CONSUMER CONFIDENCE INDEX, THE RELATIONSHIP BETWEEN GROWTH AND INFLATION

A CASE OF TURKEY

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Abstract

In this study, the possible relationship among the consumer confidence index, the growth index and the price indices (Producer Price Index; PPI and Consumer Price Index; CPI) is analyzed on the basis of quarterly data that covers the Turkish economy between 2004:1 and 2013:4. A model is set up by using quarterly data announced by the OECD. By analyzing the unit root, causality and cointegration for the variables, the effects of the variables on each other are studied. According to the unit root test results, it is found that the variables are stationary at the first difference. According to Granger causality analysis results, it is found that there is dual causality between growth and the confidence index and growth and the PPI and CPI Granger causes GDP. According to Johansen Cointegration Analysis results, it is found that variables are cointegrated and will be equilibrated in the long term. According to error correction model

results, in terms of the consumer confidence index, it is found that 76% of the disequilibrium that is derived from other variables, vanishes. According to VECM results, when CPI and PPI are dependent variables, it is found that there is long-run causality among the variables, dual short-run causality between the growth and confidence index and the growth and PPI, and there is short-run causality between CPI and PPI. It is concluded that positive changes are required in consumer confidence to provide economic growth.

Keywords: Consumer Confidence Index, Growth, Producer Price Index, Consumer Price Index, Consumer Expectation

INTRODUCTION

The consumer confidence index was calculated for the first time in 1967 in order to assess the overall confidence, spending power and financial situation of consumers in the United States and was then followed by other countries. In Turkey, since 2004, it is has been calculated based on the results of the "Monthly Consumer Tendency Survey" prepared in collaboration by the Turkish Statistical Institute (TUIK) and Central Bank. As stated in the TUIK website, the index is based on identification of future expectations by evaluating the current economic conditions and individual financial situations of consumers. Since it depends on macro variables from saving expectations to the general economic situation of the consumers, it is interacting with macro variables. Kara and Orak (2008) state that the consumer tendency survey is conducted for a better explanation of inflation targeting. Although consumer confidence is calculated based on the current economic situation, when the overall economic expectations of consumers are pessimistic, the general economic situation may also be affected.

In a study conducted by Matsusaka and Sbordone (1995), it was determined that the negativities in the level of confidence of consumers adversely affect the level of GDP and there is Granger causality between them. According to another study conducted by Danthine et al. (1998), the overall balance is caused by the changes in the mood of consumers, who are free of the effects of the reduction in economic activities on investments and labor supply.

Ludvigson (2004) investigated the relationship between consumer behaviors and the real economy by using the University of Michigan Consumer Confidence Index. She made some predictions about total growth in consumer spending. She also noted that the predictive power of future expenditures and the expectation component of the confidence index are lower than the predictive power of the total index. She found that the expectation component of the confidence index can only explain 19% of the change in consumer spending. As a result, it has

been observed that the contribution of the confidence index is very low in the prediction of total consumption.

In the study of Golinelli and Parigi (2004), the accuracy of consumer confidence was tested for the years between 1970 and 2002 with a prediction of the calculation of economic activities within the framework of VAR analysis using the product model of Consumer Confidence Index of some countries such as France, Germany, Italy, Japan, UK, Canada, Australia and the US. They investigated the natural model relationship of macroeconomic variables especially of consumer sentiment, product fluctuation and product period for the countries selected in the VAR model. As a result of the analysis, consumer confidence may not be assessed on shared fundamental and macroeconomic variables. In addition, consumer confidence has some facilities which predict the calculation of economic activities in VAR analysis by using limited information. As a result of the analysis, the relationship between products and consumer sentiment is different in selected countries and the relationship between macroeconomic variables and consumer sentiment are differentiated over time. Therefore, the natural development of consumer confidence cannot be prevented. However, its effect may be reduced over time for different countries.

