Marmara Üniversitesi İktisadi ve İdari Bilimler Dergisi • Cilt: 39 • Sayı: 2 • Aralık 2017, ISSN: 2149-1844, ss/pp. 487-502
DOI: 10.14780/muiibd.384149

MAKROEKONOMİK DENGE İÇİN PETFOL FİYATLARI ÖNEMLİ MİDİR?

Dina ÇAKMUR YILDIRTAN*
Niyazi BERK**

Özet

Petrol fiyatlarında 2014 sonu itibarıyla yaşanan sert düşüşün, birçok ülke ekonomisinin makro dengelerinde oldukça ciddi etkiler oluşturması beklenmektedir. Bu sert düşüşün ülkemiz ekonomisi açısından cari açıkta düşüş ve enflasyon oranında gerileme sağlayacağı beklentisi oluşmaktadır. Ucuz enerji Avrupa bölgesi ekonomileri için de itici güç olarak büyümeye katkı sağlayabilir. Böylece ülkemiz açısından bölgeye olan ihracatımızı artırarak ülkemiz büyümesine de katkı sağlayabileceği düşünülmektedir. Bu çalışmada petrol fiyatlarındaki düşüşün Türkiye'nin ekonomisine uzun dönem etkisini analiz etmek amacıyla; dış ticaret haddi, cari açık, tüketici fiyat endeksi (tüfe) ve sanayi üretim endeksi arasındaki ilişki incelenmiştir. Çalışmada makroekonomik değişkenler ve petrol fiyatları arasında ilişki kurmak amacıyla, öncelikle değişkenlerin durağanlıkları birim kök testleri ile sınanmıştır. Petrol fiyatlarıyla temel makroekonomik değişkenler arasındaki nedensellik ise VAR Granger Causality/Block Exogeneity Wald Test ile sınanmıştır. Bu çalışma petrol fiyatlarında 2014'te başlayıp halen devam eden dramatik düşüşün etkilerini inceleyen ve güncel verilerle Türkiye'nin makroekonomik dengesindeki uzun dönem etkilerini inceleyen bir araştırma olma özelliği taşır.

Anahtar Kelimeler: *Petrol Fiyatları, Dış Ticaret Haddi, Cari Açık, Tüketici Fiyat Endeksi (TÜFE) ve Sanayi Üretim Endeksi, VAR Granger Causality/Block Exogeneity Wald Test, Nedensellik Testi.*

JEL Sınıflaması: R5, Q43, C1

DO OIL PRICES MATTER FOR MACROECONOMIC BALANCES?

Abstract

The sharp fall in oil prices at the end of 2014, is expected to create significant effects on many countries macro-economic balance. These falling prices in terms of Turkey's current account deficit and inflation rate are expected to decline. Lower energy price can contribute to growth as the driving force for the European economy. It can also contribute to growth by increasing Turkey's exports to the region.

* Assoc. Prof., Marmara University, School of Banking and Insurance, Department of Capital Markets, dinacakmur@yahoo.com.tr

** Prof. Dr., Bahcesehir University, Faculty of Economics Administrative and Social Sciences, Department of Finance, niyazi.berk@eas.bau.edu.tr

This article examines long-run impact of the decline in oil prices on Turkey's basic macroeconomic indicators; terms of foreign trade, the current account deficit, consumer price index and industrial production index. In order to investigate the relationship between the macroeconomic variables with oil prices, firstly we tested the stability of the time series by unit root tests and causality of oil prices with basic macro economic indicators was tested by VAR Granger Causality/Block Exogeneity Wald Test. In the implementation of the interactions between oil prices and macroeconomic variables, Vector Autoregressive Model is performed and the variance decomposition and impulse-response analysis results were reviewed. This study examines the impact of dramatic falling of oil prices and still declining, since its begin of 2014. Thus, it is the first empirical research examining the effects of long-term balance and of Turkey's macroeconomic stability, with the current data.

Keywords: *Oil Prices, Terms of Foreign Trade, The Current Account Deficit, Consumer Price Index And Industrial Production Index, VAR Granger Causality/Block Exogeneity Wald Test, Granger Causality Test.*

JEL Classification: *R5, Q43, C1*

1. Introduction

For major oil-producing countries, although nearly 30 percent decline in oil prices that occurred over the same month in last year, continuing by reduction of oil supply, shows the downward trend in prices. Countries most adversely affected by falling oil and gas prices are Russia, Iraq, Iran, Venezuela, and Nigeria, respectively.

US economy is affected by falling oil prices positively, and as well as adversely. Low tax rates due to declining prices at the pump energy expenditure of households as well as, companies can benefit from the falling oil prices, which means a big saving in domestic demand also returning to the economy. On the other hand, diminishing income of oil companies lead to lower tax payment, which adversely affects the US economy. Canada's situation is worse than the situation in the US. Canadian type heavy oil fell sharply, which has a significant negative impact on the national economy.

