JEESS
Journal of Empirical Economics and Social Sciences
Uygulamalı Ekonomi ve Sosyal Bilimler Dergisi
Cilt/Volume: 4 Sayı/Issue: 2 Eylül/September 2022 ss./pp. 1-21
Ö. Tasşeven, S. Kozan Poturoğlu http://dx.doi.org/10.46959/jeess.1077246

THE ANALYSIS OF TURKEY'S TRADE BALANCE IN RESPONSE TO OIL PRICE CHANGES

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ABSTRACT

If authorities can get the right signals against oil price volatility, it will be possible to manage the real effects on economic performance with efficient policies. Therefore, especially for the economies dependent on oil imports and oil related raw materials, such as Turkey, analysing the impacts of the oil price shocks on the macroeconomic variables has a crucial importance. This study conducted in this context, empirically examines effects of oil prices on the trade balance of Turkey, which depends heavily on oil imports.

Unlike other studies on this subject, in this study, the relationship between oil prices and trade balance is investigated by regime dependent impulse response functions and forecast error decompositions based on multivariate Threshold VAR (TVAR) model comparing with linear VAR model. Two regimes are determined by high and low oil price volatility.

The findings suggest that, the relationship between oil prices and trade balances is non-linear. In the high regime, components of trade balance respond stronger to oil price shocks than lower regime and linear VAR model. Oil price shocks in the high regime deteriorates the total trade balance, non-oil and non-gas trade balance and intermediate trade balance of Turkey. However, on the other hand, consumption trade balance of Turkey is positively affected from oil price increases. Furthermore, consumption goods trade balance found to be the mostly affected by oil price shocks according to the impulse-response functions and variance decomposition analysis. Finally, the findings obtained from linear VAR and lowest regime are generally similar and has less effect on the trade balance components.

Keywords: *Oil Prices, VAR Models, Threshold Models, Trade Balance, Turkey.*

JEL Codes: *Q51, Q20, Q40, R11, P28.*

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Makale Geçmişi/Article History

Başvuru Tarihi / Date of Application	: 22 Şubat / February 2022
Düzeltme Tarihi / Revision Date	: 20 Nisan / April 2022
Kabul Tarihi / Acceptance Date	: 29 Mayıs / May 2022

Research Article

1. INTRODUCTION

After industrial revolution, energy role in growth and foreign trade theory has gradually increased with liberalized economies and the globalizing world. Crude oil has been remained the most prominent source of energy like no other sources. Because of the fact that oil has historically been the world's most used energy source, structural shifts in oil supply and oil demand, sharp and unexpected fluctuations in financial markets, speculative transactions in international commodity markets and increasing uncertainties due to macroeconomic and regional geopolitical risks have caused a high volatility in oil prices. An immediate unexpected increase in oil prices called oil price shocks has been resulted great fluctuations in the world economy.

After the two consecutive oil shocks in the early and late 1970s, oil price fluctuations' impact on economic activity has examined by several studies. Hamilton's (1983, 1988, 1996) influential papers in the 1980-90s were the pioneering works on this topic. Following Hamilton, handful of studies showed the negative correlation between oil prices and economic activity (Gisser & Goodwin, 1986; Burbidge & Harrison, 1984; Darby M. R., 1981). On the other hand, some researchers showed limited impacts of oil price on economic activities, mainly due to state controlled energy policies and technological innovations after the late of 1980s (Hooker M. A., 1996; Hooker M. , 2002; Doroodian & Boyd, 2003).

After the oil price collapse in 1986, the symmetrical relationship phenomenon has weakened and the asymmetrical relationship has gained importance. Mork (1989) showed the asymmetrical relationship between oil prices and economic activity. Following Mork, some studies investigated the asymmetric impacts of oil price changes on GDP (Mork & Olsen, 1994; Lee, Ni., & Ratti, 1995; Mork K. A., 1989). However, asymmetric price transmission has been subject to more advanced econometric techniques as well as theoretical discussions. Huang et al. (2005), by using the two-regime threshold model developed by Tsay (1998), showed the asymmetric relationship between oil price and industrial production level and real stock returns as indicators of economic activity.

Most of studies in the literature focus on the effects of oil prices on the domestic economies of countries, however few studies examines the effect of oil prices on trade balance and potential role of asymmetries and threshold effects. Oil price fluctuations have major impact on countries 'trade balance. Trade balance has significant impact on economic growth. This study focuses on the relationship between oil price and trade balance and attempts to fill the gaps in the literature.

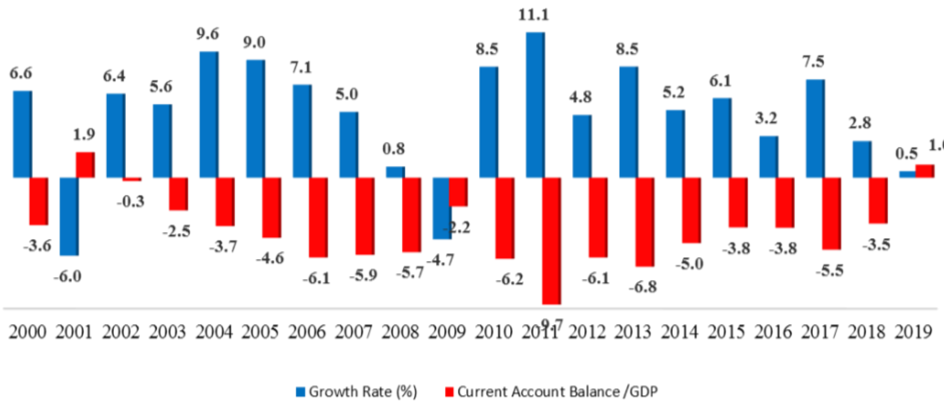
Theoretical literature generally shows that oil price increases has positive impact on oil exporter countries through the income they provide by exporting oil, on the contrary has negative impact on oil exporting countries because of increased costs in manufacturing industry. However, in a different perspective, high oil prices will cause an appreciation of the oil exporting countries' exchange rate and their existing production factors shift towards new resources which may lead deterioration in their total production (Dutch Disease). On the other hand, wealth transfers to oil exporting countries will cause a depreciation in local currencies of the oil importing countries, thus making their exports more attractive.