Lemmon and Portniaguina (2006) tested the relationship between stock returns and investor sentiment using the investor optimism measure and consumer confidence by employing a time series analysis. Two research projects are used for the intellectual values of the investors: firstly, the consumer sentiment research from the University of Michigan and secondly, the consumer sentiment research from the Board Conference. The investor sentiments for the last 25 years were examined by using models taking the sentiment of the individual investor as the basis of consumer confidence. In their studies, the significance of sentiment in the price values in terms of both behavioral and rational channels was observed. As a result of the analyses, there was no great predictive power for either companies or balance factors in the measure of consumer confidence-based sentiment. There was no evidence of estimation sentiment for transformation on improved returns. The future of macroeconomic activities and transformations on small stocks should be supported by powerful estimations in terms of the consumer confidence exhibited for the last 25 years.

Nadenichek (2007) explains the recession period experienced in the Japanese economy in the 1990s, by consumer expectations. He says that the problems affected the financial sector and economic growth, negatively. He also states that it is not possible to express expectation effects in numerical form due to the nature of the data, but it had a significant level of influence on the economic recession.

In a study conducted by Le (2011), consumer expectations are explained by the sunspot theory for the Chinese economy and it was determined that the changes in expectations are the reason for complicated quantitative changes and there is Granger causality between them.

Arisoy (2012) conducted empirical analyses for whether the consumer confidence index in Turkey has an effect on macroeconomic level by using the monthly data of the 2005:1-2012:1 period. For this purpose, he investigated the interaction between consumer confidence and employment, stock market, consumer spending, and production changes with each other over time, and used the VAR analysis, which was also used by Aarle and Kappler (2012), to examine the dynamic relationship between them. As a result of the analyses, it can be seen that consumer confidence has significant effects on macro variables. These results confirm that the confidence index, which gives information about the general course of the economy, indicates the consumption behavior of consumers.

Ozdemir (2013) examined the relationship between consumer spending and consumer confidence and tested whether consumer confidence can predict consumer spending. The author developed a base model, in which the total expenditure and sub- expenditure items for the period of 2004:2-2012:1 are predicted by macroeconomic variables. Thereafter, the contribution of consumer confidence to the prediction model has been investigated by adding the consumer confidence index and sub-indexes to the base model as independent variables. As a result of the analysis conducted, some findings regarding the addition of consumer confidence to the base model have reduced the prediction errors of the changes in total consumption expenditure and many sub-expenditure items have been identified.

METHODOLOGY

The aim of this study is to investigate the relationship between economic growth, the consumer confidence index and the price indices in Turkey's economy; to determine if there is a relationship; and to present the results related to the direction and extent of this relationship. For this purpose, the quarterly data received from the OECD (Organization for Economic Co-operation and Development) for the years 2004-2013 are used. Hence consumer confidence index for Turkey has been calculated since 2004, 2004 is taken as starting date and the effects in 10 year period are tried to explain. The consumer confidence index is in the range of 0-200. The value between 0 and 100 refers to the negative expectations of consumers, whereas the value between 100 and 200 refers to the positive expectations of consumers. In Turkey's economy, the confidence index was between 0-100 until the 4th Quarter of 2010. This shows that consumers were pessimistic in terms of expectations. After this period, the confidence index increased to a value in the 100-200 range, which indicates that the expectations changed

positively. In the same period, significant increases are observed in the values of the gross domestic product (GDP). This suggests an association between the variables. The natural logarithm of the variables used in the model is then taken. The variables are as follows: the confidence index; lnge; GDP; lngdp; the CPI; the lntufe, the PPI; and the lnufe.

In a time series, the statistics calculated by the non-stationary time series (t, F and R^2) are not reliable. A stability test should be done before the calculations of the series in order to achieve reliable statistics and to determine whether the series are constant or not over time (Kutlar 2000). A probable spurious regression problem arises when performing the statistical analyses with non-stationary series. In the spurious regression problem, although the value of R^2 is high and the values of t are significant, Durbin-Watson statistics are low. There is no economic meaning for these results which are calculated in this way (Granger and Newbold, 1974). Therefore, if the series are non-stationary, they should become stationary. The most common way to test for stationarity is by performing the unit root test. One of the most common tests to be used in the unit root test is the Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1981). In this study, the stationarity of the series was identified in accordance with the ADF test and Akaike information criterion.