The majority of European countries are oil importer, therefore the falling prices affect the economy positively to meet the needs of it. Low oil prices have a broad impact on the economies of the Euro region, with opportunities arising to address many longstanding macroeconomic issues. Decreases in the pump prices, which is an important input for European trade, the falling prices reduce the costs production, especially to the southern countries, which still are in a cash insolvency condition was supported by the falling prices. Due to falling oil prices, the Russian economy shrinks considerably, there was also a decrease in the fund's assets, where foreign exchange reserves of oil and gas revenues are collected. However, especially the depreciation of ruble against the dollar increased relative export revenues.

As a member of OPEC Venezuela is the most adversely affected by the falling oil prices since each $1 drop in oil prices means loss of income of around 700 million dollars annually for the country's

economy that is largely dependent on oil exports. Falling oil prices led Brazilian state oil company Petrobras to a significant loss. Moreover, corruption investigations combined with the Rio 2016 Olympic spending, experienced Brazil a major recession in the country's history. Nigeria, Angola, Libya, and Algeria were also negatively affected by the falling oil price, these countries need to reduce their dependence on oil revenues, by diversifying economic activities.

If Saudi Arabia foreign exchange reserves continue to shrink, the budget deficit may create problems. Therefore, in addition to borrowing, the state oil company Saudi Aramco will go for IPO. Political instability has led to major problems in the Iraqi economy, thus, industrialization and diversification urgently required in Iraq. The end of sanctions, it is time for Iran to increase substantially oil export income, in order to reduce the impact of falling oil prices.

The world's most important oil importers China and India have benefited from cheaper oil. This is because both countries have increased consumption as a result of falling oil prices, particularly high growth in gasoline consumption and they are also stepping up their strategic oil reserves.

2. Literature Review

In the literature, there are several studies examining the relationship between oil prices, trade balance, and the GDP. A selected summary of the studies about the impact of oil price fluctuation has been conducted for the different countries are summarized here.

Studies for the US and other developed countries conducted by Darby[1] and Hamilton[2] are the pioneer in this sense, the first study investigated the relationship between macroeconomic variables and oil prices, among these variables have achieved significant results. Hamilton[3] in his analysis of VAR for the period 1948-1980 of the United States has determined that a negative correlation between real GDP and oil prices. Burbridge and Harrison[4] using the VAR method in the study examined the OECD countries like the US, Japan, Germany, United Kingdom and Canada, have concluded that there is a statistically significant effect of oil prices on industrial production rise.

Canada and Gracie[5] studied the relationship between oil prices and macroeconomics for 15 European countries for the period of 1960 to 1999. They analyzed the impact of oil price on industrial production index, as well as on inflation, in their study. They used manufacturing index instead of economic activity. Using the cointegration analysis, Granger causality test, the

1 Darby, Michael R. (1982). The Price of Oil And World Inflation and Recession, The American Economic Review, 72, 1982, p.738-751.

2 Hamilton, J.D. (1983). Oil and the Macroeconomy Since World War II, Chicago Journals**,** 91(2), 228-248.

3 Hamilton,1983, 240

4 Burbidge, J., and Harrison, A. (1984). Testing for the Effects of Oil-Price Rises Using Vector Autoregressions, International Economic Review, 25(2), 459-484.

5 Cunado, J., and Gracia de, F. P. (2003). Do Oil Price Shocks Matter? Evidence for Some European Countries, Energy Economics, 25, 137-154.

effect is the response function they have analyzed 15 European countries: Germany, Belgium, Austria, Spain, Finland, France, Ireland, Italy, Luxembourg, Portugal, England, Holland, Denmark, Greece, and Sweden. As a result of the study, no relationship between the oil price and the industrial production index, nor is there was cointegration relationship between oil prices and inflation. This suggests that the oil prices affect economic activity only via inflation channels not via other mechanisms.

Rautav[6] studied the effects of oil price on the real exchange rate and the real GDP, using VAR method with the data of Russia for 1995: Q1-2002: Q4 period. In this study, Raghav has found that a 10% increase in oil prices, increases Russia's economic growth of 2.2%, a 10% depreciation in the ruble leads to a decrease of 2.7% Russia's economic growth.

Faria et. al. (2009) [7] They examine the relationship between growth rate of the economy of China and oil prices. The impact of China's exports on the oil prices and their effect on the global economy has been investigated by using ARDL method with monthly data for the period of 1992-2005. As a result; they found that China's economic growth, increases the price of oil and they determined that this relation also affects the global economy. Rafiq et.al (2009)[8] investigate empirically the impact of oil price volatility on economic indicators of Thailand. The impact of the oil price volatility is examined by the VAR method. Using the quarterly data from 1993Q1 to 2006Q4 by Granger causality test, impulse response functions, and variance decomposition they found that, oil price volatility has a significant impact on unemployment and investment. They also identify the structural breaks in all the related variables along the Asian Financial Crisis (1997–1998). They determined that the impact of oil price volatility is transmitted to the budget deficit. Monaldi[9] concluded unfavorable economic conditions in the country's history as a result of long period of lower oil prices, the country may become an economic difficulty. Conventional production would continue falling, so total production is most probably going to remain stagnant in the short term and is highly unlikely to grow significantly in the next two to three years. Political instability may also increase.