The aim of this study is to analyse empirically how Turkey's trade deficit is affected by the asymmetric oil price changes by using Multivariate Threshold Vector Regression method based on different regimes. VAR and TVAR methods were estimated for Turkey's total trade balance, trade balance excluding oil and natural gas in Turkey and subgroups of trade. Subgroups of the trade balance are raw material (intermediate goods) goods trade balance, consumer goods trade balance and investment (capital) goods trade balance, Impulse response functions and variance decomposition analysis findings obtained from linear VAR and threshold TVAR models are comparatively analysed.

2. DEVELOPMENTS IN THE TURKISH ECONOMY

After 2001 crisis, Turkish economy performed with high growth rates, mainly due to structural reform programs along with the provision of basic transformation and stability in the economy and contribution of high international liquidity. On the other hand, during this period, foreign trade and current account deficit increased. The appreciation of the Turkish Lira in between 2003 and 2013 was another factor that increased imports and current account deficit. Manufacturers also focused on imported inputs in order to use their competitive power. The current account deficit has been an important determinant of growth and crisis periods for Turkey.

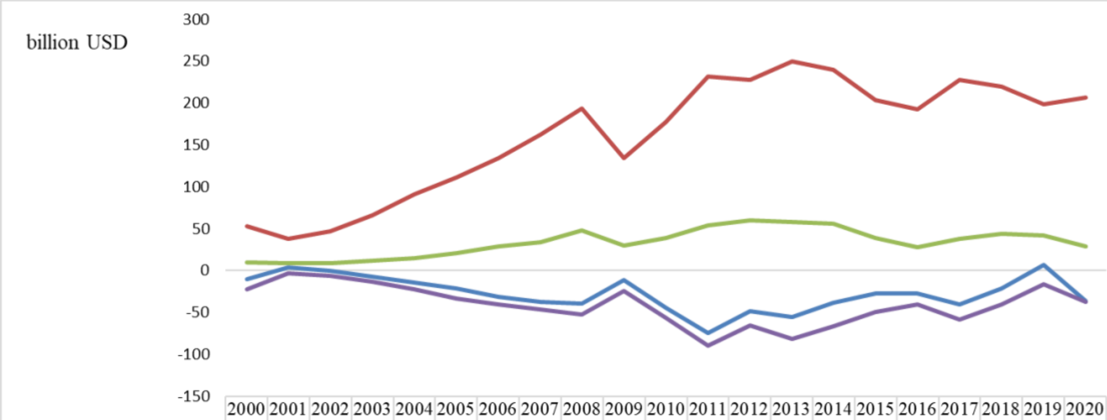
Figure 1. Turkey's Growth Rate and Current Account Balance in Between 2000 and 2019



Source: TURKSTAT

As seen in Figure 1, the current account deficit increases in growth periods and decreases in periods of stagnation. For example, highest current account deficit and highest growth recorded in 2011. On the other hand, the currency crisis in 2019 resulted with current account surplus and low level growth. The current account deficit in Turkey was generally financed by direct investment inflows. This situation reveals dependent, risky and fragile character of the Turkish economy.

Figure 2. Turkey's current account balance and foreign trade balance in between 2000 and 2020



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Current Account Balance	-10	4	-1	-8	-14	-21	-31	-37	-39	-11	-45	-74	-48	-56	-39	-27	-27	-41	-22	7	-37
Total Import	53	38	47	66	91	111	135	162	194	134	177	232	227	249	240	204	193	228	220	199	206
Energy Import	10	8	9	12	14	21	29	34	48	30	38	54	60	58	56	39	27	38	44	42	29
Trade Balance	-22	-3	-6	-13	-22	-33	-41	-47	-53	-25	-56	-89	-65	-82	-67	-49	-40	-59	-41	-17	-38

Source: TURKSTAT, TCMB

Figure 2 shows Turkey's current account balance, foreign trade balance, total imports and energy imports in between 2000 and 2020 years. Turkey, as being a net energy importer country, imports more than 90% of its energy sources. Despite the oil and gas import weight in Turkey account for 10% of the total import, the price of imported raw material goods and therefore domestic cost of production is closely tied to the oil prices. Therefore, Turkey's current account balance is highly correlated with its foreign trade balance including its energy imports. Energy import of Turkey, which has a substantial share in total imports (around 20%), constitutes a significant part of the foreign trade and current account deficit.

3. LITERATURE REVIEW ON THE RELATIONSHIP BETWEEN TRADE BALANCE AND OIL PRICE SHOCKS

Although there are many studies investigating the macroeconomic effects of oil price changes in the literature, the number of studies investigating the effects of oil price changes on foreign trade balance is relatively limited (Bruno & Sachs, 1982; Ostry & Reinhart, 1992; Gavin M. , 1990; Gavin M. , 1991).

Researchers and policymakers tent to approach to the oil and trade relationship in regards to the common assumption that oil price shocks effect countries' trade balance depending whether they are oil importers or exporters. Generally, there is a common concern that oil importing countries are adversely affected by oil price shocks since they need to borrow from foreign countries to sustain their trade balance deficit. However, this relationship is more complex than usually assumed. In the last two decades, because of the imbalances in the current accounts of countries, the number of studies investigating the impacts of oil price shocks on countries' trade balances has increased (Kilian, Rebucci,

& Spatafora, 2009; Backus & Crucini, 2000; Bodenstein, Erceg, & Guerrieri, 2011; Le & Chang, 2013; Jibril, 2016).

For the oil importing countries, oil price increases lead increase production costs in their manufacturing industries. Since oil and oil related raw materials are used as an input in the production process, oil price may positively affect the non-oil trade balance through the transfer of wealth from oil importing countries to oil exporting countries. The overall impact is determined by the combined responses of the oil and non-oil trade balances. On the other hand, increased cost, wealth transfers to oil-exporting countries and deteriorated trade balance lead to decline in consumption and a depreciation of the real exchange rate of the oil importer, thus making their exports more attractive and improve nonoil trade balance (Bodenstein, Erceg, & Guerrieri, 2011).