Granger causality analysis (Granger, 1969) and Johansen cointegration tests were used in order to identify the relationship between the series determined as stationary. Granger causality analysis was performed to understand the lag of a variable, its relationship with the lags of other variables and the level of explanation. The Johansen cointegration analysis was performed to reveal the long-term relationship between the variables (Horvath and Watson, 1995). In the cointegration analysis, an error correction model was established to eliminate losses arising from taking the difference between the series. Even if only one cointegration is identified, a VECM (vector error correction model) will be created since it is more suitable for identification of short-term relationships (Granger, 1988).

The model established for the first differences by the Ordinary Least Squares (OLS) method is: dlnge=0.015+dlngdp-0.71dlntufe-1.14dlnufe.

Considering the coefficients, there is a negative relationship between CPI and PPI, and a positive relationship between GDP and the confidence index.

ANALYSIS AND MODEL ESTIMATION

Unit Root Test

In the unit root test, the stationary status of the series is examined. Therefore, the ADF root test, which is the most commonly used method, is employed. Constant and trend-constant criteria as well as Akaike information are also considered. ADF unit root test results are shown in Table 1.

According to these results, the hypothesis stating that the unit root exists (non-stationary) for the series used in the study, with a significance level of 1%, is accepted. Thus, series have unit roots at the level of the series. When the first differences of the series are taken, it has been concluded that the series are stationary by rejecting the null hypothesis and accepting the alternative hypothesis, indicating that there is no unit root (stationary). All of the series used are as I(1).

Table 1 ADF Unit Root Test Results

Variables	Difference Values		Model	
			With Constant	With Trend-Constant
lnge	Level		-2.25	-1.91
	First Difference		-5.78	-5.85*
lngdp	Level		-1.07	-2.42
	First Difference		-4.74*	-4.68*
lntufe	Level		-1.15	-1.91
	First Difference		-5.05*	-5.65*
lnufe	Level		-0.89	-3.91**
	First Difference		-5.15*	-5.11*
Critical	Significance	%1	-3.62	-4.22
Values	Level	%5	-2.94	-3.53

* and ** present the significance levels at 1% and 5%, respectively. Although the lnufe variable is stationary at 5%, it is non-stationary at a significance level of 1% and it is also non-stationary at 5% for the constant model. The first difference of the lnufe is taken.

The series are non-stationary at level and there may be a long-term relationship between them due to I(1). Cointegration analysis is done to understand this long-term relationship. Granger Causality Analysis is performed to determine the short-term relationship.

Granger Causality Test

In order to find to what extent the variables affect each other, the Granger causality test was performed and it showed how they explain each other. Since the number of optimum lags is 2, Granger causality was calculated for the second difference and the results are given in Table 2. According to these results, GDP causes the confidence index at a significance level of 5%. The confidence index causes GDP at a significance level of 10%. Thus, it can be said that there is dual causality between the confidence index and GDP at a significance level of 10%. There is also a similar relationship between GDP and PPI. PPI causes GDP at a significance level of 5%,

whereas GDP causes PPI at a significance level of 10%. In addition, PPI Granger causes GDP at a significance level of 10%. There was no Granger causality between the other variables.