The empirical research on Turkey has been presented and summarized below. Sengul and Tuncer[10] examined the causal relationship between energy consumption, energy prices and the GDP of Turkey. Using annual data of 1960 – 2000 period, they found that there is unidirectional (one-way) causality from energy consumption to the GDP and a causal relationship between the GDP and

6 Rautava, J. (2004). The Role of Oil Prices and the Real Exchange Rate in Russia's Economy-a Cointegration Approach, Journal of Comparative Economics, 32(2), 315-327.

7 Faria R., J, Albuquerque, P., Leon-Ledesma, M., Varella Mollick, A. (2009).The Effect of Oil Price on China's Exports, China Economic Review,Vol 20,793-805, 10.1016/j.chieco.2009.04.003.

8 Rafiq, S., Salim, R., Bloch,H. (2009). Impact of Crude Oil Price Volatility on Economic Activities: an Empirical Investigation in the Thai Economy, Resources Policy, Vol 34, 121-132, 10.1016/j.resourpol.2008.09.001.

9 Monaldi, F.(2015). The Impact of the Decline in Oil Prices on the Economics, Politics and Oil Industry of Venezuela, The Center on Global Energy Policy, Columbia, SIPA.

10 Şengül, S. and Tuncer, I. (2006). "Türkiye'de Enerji Tüketimi ve Ekonomik Büyüme: 1960-2000", İktisat İşletme ve Finans Dergisi, 21(242), 69-80.

real energy price index in two-way causality. Ediger and Berk[11] implemented component analysis to construct an oil import vulnerability index (OIVI) based on four factors, which are crude oil import dependency of primary energy consumption, crude oil import bill as a share of GDP, non-diversification of import sources, and share of oil in total energy import. The contribution of these factors to the OIVI is found to be approximately equal, however, better diversification of oil import sources is suggested in order to benefit increasing oil prices differences.

Gocer and Bulut[12] investigate the impact of changes in oil prices in the Russian economy, with 1992Q1-2014Q3 period data, using the symmetric multiple structural breaks cointegration and causality test were analyzed. They examined the symmetrical causal relationship between export of oil prices and the trade balance they have determined that there is a causal relationship between variables; from the oil prices to the trade balance and to the national income. Accordingly, 1% increase in oil prices, caused an increase 1.01% in exports, 0.27% in trade balance and 0.13% in national income, respectively for long-term analysis.

Terzi and Pata have examined the relationship between oil consumption and growth of the Turkish economy. Using annual data for the 1974-2014 period, they have applied short-term causality tests, long-term Engle-Granger and Gregory-Hansen cointegration test. The empirical results showed that there was no relationship between the variables for the long term. However, UVAR, TYVAR, and Granger causality tests indicated positive causality in the short term from oil consumption to the economic growth and this is only one way, thus they found that increased consumption of oil increases the growth rate.

In further studies related Turkey; Altintas[13], using the quarterly data of 1987-2010 period, he investigates the relationship between real oil prices and exports, relative export prices, international real income, real exchange rate variables, by using the ARDL method and causality tests, as a result, Altintas has determined that a 1% increase in the real exchange rate lead to 0.61% decrease in exports income. In the same survey conducted for Turkey referring to Yıldırım and Öztürk (2014)[14] based on the data, the period for 2003 – 2013 period of G7 countries by asymmetric and non-asymmetric causality analysis method examined the relationship between oil prices and industrial production index. According to the finding of asymmetric causality analysis, shocks in oil prices, affect the industrial production index of net energy importing countries, however, it has determined that the increase in oil prices does not explain a decrease in industrial production index.

11 Ediger, V. S., Berk, I. (2011). Crude Oil Import Policy of Turkey: Historical Analysis of Determinants and Implications Since 1968, Energy Policy, Volume 39, Issue 4, April 2011, 2132-2142.

12 Göçer, I. and Bulut. S. (2015). Petrol Fiyatlarindaki Değişimlerin Rusya Ekonomisine Etkileri: Çoklu Yapısal Kırılmalı Eşbütünleşme ve Simetrik Nedensellik Analizi, Cankiri Journal of the Faculty of Economics and Administrative Sciences, 721-748.

13 Altintaş, H. (2013). Türkiye'de Petrol Fiyatları, İhracat ve Reel Döviz Kuru İlişkisi: ARDL Sinir Testi Yaklaşımı ve Dinamik Nedensellik Analizi, Uluslararası Yönetim İktisat ve İşletme Dergisi, 9(19), 1-30.

14 Öztürk, Z.,Yildirim, E. (2014). Oil Price and Industrial Production in G7 Countries: Evidence from the Asymmetric and Non-asymmetric Causality Tests, Procedia – Social and Behavioral Sciences,Vol 143, 1020-1024, 10.1016/j.sbspro.2014.07.547.

3. Research Method

The objective of this study was to determine, occurring a shock in oil prices its impact on the basic macroeconomic indicators such as the current account deficit as, industrial production index, inflation and external terms of trade. In order to investigate the interactions between the macroeconomic variables with oil prices, firstly we tested the stability of the time series by unit root tests and the causality of oil prices with basic macro economic indicators was tested by Granger Causality Test. In the implementation of the interactions between oil prices and macroeconomic variables Vector Auto-Regressive model is performed and the variance decomposition results were reviewed. The study used the monthly data consists of 140 observations covering the period January 2005 and August 2016. In order to consider the proportional change of the time series; has been corrected as

$X_t = \left(\frac{X_t}{X_{t-1}}\right) X_t = \left(\frac{X_t}{X_{t-1}}\right)$ where the X_t X_t is the variable current value and $X_{t-1} X_{t-1}$ is the lagged value.