Bodenstein et al. (2011) analyses the effects of oil price chances on the US foreign trade balance and non-oil trade balance by using Dynamic Scholastic General Equilibrium Model (DSGE). The two countries are classified as the US and the rest of the world. In the study, it is shown that oil price shocks causes greater changes in the non-oil trade balance compared to the total trade balance through the wealth transfer from oil importing countries to oil exporting countries. Increased wealth transfers from oil importing countries with low oil price flexibility to oil exporting countries leads to a decline in consumption and a depreciation of the real exchange rate of the oil importer, which causes an improvement in the non-oil trade balance because of the improvement of non-oil exports of the oil importing country. For that reason, non-oil trade balance partially offsets the deficit of the total trade. Vice versa, oil price increases deteriorates the nonoil trade balance of oil exporting countries through higher wealth and exchange rate appreciation.

The asymmetry and nonlinear models have been investigated by various researchers and policy makers, considering the effects of positive and negative oil shocks on macroeconomic variables (Narayan & Sharma, 2011; Le & Chang, 2013).

Le and Chang (2013) examine the changes in trade balance and non-oil trade balance, caused by oil price fluctuations. Three different characteristics of Asian economies in terms of oil are analysed, including Malaysia as an oil exporting country, Singapore as an oil refinery economy and Japan as an oil importing company. All these three economies' growths are highly dependent on their trade. According to the findings of the study, Japan's overall trade balance and its non-oil trade balance respond positively to oil price shocks whereas its oil trade balance is adversely affected. For Malaysia, oil price impacts are positive for both overall trade and oil trade balance and rising oil revenues seems to be major factor contributing to economy's overall trade surplus in the long-run. For Singapore, positive oil price shocks are adversely effected their oil trade balance only in the short-run.

4. LITERATURE REVIEW ON NONLINEAR ECONOMETRIC METHODS

Theoretical studies in macroeconomics have relied increasingly on nonlinear models. On the other hand, most applied studies have been still using linear time series, but methods used in these studies may fail to capture all effects if these only materialize under particular circumstances. This situation has caused widespread use of nonlinear models (Schmidt, 2013).

The reasons for preferring nonlinear time series can be listed as follows: (Grynkiv & Stentoft, 2018).

1) Usual linear framework often falls short of properly describing the data, which, instead, exhibit important nonlinear features.
2) Economic theory regularly results in models with multiple equilibria and asymmetries, which the time series model should be able to accommodate.
3) Data is often interconnected and hence simple univariate models generally fall short of appropriately describing the complex nature of the data.

Two main issues can be captured by nonlinear time series models. First is the characteristics of shocks. Shocks in different characteristics affect macroeconomic variables disproportionally. Shocks can differ in direction (positive and negative shocks) and size (small and large shocks) Therefore in a nonlinear system, asymmetric effects should arise in response to shocks of different magnitudes and direction. Most importantly, these mechanisms can operate in different extent depending on whether the economy is very fragile or not during the time of shock. Secondly, initial conditions or regime changes describe the point of the business cycle at which the economy is situated when the shock occurs. For example, adverse shocks can have a more detrimental impact on the fragile economies (Schmidt, 2013).

Empirical studies have used nonlinear models to explore the asymmetry of shocks and nonlinear relationship between variables in financial markets and data from the real and monetary economy. Threshold VAR models are commonly used to examine the asymmetric effects of fiscal and monetary policies in various credit, interest rate and inflationary regimes (for example “tigh” and “normal” credit regimes) (Weise, 1999; Balke, 2000; Shen & Chiang, 1999; Atanasova, 2003; Fazzari, Morley, & Panovska, 2014; Ferraresi , Roventini, & Fagiolo, 2014).

TVAR models have also been extensively used to study the business cycle regimes (for example, “recession” and “expansion” regimes) (Grynkiv & Stentoft, 2018; Altissimo & Violante, 2001; Koop & Potter, 1999). Finally, multivariate TVAR models have been widely used to study the dynamics in energy prices, stock prices, returns, volatilities, inflation and economic activity (Griffin, Nardari, & Stulz, 2007; Huang, Hwang, & Peng, 2005; Li, Ng, & Chan, 2015; Grynkiv & Stentoft, 2018).

According to empirical evidences, Van Robays (2012) showed that oil price fluctuations in times of uncertainty have greater effects on economic activity. Jobling and Jamasb (2017) showed that countries can tolerate oil price increases to a certain level, and after this level they will start adjusting their consumption (Jobling & Jamasb, 2017). Additionally, large and long-term investments will not be that much affected by certain price changes (Kilian & Vigfusson, 2011b; Huang, Hwang, & Peng, 2005).

Catık and Onder (2013) analysed the asymmetric impact of oil prices on the economic activity in Turkey. By using the two-regime TVAR method, they shows the asymmetric pattern that oil shocks have a larger effect on inflation and output when the change exceeds the optimal threshold level (Çatık & Önder, 2013).

5. DATA DESCRIPTION AND PRELIMINARY ANALYSIS

To investigate the impact of the oil price shocks on the Turkey's foreign trade balance, we used the monthly data for the period 1987:5 to 2019:7 in this study. Nominal oil prices are calculated using the local producer price index and the real effective exchange rate and converted into real domestic prices. The logarithmic values of real oil price$(roil_t)$, industry production index(lip_t), and real effective exchange rate (lrer_t) are obtained.

$$lrpoil_t = \ln(rpoil_t) \quad ; \quad lrer_t = \ln(rer_t) \quad ; \quad lip_t = \ln\,(ip_t)$$

Turkey's trade balance (LXM_t), non-oil and non-gas trade balance[1] $(LNOGXM_t)$, intermediate goods trade balance $(LINTXM_t)$, investment goods trade balance $(LINVXM_t)$ and consumption goods trade balance $(LCONSXM_t)$ shown by the ratio of exports to imports by taking logarithms.[2]

$$LXM_t = \ln\left(\frac{X_t}{M_t}\right); \qquad LNOGXM_t = \ln\left(\frac{NOGX_t}{NOGM_t}\right)$$

$$LINTXM_t = \ln\left(\frac{LINTX_t}{LINTM_t}\right); \quad LINVXM_t = \ln\left(\frac{LINVX_t}{LINVM_t}\right); \quad LCONSXM_t = \ln\left(\frac{LCONSX_t}{LCONSM_t}\right)$$

(1)

We commence our empirical analyse by performing common-used unit root tests in order to examine time series properties of the variables employed. We consequently employ the Augmented Dickey Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski, Phillips, Schmidt ve Shin (KPSS) to tests the stationarity. Additionally, since our estimation sample covers long run relationship of variables under consideration allowing for the incidence of structural breaks, a battery of unit root tests was carried out to see the implications of structural breaks on the integration level of the variables. So, we conduct

[1] Based on the study Bodenstein et. al. (2011), it has been asked to analyse the oil price impact of Turkey's non-oil trade balance. However, in the database of TURKSTAT, there is no data showing the amount of oil exports and imports. Therefore in this study we used the non-oil and non-gas trade balance instead of only non-oil trade balance. The non-oil and non-gas trade balance is obtained by deducting the oil and gas trade balance (which are showed under "Secret Data") from the total trade balance.