Table 2 Granger Causality Test Results

Null Hypothesis	F Statistics	Possibility Value	Decision	Result
Lngdp does not Granger cause lnge.	3.31	0.049	Rejected	Lngdp Granger causes lnge (α =%5).
Lnge does not Granger cause Lngdp.	2.88	0.071	Rejected	Lnge Granger causes lngdp (α =%10).
Lnufe does not Granger cause lnge.	2.42	0.10	Accepted	Lnufe does not Granger cause lnge.
Lnge does not Granger cause lnufe.	0.80	0.46	Accepted	Lnge does not Granger cause lnufe.
Lntufe does not Granger cause lnge.	1.02	0.37	Accepted	Lntufe does not Granger cause lnge.
Lnge does not Granger cause lntufe.	0.65	0.53	Accepted	Lnge does not Granger cause lntufe.
Lnufe does not Granger cause Lngdp.	3.77	0.03	Rejected	Lnufe Granger causes lngdp (α =%5).
Lngdp is not the Granger cause of lnufe.	2.57	0.09	Rejected	Lngdp Granger causes lnufe (α =%10).
Lntufe does not Granger cause Lngdp.	2.68	0.08	Rejected	Lntufe Granger causes lngdp (α =%10).
Lngdp does not Granger cause lntufe.	1.52	0.23	Accepted	Lngdp does not Granger cause lntufe.
Lntufe does not Granger cause lnufe.	1.02	0.37	Accepted	Lntufe does not Granger cause lnufe.
Lnufe does not Granger cause lntufe.	2.41	0.11	Accepted	Lnufe does not Granger cause lntufe.

Johansen Cointegration Analysis

Cointegration analysis can be made for stationary series within the value difference. The purpose of cointegration analysis is to understand whether the long-term movements of the

series are the same or not. Since there are more than two variables, Johansen cointegration analysis is performed to determine the existence and number of cointegration vectors between the series. The 4th model (linear model with constant and trend), which gives the lowest average information criteria of Akaike and Schwarz, was identified as a suitable Johansen model. Under these conditions, the results of the Johansen cointegration test are given in Table 3. According to Trace and Max eigenvalue statistics, there is one cointegration vector at a significance level of 10%. Therefore, the hypothesis stating that there is no cointegration vector ($r = 0$) between variables is rejected at a significance level of 10% and the alternative hypothesis that there is at least one cointegration vector, is accepted. The alternative hypotheses stating that there are two, or more than two, cointegration vectors are rejected. So, it has been concluded that there is only one cointegration. It can also be said that the variables can be equilibrated in the long term.

Table 3 Johansen Cointegration Test Results

Null Hypothesis	Alternative Hypothesis	Eigenvalue Statistics	Trace Statistics	Critical Values 5%	10%
$r = 0$	$r > 1$	0.57	69.74	63.88	60.09
$r \leq 1$	$r > 2$	0.45	38.79	42.92	39.75
$r \leq 2$	$r > 3$	0.26	16.99	25.87	23.34
$r \leq 3$	$r > 4$	0.14	5.85	12.52	10.67
		Eigenvalue Statistics	Max. Eigenvalue Statistics		
$r = 0$	$r = 1$	0.57	30.95	43.12	29.54
$r = 1$	$r = 2$	0.45	21.8	25.82	23.44
$r = 2$	$r = 3$	0.26	11.14	19.39	17.23
$r = 3$	$r = 4$	0.15	5.85	12.53	10.67

A long-term relationship was found between variables. Their short-term relationships are determined by causality analysis.

Error Correction Model

Since there is a cointegration relationship between the series, their short-term dynamics can be checked by establishing an error correction model. The error term in the model established according to the level value (u) is determined and its lag is added to the model established by the stationary values. The error term is required to be stationary at the level. The error term found is stationary at the level (t statistics: -3.36 and -2.63 for the critical value of 1%). The error correction model, where the dependent variable is the confidence index, is given in Table 4. The critical t-value for the two-tailed test at a significance level of 5% is 2.042. Accordingly, since all

parameters exceed the critical t-value at 5% significance level, they are all significant. The variable coefficient of the variable, which is the lag value of the correction term, should be -1 < coefficient <0. This coefficient is also in this range in the model and significant. Since other variables are also significant, it can be said that the error correction model is effective. 76% of the disequilibrium of the confidence index caused by GDP, PPI and CPI will disappear in the next period. In this way, the short-term disequilibrium would also disappear.

Table 4 Error Correction Model Results

Variables	dlngdp	dlnufe	dlntufe	c	U(-1)
Coefficient	1.76	-1.16	-2.2	0.04	-0.76
Standard Dev.	0.33	0.32	0.89	0.017	0.019
t value	5.34	-3.64	-2.27	-2.09	-4.04
R^2	0.59				
F	12.45				
d	1.69				

Vector Error Correction Model (VECM)

Although short-term causality relationships between variables were determined by Granger causality analysis, since cointegration is determined between the variables, the VECM is more suitable for short-term and long-term causality relationships. Four error correction models were established, in which each variable is a dependent variable, through the VECM. Long-term and short-term relationships were determined in each model. If the parameter showing the coefficient of the first lag of the dependent variable in the model was negative and significant, there would be a long-term relationship.