3.1. Data

Data set is composed as follows;

Variable vector is defined as

$X_t = [copita, tft, cpi, cad, ipi] X_t = [copita, tft, cpi, cad, ipi]$

$copita_t$; Crude oil(petroleum) price index(2005=100)

tft_t; Terms of foreign trade

cpi_t; Consumer price index

cad_t; Current account deficit

ipi_t; Industrial production index

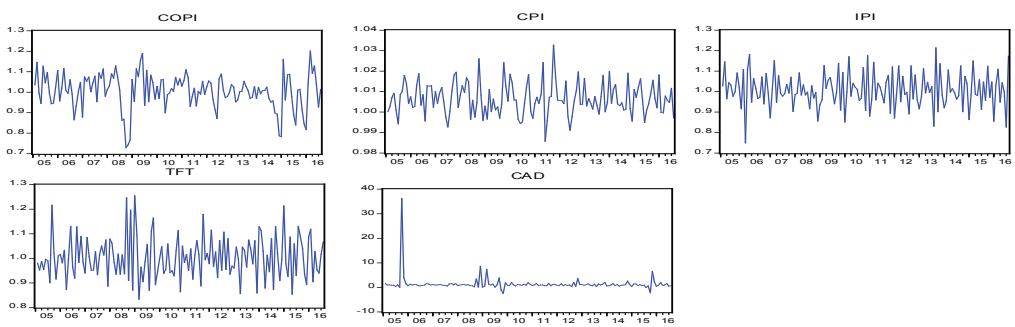


Figure 1: Line Graphs of the Variables

Table 1: Descriptive Statistics for Data Set

	$copita_t$	cpi_t	ipi_t	tft_t	cad_t
Mean	1.00	1.01	1.01	1.00	1.42
Std. Dev.	0.09	0.01	0.08	0.09	3.21
Skewness	-0.72	0.42	-0.01	0.49	9.36
Kurtosis	3.99	3.37	2.98	3.10	100.69
Jarque-Bera	17.75	4.83	0.01	5.71	57299.18
Probability	0.00	0.09	1.00	0.06	0.00

The descriptive statistics for the variables are summarized in Table 1. We can clearly accept $copi_t$;" crude oil price index" and cad_t; "current account deficit" is normally distributed under 0.01 significance level. Also normality exist for tft_t; "terms of foreign trade" and cpi_t;"consumer price index" variables under 0.10 significance level but ipi_t; "industrial production index" is not normally distributed.

4. Results And Analysis

4.1. Correlation Matrix

The highest correlation of *Crude oil price index* is with the current account deficit (-0.53) is the reverse relation (Table 2) Then, with *terms of foreign trade* (-0.46) and *industrial production index* (0.24), respectively.

The highest correlation between variables (0.84); c*onsumer price index* and *industrial production index* in the same way and reveals the existence of a strong relationship. In addition, the *current account deficit* and *terms of foreign trade* in the same way for a close and strong (0.58) presence are among the findings.

Table 2: Correlation Matrix

	Copitat	**cpit**	**ipit**	**tftt**	**cadt**
$copita_t$	1.00	0.06	0.24	-0.46	-0.53
cpi_t	0.06	1.00	0.84	0.21	-0.22
ipi_t	0.24	0.84	1.00	-0.05	-0.40
tft_t	-0.46	0.21	-0.05	1.00	0.58
cad_t	-0.53	-0.22	-0.40	0.58	1.00

4.2. Unit Root Test

According to Dickey and Fuller[15], it is accepted that error terms are white noise, i.e. have sequential independence, normal distribution, and fixed variance. On the other hand, Phillips and Peron[16], contrary to Dickey and Fuller[17], allow low interdependence and heterogeneousness

15 Dickey, D. A. and Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Toot, Journal of the American Statistical Association, 74 (366), 427 – 431.

16 Philips, P.,C.,B., and Peron, P.(1998). Testing for a Unit Root in Time Series Regression, Biometrika, 75(2), 335-346.

17 Dickey and Fuller,1981, 428

among the error terms. The ADF and PP test results are shown in Table 3. The stationary of the series are determined by Augmented Dickey-Fuller (ADF) and Phillips-Peron Unit Root Test (PP) using stated bellow test equations;

$$\Delta Y_t = \alpha_0 Y_{t-1} + \alpha_i \Delta Y_{t-i} \sum_{i=1}^{p} \Delta Y_{t-1} + e_t \quad (1)$$

$$\Delta Y_t = \alpha_0 Y_{t-1} + \alpha_1 Y_{t-1} + \alpha_2 t + \alpha_i \Delta Y_{t-i} \sum_{i=1}^{p} \Delta Y_{t-i} + e_t \quad (2)$$

$$\Delta Y_t = \alpha_i \Delta Y_{t-i} \sum_{i=1}^{p} \Delta Y_{t-i} + e_t \quad (3)$$