2 The concept of trade balance given in this study will be evaluated as the ratio of exports to imports. This representation of trade balance has been used by many researchers in the literature. According to Bahmani Oskooe (1991), this expression is the unit measure used regardless of whether exports and imports are real or nominal.

a Lee and Strazicich (2003) unit root test which allows for endogenous identification of structural break in variables.

Table 1. ADF, PP and KPSS Unit Root Tests

		ADF Test statistics (Trend and constant)		PP Test statistics (Trend and constant)		KPSS Test statistics (Trend and constant)	
		Levels	First differences	Levels	First differences	Levels	First differences
LXM		-5,35***	-30,61***	-8,82***	-34,39***	0,15*	0,02***
LNOGXM		-5,24***	-30,64***	-8,59***	-33,75***	0,18*	0,02***
LINTXM		-5,35***	-28,08***	-7,39***	-36,31***	0,28	0,03***
LCONSXM		-3,76**	-5,86***	-6,80***	-32,54***	0,18*	0,02***
LINVXM		-3,65**	-18,90***	-11,18***	-59,92***	0,35	0,09***
LRPOIL		-4.41***	-15,57***	-3,62**	-15,30***	0,15*	0,04***
LIP		-3,24*	-24,70***	-3,49**	-26,08***	0,32	0,03***
LRER		-2,66	-13,39***	-2,17	-13,75***	0,27	0,06***
Significance Level	*1%*	*-39,823*	*-39,824*	*-39,822*	*-39,822*	*0,2160*	*0,2160*
	5%	*-3.4216*	*-3.4216*	*-34,216*	*-34,216*	*0,1460*	*0,1460*
	10%	*-3.1336*	*-3.1336*	*-31,336*	*-31,336*	*0,1190*	*0,1190*

Note: In the ADF test, the Schwarz Information criterion was used and the maximum delay length was taken as 16. In PP and KPSS tests, optimal delay length was obtained by using Bartlett kernel (default) spectral estimation method and Newey-West Bandwidth criteria. ***, **, * denotes 1%, 5% and 10% level of significance, respectively.

The results as detailed in Table 1 indicate that, all trade balance components and real Brent oil price variables are stationary at their levels at the 5% level of significance according to the ADF and PP tests' results. However, industrial production index and real exchange rate index indicate the existence of unit root. Moreover, according to the KPSS tests results none of variables stationary at the 5% level of significance.

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Table 2. Lee and Strazicich Unit Root Test with two structural breaks

	Model A (crash model)				Model C (trend shift model)					
	LM-stat	Lag	Breaking time		LM-stat	Lag	Breaking time			
			D_{1t}	D_{2t}			D_{1t}	DT_{1t}	D_{2t}	DT_{2t}
LXM	-5,471***	12	1992:12	1992:12	-6,433***	12	1993:10	1993:10	2010:09	2010:09
LNOGXM	-5,655***	12	1992:12	1992:12	-6,438***	12	1993:10	1993:10	2010:09	2010:09
LINTXM	-5,828***	12	1992:11	1992:11	-6,449***	12	1992:11	1992:11	1996:01	1996:01
LCONSXM	-5.592***	12	2009:09	2009:09	-6.387***	12	1999:12	1999:12	2009:09	2009:09
LINVXM	-5.251***	3	2001:02	2001:02	-8.058***	1	1998:10	1998:10	2010:08	2010:08
LRPOIL	-3,983**	11	2005:08	2005:08	-5.780***	11	1999:04	1999:04	2014:11	2014:11
LIP	-4,094*	8	2004:11	2004:11	-4.7628	8	2000:10	2000:10	2005:01	2005:01
LRER	-4,348**	2	2013:04	2013:04	-5.954***	1	1994:02	1994:02	2010:06	2010:06
ΔLXM	-8,633***	11	1994:08	1994:08	-11,215***	11	1997:12	1997:12	2001:03	2001:03
ΔLNOGXM	-8.818***	11	1994:08	1994:08	-11,451***	11	1997:12	1997:12	2001:03	2001:03
ΔLINTXM	-7.099***	11	2016:02	2016:02	-12.834***	11	1993:05	1993:05	1999:04	1999:04
ΔLCONSXM	-8.875***	11	1996:01	1996:01	-11.818***	12	1997:12	1997:12	2001:01	2001:01
ΔLINVXM	-7.515***	12	1997:01	1997:01	-29.399***	0	1991:12	1991:12	2005:01	2005:01
ΔLRPOIL	-6,751***	9	2016:06	2016:06	-8,825***	12	1994:03	1994:03	1991:01	1991:01
ΔLIP	-8,335***	4	1993:11	1993:11	-21,895***	0	1993:11	1993:11	2002:12	2002:12
ΔLRER	-12,662***	1	2014:01	2014:01	-13,066***	1	2001:08	2001:08	2010:03	2010:03

Note: The significance of LM test statistics is evaluated by using the critical values reported in the Lee and Strazicich (2003) ***, **,* denotes 1% , 5% and 10% level of significance at given breakpoints. In line with Perron (1989), Model A, i.e. "crash" model allows shifts in the intercept $Z_t = [1, t, D_{1t}, D_{2t}]$, whereas Model B, i.e. "trend shift" model considers both breaks in intercept and trend in the variables $Z_t = [1, t, D_{1t}, D_{2t}, DT_{1t}, DT_{2t}]$.