The short-term causality relationships are determined by applying the Wald test (as c(1)=c(2)=0) for coefficients showing the first and second lags of each independent variable. The results calculated by the VECM equations are given in Table 5. The cointegration equation established by the VECM is as follows: lnge(-1)=-40.77+3.72*lngdp(-1)+10.26*lntufe(-1)-22.396*lnufe(-1)+0.14*trend. The model is normally distributed. There is no autocorrelation or heteroscedasticity.

Table 5 VECM Results and Wald Statistics

Depen. Variable	GE	GDP	TUFE	UFE	Long-Term Relationships	
Indep. Variables					Coefficient	P
GE	-	0.02**	0.21	0.16	-0.03	0.76
GDP	0.0198**	-	0.99	0.08***	-0.04	0.24
TUFE	0.263	0.91	-	0.0009*	-0.048**	0.04
UFE	0.158	0.01**	0.23	-	-0.14*	0.0002
R^2	0.36	0.46	0.45	0.59		
Adjusted R^2	0.15	0.28	0.26	0.46		
Jarque-Bera	0.09	0.79	0.87	0.11		
LM(1)	0.79	0.79	0.72	0.66		
White	0.32	0.72	0.89	0.57		

*, **, and *** present significance at the levels of 1%, 5% and 10%, respectively.

According to the VECM results, although the coefficients are negative in two of the error correction models, in which the confidence index and GDP are dependent variables, since they are not significant, it can be said that there is no long-term causality. In the other two error correction models, in which the PPI and CPI are dependent variables, the coefficients are both negative and significant. Thus, the variables have long-term relationships in these equations. Considering the Wald statistics for short-term relationships, GDP causes the confidence index and the confidence index causes GDP; and PPI and the confidence index cause GDP for the short term, respectively. Likewise, GDP and CPI cause PPI for the short term. Thus, considering the short-term relationships, it has been determined that the confidence index and GDP cause each other, while GDP and PPI cause each other and finally, CPI causes PPI.

RESULTS AND CONCLUSION

The consumer confidence index affects many economic variables and it can also be affected by these variables. It has been accepted that changes to consumer expectations are required in order to make changes in the economic variables or consumer expectations which affect the economic variables.

In this study, the relationship between consumer confidence index and GDP, PPI and CPI has been investigated. The analyses were performed using the quarterly data for the years between 2004 and 2013 for Turkey's economy. According to the ADF test conducted for the variables, the series are stationary at the 1st difference value. It has been concluded that there

are dual Granger causalities between the confidence index and GDP; and PPI and GDP. In addition, there is one-way Granger causality between GDP and CPI(CPI Granger causes GDP). Considering the long-term relationship of the variables, only one cointegration vector is identified. It has also been determined that 76% of the disequilibrium caused by other variables used in the confidence index will disappear in one period. According to VECM results, there are dual causalities between the confidence index and GDP; and PPI and GDP in the short-term. CPI causes PPI. In the VECM equations, where PPI and CPI are used as dependent variables, a long-term relationship has been identified. The changes occurring in PPI and CPI affect GDP. On the other hand, GDP affects the confidence index. At the same time, the confidence index is also affected by GDP. In order to ensure economic growth, the PPI and CPI variables should be taken under control and consumer expectations need to be changed in a positive manner. The confidence index will improve as economic growth is established, and economic growth will accelerate as the confidence index improves.

This study figures out relations and interactions between consumer confidence index with price index and economic growth for ten year period. Analyses can be renewed for different macro economic variables and different periods. Consumer confidence index affects many macro economic variables and is affected by many macro economic variables. This study can be considered as a starting point for further studies which are planned to study similar issues.

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