Table 3: Unit Root Test of the Variables ADF Unit Root Test

Intercept			**Trend and Intercept**		**None**	
Variable	**Test Statistic**	**Prob.**	**Test Statistic**	**Prob.**	**Test Statistic**	**Prob.**
copi$_t$	-7.75	0.00**	-7.84	0.00**	-0.55	0.47
tft$_t$	-16.7	0.00**	-16.65	0.00**	0.08	0.7
cpi$_t$	8.66	0.00**	-8.68	0.00**	-0.12	0.63
cad$_t$	-11.57	0.00**	-11.72	0.00**	-4.17	0.00**
ipi$_t$	-2.26	0.18	-2.26	0.44	-0.11	0.64
Phillips-Perron Unit Root Test						
Intercept			**Trend and Intercept**		**None**	
Variable	**Test Statistic**	**Prob.**	**Test Statistic**	**Prob.**	**Test Statistic**	**Prob.**
copi$_t$	-7.74	0.00**	-7.79	0.00**	-0.26	0.58
tft$_t$	-18.55	0.00**	-18.52	0.00**	0.32	0.56
cpi$_t$	16.73	0.00**	-25.02	0.00**	-0.11	0.64
cad$_t$	-11.57	0.00**	-11.73	0.00**	-10.31	0.00**
ipi$_t$	-34.96	0.00**	-33.37	0.00**	-0.2	0.61

The values in parentheses are the probabilities of the relevant test statistics. Test statistics indicate the variables are stationary at various levels; ** p<0.01.Lag length established using Schwarz Information Criteria.

As is seen in Table 3 all the variables are stationary according to ADF abd PP Unit Root test statistic.

The variables included in the VAR model are still stationary and this is presented in Appendix 3 in Inverse Roots of AR Characteristic Polynomial Figure.

4.3. Granger Causality Test

Granger causality test is widely used in finance, in order to test a possible causality relation between two variables. In this study, Granger causality analysis was used for the purposes of deciding the compilation of the variables used in VAR model from exogenous to endogenous.

The lag used in the causality analysis was defined as "4" based on SC for all equations as listed in Appendix 1.

Table 4: VAR Granger Causality/Block Exogeneity Wald Test

H_0 Hypotesis	Chi-sq	Prob.	Result
ipi_t does not granger cause cpi_t	12.50	0.01	Industrial production index cause for consumer price index
tft_t does not granger cause cpi_t	11.23	0.02	Terms of foreign trade is cause for consumer price index
cpi_t does not granger cause ipi_t	29.31	0.00	Consumer price index cause for industrial production index
copit does not granger cause *tftt;*	19.13	0.00	Crude oil price index cause for terms of foreign trade
*ipit*does not granger cause *tftt;*	28.47	0.00	Industrial production index cause for Terms of foreign trade
*ftt;*does not granger cause *cadt*	11.96	0.02	Terms of foreign trade is cause for current account deficit

4.4. Vector Autoregression Models

VAR models allow analysis of the relation of selected variables with each other, as developed by Sims (1980)[18] and based on Granger causality test model. According to Sims, if there is true simultaneity among a set of variables, they should all be treated on an equal footing; there should not be any a priori distinction between endogenous and exogenous variables. It is in this spirit that Sims developed his VAR model.

The most important issue on the implementation of VAR model is to select the proper lag order. A VAR with m variables, all m variables should be constant. In this study, for the selection of proper lag for estimated models, optimal lag was defined as "2" with SC. In this study, three different VAR models are estimated in order to measure of interaction between macroeconomic indicators with oil prices in Turkey's case.

4.5. Impulse Response Analysis

Interpretation of individual factors in the estimated VAR models is difficult; therefore, an interpretation with impulse-response analysis and variance decomposition methods is required. The direction and level of reaction of variables in three different VAR models to the shocks in the impulse-response analysis are stated bellow graphics. In impulse-response analysis and variance decomposition, the order of variables entering the estimation is important. The order of the variables should be from exogenous to endogenous. Orders of the variables are determined "Crude oil (petroleum) price index", "Terms of foreign trade ", "Consumer price index", "; Industrial production index" and "Current account deficit" according to Granger causality test results.