The results of Lee and Strazicich (2003) unit root tests as detailed in Table 2, confirm the ADF, PP test results. According to the results, while all trade balance components and real Brent oil price variables are strongly stationary at their levels (at 1% significance level), industrial production index and real exchange rate index treated as I(1), and can be used in the VAR/TVAR models with their first differences. Lee and Strazicich (2003) tests also suggests the impacts of financial crises on the macroeconomic variables in Turkey. Because the breaking dates for trade balance components, real exchange rate index and industrial production index are found to be significant and seem to be associated with the periods before and after 1994, 2001 and 2009 crisis. The significant breakpoints for Brent oil prices are associated with 1999, 2005 and 2014 years when sharp increases and decreases were recorded in oil prices.

6. MODEL

TVAR model, which is multivariate extension of the VAR model, is a modelling in which the economy has two regimes and these regimes switches from one to the other depending on the optimum value of the threshold variable. This model allows a regime dependent structure driven by nonlinear shocks. Regimes are defined as the periods separated by an optimum threshold at which the value of a particular variable (threshold variable) in the model is estimated. A two-regime TVAR model is specified as follows (Atanasova, 2003; Balke, 2000):

$$Y_t = I[c_{t-d} \geq \gamma]\left(\sum_{i=1}^{p}(A_i^1 Y_{t-i}) + \sum_{i=1}^{q}(B_i^1 X_{t-i})\right) + I[c_{t-d} < \gamma]\left(\sum_{i=1}^{p}(A_i^2 Y_{t-i}) + \sum_{i=1}^{q}(B_i^2 X_{t-i})\right) + u_t \quad (2)$$

c_{t-d}: Threshold variable lagged by d periods

γ: Optimum value of the endogenously estimated threshold variable

$I[.]$: Dummy indicator function that equals 1 when $c_{t-d} \geq \gamma$, and 0 otherwise

A_1^1,A_1^2,B_1^1 and B_1^2 are regime dependent parameters

Equation states that, when the threshold variable, lagged by d periods, is equal to or exceeds the threshold variable, the economy is in a high regime, and for the other conditions, the economy is in a in a low regime. TVAR model allows us to estimate endogenously the threshold value (γ), lag parameter (d) and regime dependent parameters (A_1^1,A_1^2,B_1^1 ve B_1^2)

7. EMPIRICAL RESULTS

Before proceeding to the estimation of the model, the threshold effect and the existence of multiple regimes are investigated with the $C(d)$ threshold nonlinearity test based on an arranged regression developed by Tsay (1998) The C(d) test is multivariate extension of the threshold nonlinearity test developed by Tsay (1989) To obtaining C(d) threshold nonlinearity test results, as seen in Table 3, recursive estimation of arranged regression using alternative starting points of $m_0 = 25$ and m_0=50 and delay parameters are $d = 1,2,3,4,5,6$ are used. The optimal lag p is selected using the Akaike Information Criteria and the $C(d)$ test is applied for different d, $(d \leq p)$ values. At the point where $C(d)$ statictic is significant, the null hypothesis indicating the linearity is rejected, and at the point where the statistic $C(d)$ is most significant, it means that d, is at the optimal value.

Table 3. Multivariate Threshold Nonlinearity test

d	m_0	C(d) stat.	Prob.
1	25	38.67	0.350
1	50	38.97	0.338
2	25	41.23	0.253
2	50	41.21	0.253
3	25	45.36	0.136
3	50	49.37	0.068
4	25	37.02	0.422
4	50	41.41	0.246
5	25	53.74	0.029
5	50	48.59	0.078
6	25	53.61	0.030
6	50	46.9	0.105
Υ	7.33%	AIC	-4,663

Note: AIC is the minimum Akaike Information Criterion.

Υ is the optimum value of the threshold variable determined by the test.

In Table 3 represents the results of the model consisting of the total trade balance, the real oil price, the real exchange rate index and the industrial growth index. According to the multivariate threshold nonlinearity test results, it is seen that linearity, which is zero hypothesis, is rejected at 5% significance level for the different lag levels in both models. These results provide strong evidence in favour of TVAR against the linear model and further corroborates two distinct regimes phenomena driven by oil price changes. The threshold test chooses the 5th lag for the threshold variable $dlrpoil_{t-d}$, with the maximum values of the x^2 test statistic 53.74. After finding the delay parameter, the interval where the threshold value of the possible oil price changes is partitioned into 1000 grids, and the optimal threshold value for each TVAR model according to the minimum Akaike Information Criteria (AIC) is obtained. The threshold value determined accordingly the models is $\Upsilon = \%7{,}33$.

According to the threshold estimation results, the high regime is the periods when oil price changes exceed the optimal threshold value $dlrpoil_{t-d}$>%7,33, while the low regime is the periods when oil price changes remain below that threshold value $dlrpoil_{t-d}$<%7,33.

