	0.797
TSICCI(-1)	0.020	0.911
GFKGCCI	0.044	0.321
MCSI	0.134	0.129
VIX	0.106	**0.000**
R2	0.149	
Adj. R2	0.110	

CBRTRSCI=		
c	-0.220	0.577
BISTSER(-1)	0.122	*0.053*
CBRTRSCI(-1)	0.403	**0.000**
TSICCI(-1)	0.048	0.715
GFKGCCI	-0.005	0.891
MCSI	0.127	*0.056*
VIX	0.029	0.150
R2	0.272	
Adj. R2	0.238	

TSICCI=		
c	-0.352	0.182
BISTSER(-1)	0.083	**0.048**
CBRTRSCI(-1)	0.104	*0.065*
TSICCI(-1)	0.107	0.227
GFKGCCI	-0.009	0.694
MCSI	0.165	**0.000**
VIX	0.001	0.960
R2	0.202	
Adj. R2	0.165	

Note:Lag=1, n=137

VAR MODEL-5

BISTTECH=		
Variable	Coeff.	Prob.
c	1.260	*0.093*
BISTTECH(-1)	0.093	0.265
CBRTRSCI(-1)	0.293	*0.073*
TSICCI(-1)	-0.047	0.853
GFKGCCI	0.038	0.553
MCSI	0.270	**0.037**
VIX	0.148	**0.000**
R2	0.185	
Adj. R2	0.147	

CBRTRSCI=		
c	-0.175	0.649
BISTTECH(-1)	0.100	**0.020**
CBRTRSCI(-1)	0.398	**0.000**
TSICCI(-1)	0.042	0.752
GFKGCCI	-0.008	0.813
MCSI	0.116	*0.081*
VIX	0.026	0.187
R2	0.281	
Adj. R2	0.248	

TSICCI=		
c	-0.338	0.185
BISTTECH(-1)	0.080	**0.005**
CBRTRSCI(-1)	0.097	*0.081*
TSICCI(-1)	0.099	0.256
GFKGCCI	-0.012	0.588
MCSI	0.154	**0.001**
VIX	-0.001	0.933
R2	0.226	
Adj. R2	0.190	

Note:Lag=1, n=137

Appendix C. Granger Causality in different VAR models.

VAR MODEL-1

BIST100	
Variable	Prob.
CBRTRSCI	**0.039**
TSICCI	0.949
CBRTRSCI	
BIST100	**0.016**
TSICCI	0.777
TSICCI	
BIST100	**0.044**
CBRTRSCI	**0.048**
n135	

VAR MODEL-2

BISTFIN	
Variable	Prob.
CBRTRSCI	**0.019**
TSICCI	0.923
CBRTRSCI	
BISTFIN	**0.004**
TSICCI	0.800
TSICCI	
BISTFIN	**0.034**
CBRTRSCI	**0.030**
n135	

VAR MODEL-3

BISTIND	
Variable	Prob.
CBRTRSCI	**0.041**
TSICCI	0.889
CBRTRSCI	
BISTIND	**0.014**
TSICCI	0.843
TSICCI	
BISTIND	*0.055*
CBRTRSCI	0.140
n137	

VAR MODEL-4

BISTSER	
Variable	Prob.
CBRTRSCI	0.797
TSICCI	0.911
CBRTRSCI	
BISTSER	*0.052*
TSICCI	0.715
TSICCI	
BISTSER	0.047
CBRTRSCI	*0.064*
n137	

VAR MODEL-5

BISTTECH	
Variable	Prob.
CBRTRSCI	*0.072*
TSICCI	0.853
CBRTRSCI	
BISTTECH	**0.020**
TSICCI	0.752
TSICCI	
BISTTECH	**0.005**
CBRTRSCI	*0.080*
n137	

Appendix D. Variance decomposition in different VAR models.