18 Sims, C. (1980), Macroeconomics and Reality, Econometrica, Vol. 48, No. 1, 1-48

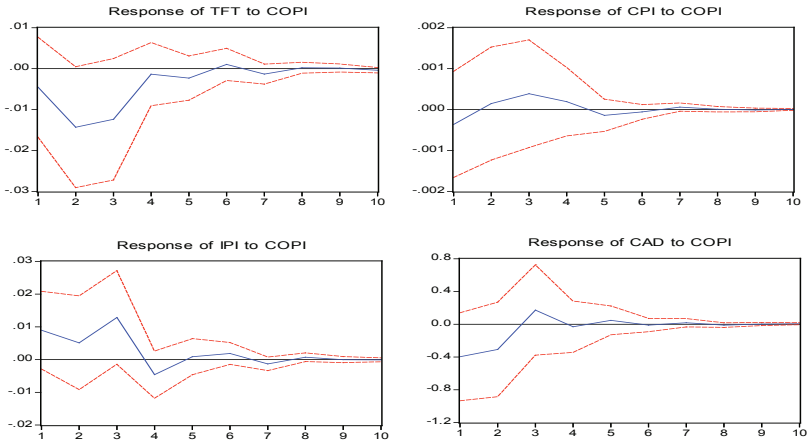


Figure 2: Response of Variables to Consumer Price Index

As " Crude oil (petroleum) price index " become a shock, is causing quite a high volatility on all variables (Figure 2). Compared to other variables such a shock *consumer price index* is observed on caused a softer effect. The correlation matrix as obtained in the *terms of foreign trade* and *Industrial production index* constitutes a response in the negative direction. On the other hand, the *current account deficit* and *consumer price index* enhancing variables are observed to form a response. Furthermore, a shock by the *consumer price index* effect all of the variables and it has been observed that stabilized about at the Period 8th.

4.6. Findings of Variance Decomposition

About 5% of the change of the t*erms of foreign trade,* during 10 periods arise from Crude oil price index, however, it is observed that it shows its effect at the Period 3. Approximately 8% of the change in the *terms of foreign trade* is caused by the *industrial production index* the and it is interesting that this effect is zero in the first period. About 4% of the change in the Terms of foreign trade is caused by the Consumer price index and it can be stated that the explanatory power is zero in the first period.

Approximately 11% of the change in the *consumer price index* during the 10 periods is caused by the *terms of foreign trade* and 3% of this change arise from industrial production index. The effects the current account deficit and consumer price index was fairly low.

5% of the change in the industrial production index is caused by the terms of foreign trade during the 10 periods and 4% of this change arises from crude oil, and 1.5% from the current account deficit, respectively. According to another finding, about 10% of the change in the current account deficit arises from Terms of foreign trade on average 8% of along the period is caused by Crude oil (petroleum) price index.

In summary, it was observed that crude oil price index affect the variables leads to change on the terms of foreign trade by 5%, on the industrial production index by 4%, and on the current account deficit by 3%, respectively. Overall crude oil price index variable which is the subject of the study variables were reached on the literature concluded that lead to a change to the extent predicted.

5. Conclusion

In this study, the major effect of the falling oil prices is on the terms of foreign trade, while the effect of reducing the current account deficit by reducing the external terms of trade, it was determined that to be gleaned indirectly. The decline in oil prices, which has a direct impact on inflation, foreign trade channels with very meager rate has also been found to lead to a conclusion. On the other hand, the relationship between the industrial production index and oil price still is the channel of inflation, but it has been concluded that there is a strong relationship between the way and the same inflation and industrial production. In addition, the impact of changes in oil prices has been identified as on the external terms of trade, industrial production index, and the current account deficit, respectively. Thus, it should be noted that the effect of changes in oil prices remained relatively low for the key the indicator of Turkey.

The highest correlation of *Crude oil price index* is with the current account deficit (-0.53) is the reverse relation (Table 2) Then, with *terms of foreign trade* (-0.46) and *industrial production index* (0.24) respectively. The highest correlation between variables (0.84); c*onsumer price index* and *industrial production index* in the same way and reveals the existence of a strong relationship. In addition, the *current account deficit* and *terms of foreign trade* in the same way for a close and strong (0.58) presence are among the findings.

As a result of the impulse-response analysis, consumer price index become a shock, is causing quite a high volatility on all variables. Compared to other variables such a shock *consumer price index* is observed on caused a softer effect. The correlation matrix as obtained in the *terms of foreign trade* and *ındustrial production index* constitutes a response in the negative direction. On the other hand, the *current account deficit* and *consumer price index* enhancing variables are observed to form a response. Furthermore, a shock by the *consumer price index* effect all of the variables and it has been observed that stabilized an observed bout at the Period 8th.

In summary, it was observed that crude oil price index effects the variables lead to change on the terms of foreign trade by 5%, on the industrial production index by 4%, and on the current account deficit by 3%, respectively. Overall crude oil price index variable which is the subject of the study variables were reached on the literature concluded that lead to a change to the extent predicted. Thus, it should be noted that the effect of changes in oil prices remained relatively low for the key indicator of Turkey.

References

ALTINTAŞ, H. (2013). Türkiye'de Petrol Fiyatları, İhracat ve Reel Döviz Kuru İlişkisi: ARDL Sınır Testi Yaklaşımı ve Dinamik Nedensellik Analizi, Uluslararası Yönetim İktisat ve İşletme Dergisi, 9(19): 1-30.

BURBIDGE, J., and Harrison, A. (1984). Testing for the Effects of Oil-Price Rises Using Vector Autoregressions, International Economic Review, 25(2): 459-484.

CUNADO, J., and Gracia de, F. P. (2003). Do Oil Price Shocks Matter? Evidence for some European Countries, Energy Economics, 25: 137-154.

DARBY, M. R. (1982). The Price of Oil and World Inflation and Recession, The American Economic Review, 72: 738-751.