Figure 3. Real Brent oil prices and trade balance in Turkey

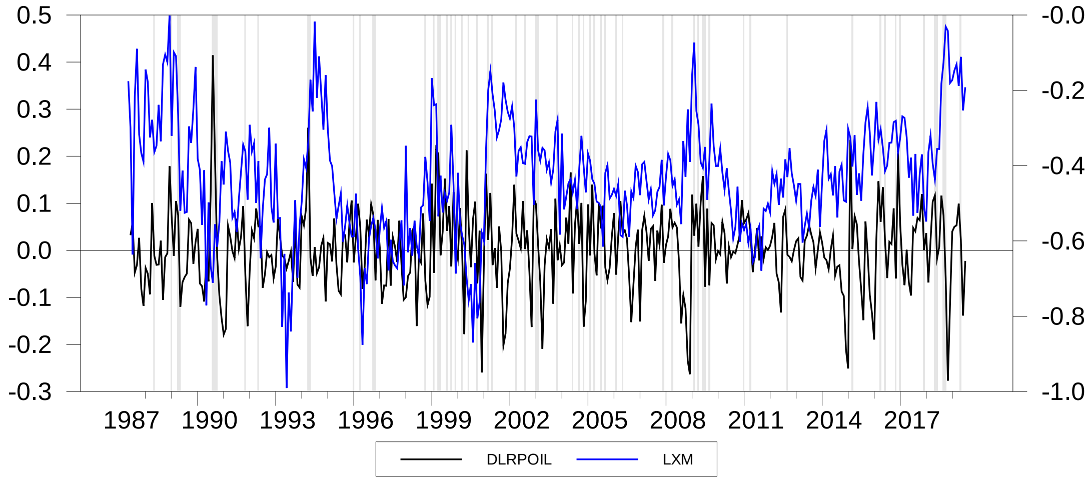
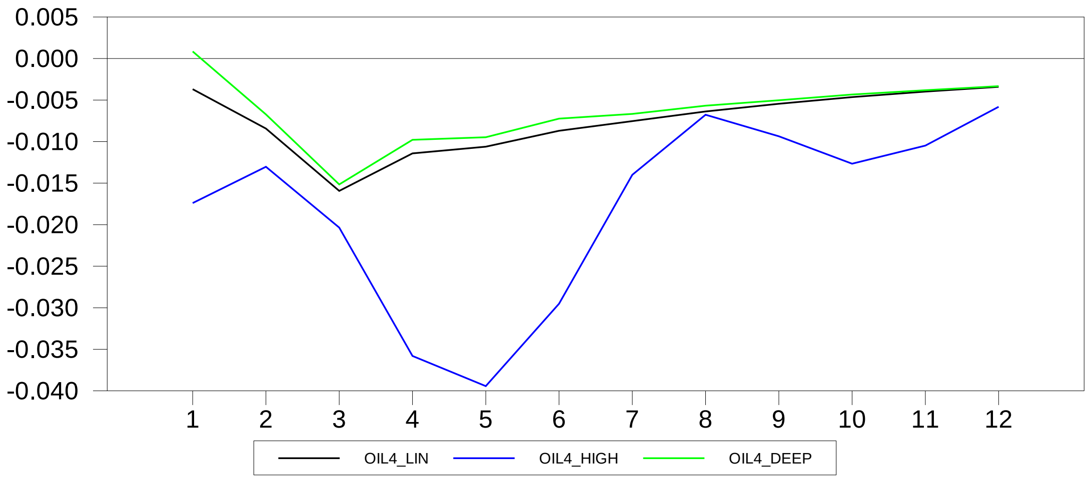


Figure 3 shows the graphs with the first difference of real oil prices and trade balance during the study period. The shaded regions represent the regime in which the transition variable exceeds the optimal value ($dlrpoil_{t-d}$>%7,33) The response functions of the VAR and TVAR models are given in Figure 3 for better understanding of estimated response functions comparatively.

Figure 4. The responses of total trade balance to real oil price shocks



Note: The black graph in the figure shows the response function obtained from the linear VAR model; the green graph shows the response function obtained from the low regime TVAR model and the blue graph represents the response function obtained from the high regime TVAR model.

Through Figure 4, the response functions obtained from the low regime TVAR and linear VAR are almost the same. In the regime above the threshold value, the trade balance reached the lowest level in the fifth month against oil price shocks, and the trade balance recovered after the fifth month. In other words, the oil price shock within the high oil price volatility, brought the total trade balance of Turkey to its worst level in the fifth month after the shock has occurred.

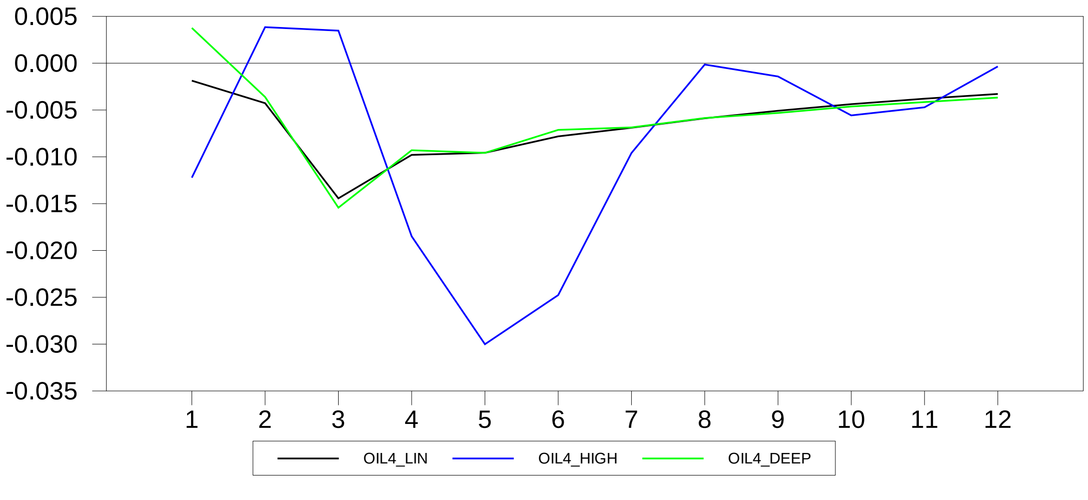
Table 4. Forecast error variance decomposition of oil price and total trade balance

Linear VAR						TVAR - High Regime						TVAR - Low Regime					
Period	s.e.	dlrpoil	dlrer	dlip	lxm	Period	s.e.	dlrpoil	dlrer	dlip	lxm	Period	s.e.	dlrpoil	dlrer	dlip	lxm
1	0.098	0.160	0.725	0.057	99.058	1	0.102	2.264	5.885	0.036	91.815	1	0.095	0.006	0.391	0.018	99.585
2	0.110	0.708	2.197	1.128	95.967	2	0.127	2.295	12.654	0.033	85.018	2	0.104	0.406	0.932	2.076	96.586
3	0.127	2.060	4.551	2.010	91.378	3	0.144	3.288	21.966	0.157	74.590	3	0.122	1.799	2.214	3.210	92.777
4	0.135	2.502	5.810	2.156	89.532	4	0.153	6.649	23.929	0.456	68.966	4	0.129	2.170	3.037	3.416	91.378
5	0.141	2.814	6.472	2.424	88.290	5	0.159	10.077	22.712	0.986	66.225	5	0.136	2.420	3.583	3.758	90.238
6	0.145	2.992	6.811	2.548	87.648	6	0.162	11.411	21.990	1.052	65.548	6	0.140	2.531	3.893	3.931	89.645
7	0.148	3.113	7.045	2.623	87.219	7	0.162	11.444	22.003	1.049	65.504	7	0.143	2.617	4.112	4.044	89.228
8	0.150	3.193	7.206	2.674	86.927	8	0.163	11.386	22.313	1.049	65.252	8	0.146	2.674	4.266	4.123	88.937
9	0.152	3.247	7.316	2.710	86.728	9	0.163	11.409	22.370	1.068	65.153	9	0.148	2.716	4.374	4.181	88.728
10	0.153	3.284	7.391	2.734	86.590	10	0.163	11.519	22.337	1.100	65.044	10	0.149	2.746	4.453	4.222	88.580
11	0.154	3.311	7.443	2.752	86.494	11	0.163	11.551	22.332	1.100	65.017	11	0.150	2.768	4.510	4.252	88.470
12	0.154	3.329	7.481	2.764	86.426	12	0.163	11.550	22.331	1.106	65.014	12	0.151	2.784	4.552	4.274	88.390