VAR MODEL-1

BIST100

Period	BIST100	CBRTRSCI	TSICCI
1	100.0	0.0	0.0
2	99.9	0.0	0.1
3	99.2	0.6	0.2
6	92.8	6.9	0.3
10	92.7	7.0	0.3

CBRTRSI

Period	BIST100	CBRTRSCI	TSICCI
1	10.2	89.8	0.0
2	16.7	83.1	0.2
3	16.1	83.7	0.2
6	17.5	81.8	0.7
10	17.5	81.8	0.7

TSICCI

Period	BIST100	CBRTRSCI	TSICCI
1	8.3	4.1	87.7
2	15.8	4.7	79.5
3	15.9	7.1	77.0
6	16.6	7.5	75.9
10	16.6	7.5	75.9

VAR MODEL-2

BISTFIN

Period	BISTFIN	CBRTRSCI	TSICCI
1	100.0	0.0	0.0
2	99.6	0.1	0.2
3	98.6	1.1	0.3
6	91.6	8.0	0.4
10	91.5	8.1	0.4

CBRTRSI

Period	BISTFIN	CBRTRSCI	TSICCI
1	10.2	89.8	0.0
2	16.7	83.0	0.3
3	16.3	83.5	0.3
6	18.8	80.7	0.6
10	18.7	80.7	0.6

TSICCI

Period	BISTFIN	CBRTRSCI	TSICCI
1	9.6	3.6	86.8
2	17.5	4.3	78.2
3	17.2	7.0	75.8
6	18.3	7.2	74.5
10	18.3	7.3	74.4

VAR MODEL-3

BISTIND

Period	BISTIND	CBRTRSCI	TSICCI
1	100.0	0.0	0.0
2	97.3	2.7	0.0
3	96.9	3.1	0.0
6	96.7	3.2	0.0
10	96.7	3.2	0.0

CBRTRSI

Period	BISTIND	CBRTRSCI	TSICCI
1	8.2	91.8	0.0
2	14.9	85.1	0.0
3	15.9	84.1	0.0
6	16.1	83.8	0.0
10	16.1	83.8	0.0

TSICCI

Period	BISTIND	CBRTRSCI	TSICCI
1	4.4	6.1	89.5
2	8.7	7.6	83.7
3	9.1	8.2	82.7
6	9.2	8.4	82.4
10	9.2	8.4	82.4

VAR MODEL-4

BISTSER

Period	BISTSER	CBRTRSCI	TSICCI
1	100.0	0.0	0.0
2	99.9	0.1	0.0
3	99.9	0.1	0.0
6	99.9	0.1	0.0
10	99.9	0.1	0.0

CBRTRSI

Period	BISTSER	CBRTRSCI	TSICCI
1	3.8	96.2	0.0
2	8.1	91.8	0.1
3	8.5	91.5	0.1
6	8.5	91.4	0.1
10	8.5	91.4	0.1

TSICCI

Period	BISTSER	CBRTRSCI	TSICCI
1	2.9	7.4	89.7
2	6.9	9.9	83.2
3	7.0	10.4	82.6
6	7.0	10.6	82.4
10	7.0	10.6	82.4

VAR MODEL-5

BISTTECH

Period	BISTTECH	CBRTRSCI	TSICCI
1	100.0	0.0	0.0
2	97.9	2.1	0.0
3	97.4	2.6	0.0
6	97.3	2.7	0.0
10	97.3	2.7	0.0

CBRTRSI

Period	BISTTECH	CBRTRSCI	TSICCI
1	0.3	99.7	0.0
2	4.2	95.7	0.1
3	5.0	94.9	0.1
6	5.3	94.7	0.1
10	5.3	94.7	0.1

TSICCI

Period	BISTTECH	CBRTRSCI	TSICCI
1	0.3	8.1	91.7
2	5.9	10.1	84.0
3	6.4	11.0	82.6
6	6.4	11.3	82.2
10	6.4	11.3	82.2

Appendix E. Impulse and responses in different VAR models