DICKEY, D. A., and Fuller, W. A. (1979). "Distribution of the Estimators for Autoregressive Time Series with a Unit Root", Journal of the American Statistical Association, 74 (366): 427 – 431.

EDIGER, V. S., Berk, I. (2011). Crude Oil Import Policy of Turkey: Historical Analysis of Determinants and Implications Since 1968, Energy Policy, Volume 39, Issue 4, April 2011, 2132-2142.

FARIA, R., J, Albuquerque, P., Leon-Ledesma, M., Varella Mollick, A. (2009). The Effect of Oil Price on China's Exports, China Economic Review, Vol 20,793-805, 10.1016/j.chieco.2009.04.003.

GÖÇER, I. and Bulut. S. (2015). Petrol Fiyatlarındaki Değişimlerin Rusya Ekonomisine Etkileri: Çoklu Yapısal Kırılmalı Eşbütünleşme ve Simetrik Nedensellik Analizi, Cankiri Journal of the Faculty of Economics and Administrative Sciences, 721-748.

HAMILTON, J.D. (1983). Oil and the Macroeconomy Since World War II, Chicago Journals, 91(2): 228-248.

MONALDI, F.(2015). The Impact of The Decline in Oil Prices on the Economics, Politics and Oil Industry of Venezuela, The Center on Global Energy Policy, Columbia, SIPA.

ÖZTÜRK, Z., Yıldırım, E. (2014). "Oil Price and Industrial Production in G7 Countries: Evidence from the Asymmetric and Non-asymmetric causality tests", Procedia – Social and Behavioral Sciences, Vol 143, 1020-1024, 10.1016/j.sbspro.2014.07.547.

PHILIPS, P., C., B., and Peron, P. (1998). Testing for a Unit Root in Time Series Regression, Biometrika, 75(2): 335-346.

RAFIQ, S., Salim, R., Bloch, H., Impact of Crude Oil Price Volatility on Economic Activities: An Empirical Investigation in the Thai Economy, Resources Policy, Vol 34, 121-132, 10.1016/j.resourpol.2008.09.001.

RAUTAVA, J. (2004). The Role of Oil Prices and The Real Exchange Rate in Russia's Economy—A Cointegration Approach, Journal of Comparative Economics, 32(2): 315-327.

SIMS, C. (1980). Macroeconomics and Reality, Econometrica, Vol. 48, No. 1, 1-48.

ŞENGÜL, S. and Tuncer, I. (2006). "Türkiye'de Enerji Tüketimi ve Ekonomik Büyüme: 1960-2000", İktisat İşletme ve Finans Dergisi, 21(242): 69-80.

TERZI, H. and Pata, U.K. (2016). The Effect of Oil Consumption on Economic Growth in Turkey, Doğuş Üniversitesi Dergisi, 17 (2): 225-24, 2016.

Appendix I

VAR Lag Order Selection Criteria

Endogenous variables: COPI CPI IPI TFT CAD

Exogenous variables: C

Date: 10/25/16 Time: 03:00

Sample: 2005M01 2016M08

Included observations: 131

Lag	LogL	LR	FPE	AIC	SC	HQ
0	526.5182	NA	2.40e-10	-7.962110	– 7.852370*	-7.917518
1	586.8590	115.1541	1.40e-10	-8.501664	-7.843222	– 8.234109*
2	615.8063	53.03320	1.32e-10	-8.561928	-7.354784	-8.071411
3	655.6748	69.99811	1.06e-10	-8.788928	-7.033082	-8.075449
4	682.8348	45.61222	1.03e-10*	– 8.821905*	-6.517357	-7.885464
5	707.6724	39.81599	1.04e-10	-8.819425	-5.966176	-7.660023
6	719.0264	17.33446	1.31e-10	-8.611091	-5.209140	-7.228726
7	746.3930	39.69199*	1.30e-10	-8.647222	-4.696569	-7.041895
8	761.3720	20.58178	1.57e-10	-8.494229	-3.994874	-6.665940

* 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

Appendix 2

VAR Granger Causality/Block Exogeneity Wald Tests

Date: 10/25/16 Time: 03:05

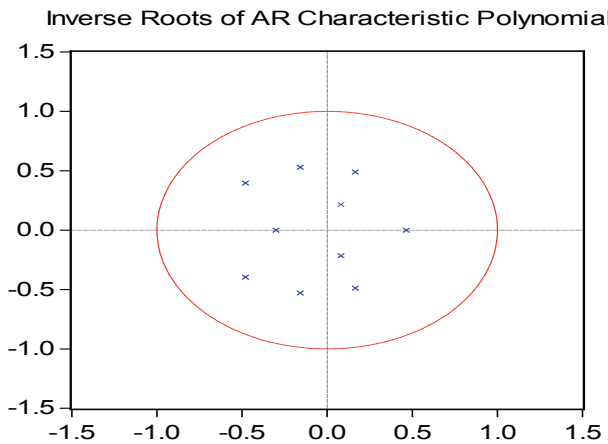
Sample: 2005M01 2016M08

Included observations: 135

Dependent variable: COPI			
Excluded	**Chi-sq**	**df**	**Prob.**
CPI	0.730600	4	0.9475
IPI	1.157489	4	0.8850
TFT	5.260902	4	0.2616
CAD	5.562870	4	0.2343
All	13.85623	16	0.6094
Dependent variable: CPI			
Excluded	**Chi-sq**	**df**	**Prob.**
COPI	7.609224	4	0.1070
IPI	12.50444	4	0.0140
TFT	11.23389	4	0.0241
CAD	2.429567	4	0.6573
All	29.93471	16	0.0183
Dependent variable: IPI			
Excluded	**Chi-sq**	**df**	**Prob.**
COPI	11.72224	4	0.0195
CPI	29.31193	4	0.0000
TFT	4.065993	4	0.3971