In order to measure the dynamic effects of the oil price shocks on endogenous variables numerically variance decomposition analysis was conducted over the twelve-month forecast horizon. Variance decomposition analysis of linear VAR and two-regime multiple threshold VAR models are given in Table 4. All variance decomposition estimates of the trade balance are mostly explained by the factors about themselves. The high regime TVAR model is best explained by the endogenous variables than low regime and linear VAR models. According to the high regime TVAR variance decomposition analysis, in the twelfth period, total trade balance mostly explained by the real exchange rate index with 22.33% share, real oil price with 11.55% share and the industrial production with only 1.10% share.

To further explore the impact of oil prices on the trade balance of Turkey, following the same procedure, the models are re-estimated for the trade balance components; non-oil and non-gas trade balance, intermediary goods trade balance, consumption goods trade balance and investment goods trade balance. Accordingly, remarkable findings are obtained from the models with the intermediate financial trade balance and the consumption goods trade balance.

Figure 5. The responses of the non-oil and non-gas trade balance to real oil price shocks



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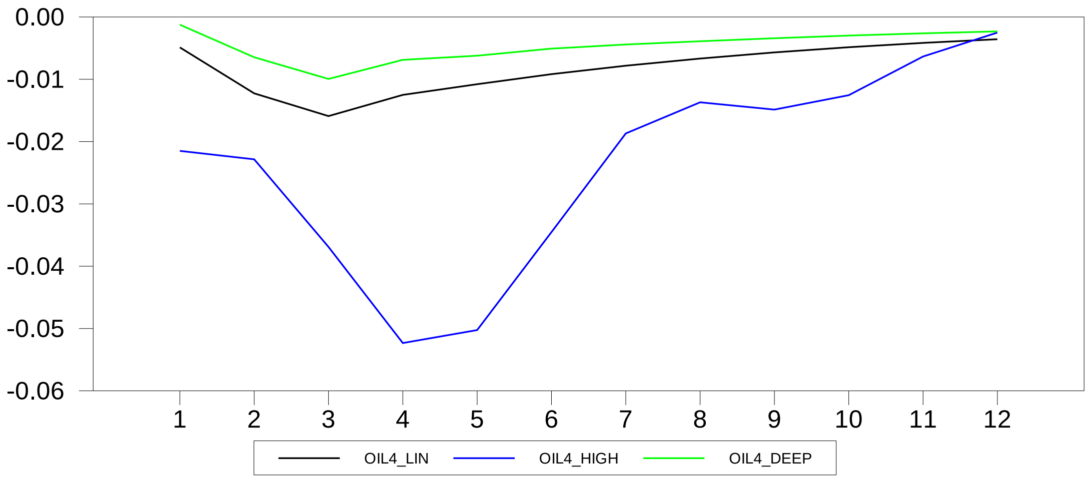
As in the total trade balance, the non-oil and non-gas trade balance, given in Figure 5, also asymmetrically resulted in response to oil price changes. Although the shock in the oil price disrupted the non-oil and non-gas trade balance at first, it is seen that trade balance is increased rapidly in the first month. This positive impact is lasted for about a two month and from the beginning of third month the non-oil and non-gas trade balance rapidly deteriorate. After reaching its worst level in the fifth month, it turn back to zero point again. For the low regime and linear VAR, it is seen that the non-oil and non-gas trade balance deteriorates for three months after and it shows a gradual improvement in the following months.

Figure 6. The Responses of The Intermediary Goods Trade Balance To Real Oil Price Shocks



As seen in Figure 6, the oil price shock has the greater impact on the intermediate trade balance than the total trade balance and non-oil and non-gas trade balance. Imports of intermediate goods to be used in production constitute the largest part of total consumption imports. This shows export dependent production structure of Turkey. As can be seen from the results and from variance decomposition results, the possible oil price shock will deteriorate mostly the intermediate goods trade balance and thus production of country, especially in the high regime.

Figure 7. The Responses of The Consumption Goods Trade Balance To Real Oil Price Shocks

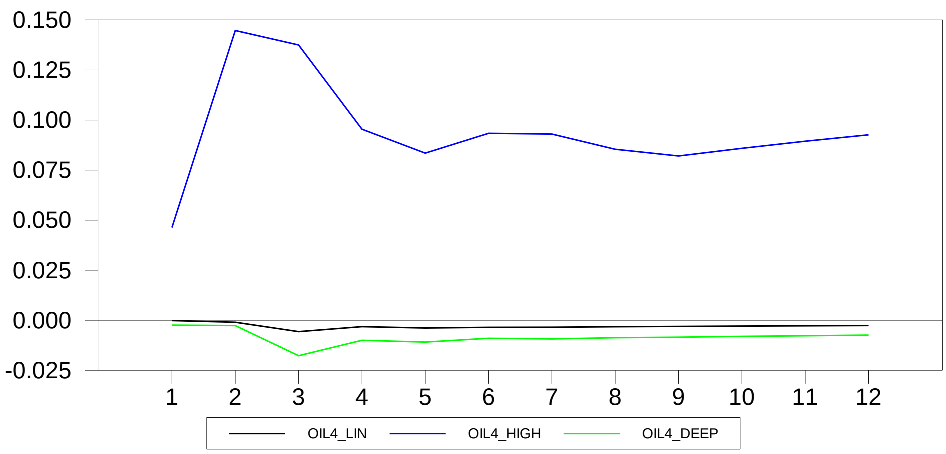


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Figure 7 shows the response graphs of the consumer goods trade balance against oil price shocks. For the consumption trade balance, the optimal threshold value is determined $\gamma = 8.89\%$. This value resulted in greater than the threshold value found for the previous trade balances. This result suggests that, the consumption trade balance is more tolerant to oil price fluctuation than total trade balance, non-oil and non-gas trade balance and intermediary trade balance.