CAD	5.872897	4	0.2088
All	64.13905	16	0.0000
Dependent variable: TFT			
Excluded	**Chi-sq**	**df**	**Prob.**
COPI	19.13049	4	0.0007
CPI	7.609700	4	0.1070
IPI	28.46744	4	0.0000
CAD	2.348201	4	0.6720
All	68.77410	16	0.0000
Dependent variable: CAD			
Excluded	**Chi-sq**	**df**	**Prob.**
COPI	4.021941	4	0.4030
CPI	5.931240	4	0.2043
IPI	1.139037	4	0.8880
TFT	11.95962	4	0.0177
All	22.55964	16	0.1260

Appendix 3



Appendix 4

Variance Decomposition

Variance Decomposition of TFT:						
Period	**S.E.**	**COPI**	**TFT**	**CPI**	**IPI**	**CAD**
1	0.071495	0.402962	99.59704	0.000000	0.000000	0.000000
2	0.085489	3.081828	90.25628	0.669934	5.991638	0.000323
3	0.088081	4.877049	85.03002	3.709345	6.282095	0.101490
4	0.088802	4.821735	83.67934	3.672498	7.726205	0.100220
5	0.089490	4.815050	82.39990	3.852469	8.778315	0.154269

6	0.089637	4.812477	82.24210	3.851120	8.919787	0.174517
7	0.089696	4.828567	82.21664	3.867436	8.911366	0.175992
8	0.089717	4.826826	82.18535	3.870029	8.940758	0.177040
9	0.089726	4.826032	82.16803	3.874673	8.953666	0.177599
10	0.089729	4.827665	82.16525	3.874590	8.954680	0.177820
Variance Decomposition of CPI:						
Period	**S.E.**	**COPI**	**TFT**	**CPI**	**IPI**	**CAD**
1	0.007585	0.229132	9.662659	90.10821	0.000000	0.000000
2	0.007884	0.246860	11.38157	85.74064	2.063869	0.567062
3	0.008024	0.472465	10.98968	85.45601	2.532296	0.549553
4	0.008061	0.525503	11.10639	84.93740	2.876644	0.554058
5	0.008071	0.554518	11.15146	84.73103	3.010182	0.552810
6	0.008073	0.559432	11.15894	84.70942	3.019489	0.552717
7	0.008074	0.564547	11.17362	84.68385	3.025432	0.552553
8	0.008075	0.564623	11.17460	84.68259	3.025545	0.552646
9	0.008075	0.564740	11.17491	84.68215	3.025571	0.552628
10	0.008075	0.564750	11.17491	84.68213	3.025572	0.552636
Variance Decomposition of IPI:						
Period	**S.E.**	**COPI**	**TFT**	**CPI**	**IPI**	**CAD**
1	0.069728	1.654183	0.006701	0.091872	98.24724	0.000000
2	0.082280	1.574334	0.098519	0.192227	97.28706	0.847861
3	0.084951	3.767655	2.643352	0.703716	91.60368	1.281600
4	0.086318	3.933710	4.815539	0.885958	89.12338	1.241412
5	0.086659	3.912882	4.917083	1.125969	88.79685	1.247218
6	0.086806	3.944887	4.926605	1.252435	88.62264	1.253436
7	0.086853	3.964048	4.972557	1.251651	88.55774	1.254000
8	0.086874	3.968734	5.001551	1.256776	88.51869	1.254249
9	0.086877	3.968501	5.006736	1.257362	88.51321	1.254188
10	0.086878	3.968455	5.006547	1.257457	88.51332	1.254222
Variance Decomposition of CAD:						
Period	**S.E.**	**COPI**	**TFT**	**CPI**	**IPI**	**CAD**
1	3.157661	1.585637	0.027254	0.294871	0.898062	97.19418
2	3.308773	2.312061	7.432159	0.375788	1.318721	88.56127
3	3.350441	2.520533	7.536212	1.897664	1.671041	86.37455
4	3.351216	2.527749	7.534515	1.918726	1.678975	86.34004
5	3.355640	2.540811	7.517075	1.967630	1.854526	86.11996
6	3.357865	2.538484	7.522151	1.965078	1.962660	86.01163
7	3.358237	2.540717	7.530278	1.967998	1.967071	85.99394
8	3.358399	2.541595	7.533210	1.967808	1.971772	85.98562
9	3.358493	2.541500	7.533387	1.968152	1.976040	85.98092
10	3.358517	2.541721	7.533412	1.968394	1.976697	85.97978
Cholesky Ordering: COPI TFT CPI IPI CAD						