The response function findings obtained with the TVAR model for the consumption-trade balance are remarkable. In the low regime of TVAR model and linear VAR model, the oil price shock negatively affected the consumption goods trade balance and brought it to its lowest level as of the third month. In the high regime, contrary to the low regime, the increase in oil prices positively affected the consumption goods trade balance. According to this regime, the trade balance of consumption goods increased rapidly within a period of one month. The positive impact of the consumption goods trade balance slows down in the second month and starts to decline. However, in the fifth month and after, the trade balance in consumption goods does not return to the initial level and remained stable at a value above the initial level. In other words, oil price increase shocks have a permanent positive effect on consumption goods trade. The magnitude of this positive impact is much greater than the other trade balances. For example, the magnitude of the impact on the trade balance of consumption goods is almost three times of the intermediate goods affected by oil price shocks at another high level. However, while the effect on intermediate goods trade was negative, the effect on consumption goods trade was positive.

Altintas (2013) and Sengonul et al (2018) studies are the other studies showing the positive correlation between oil prices and exports of Turkey. The reason of this positive correlation could be explained as follows. Turkey exports of goods are not energy-intensive in general. Majority of exports are based on labor-intensive production (such as the textile and ready-to-wear sectors) and the share of oil in the total cost is limited. Foreign-owned companies which has the high share of Turkey's exports and increase efficiency and competition with new technologies they bring into Turkey. Exporters operating in the manufacturing industry are able to reflect their energy-intensive intermediate goods and semi-finished input costs to their export goods. Due to the fact that these products are moderately technology intensive, their demand and income elasticities are high (Altıntaş, 2013).

Faria et al. (2009) showed in their study that oil price increases increased the exports of China, which is an oil importing country. According to the hypothesis of the study, oil price increases have been a driving force supporting China's growth. Thanks to the flexibility of the labour supply provided by the large labour resources of the Chinese economy, China's export capacity suffers less from oil price increases than its competitors. Another reason why China's exports increased against oil price increases is that exports are not energy-intensive so, oil is not an important input item for production. For this reason, the impact of oil price increases on production costs and exports is limited (Faria, Mollick, & Albuquerque, 2009).

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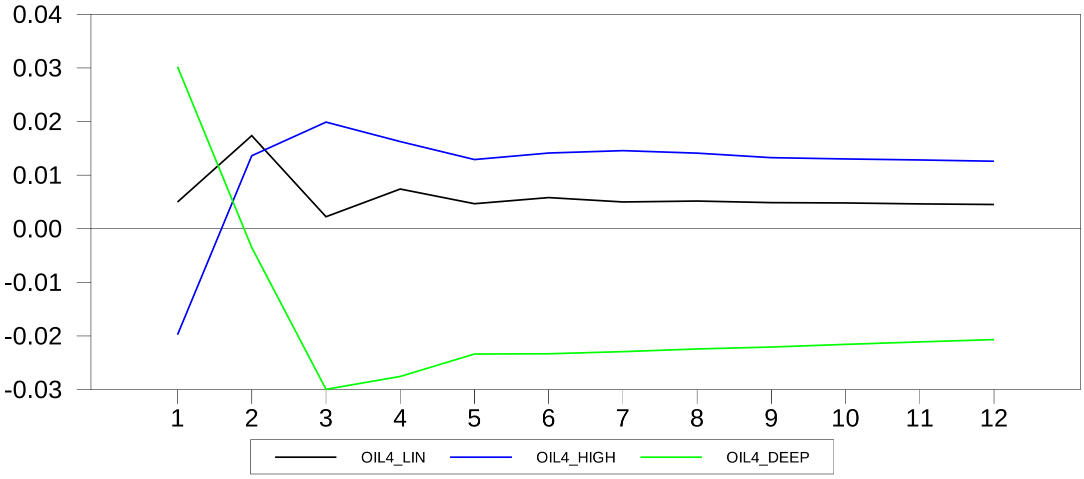
Table 5. Forecast Error Variance Decomposition of Oil Price and Consumption Goods Trade Balance

Linear VAR						TVAR - High Regime						TVAR - Low Regime					
Period	s.e.	dlrpoil	dlrer	dlip	lxm	Period	s.e.	dlrpoil	dlrer	dlip	lxm	Period	s.e.	dlrpoil	dlrer	dlip	lxm
1	0.174	0.003	0.045	2.039	97.913	1	0.146	7.091	6.352	2.215	84.342	1	0.173	0.006	0.011	1.962	98.021
2	0.199	0.004	0.684	1.616	97.696	2	0.227	32.681	14.613	2.073	50.632	2	0.194	0.026	0.162	1.770	98.042
3	0.235	0.057	2.495	1.257	96.192	3	0.266	42.464	14.326	1.578	41.632	3	0.231	0.600	1.253	1.416	96.730
4	0.258	0.061	3.627	1.047	95.264	4	0.285	43.858	14.138	1.717	40.286	4	0.252	0.655	2.038	1.211	96.096
5	0.279	0.069	4.291	0.945	94.695	5	0.300	43.502	14.715	1.549	40.233	5	0.273	0.708	2.558	1.109	95.624
6	0.295	0.074	4.671	0.868	94.386	6	0.314	43.741	15.176	1.423	39.661	6	0.290	0.725	2.861	1.034	95.380
7	0.310	0.079	4.958	0.809	94.154	7	0.323	44.273	15.230	1.356	39.140	7	0.305	0.747	3.088	0.973	95.192
8	0.322	0.082	5.181	0.765	93.972	8	0.331	44.549	15.234	1.316	38.901	8	0.318	0.762	3.261	0.929	95.048
9	0.332	0.084	5.352	0.731	93.832	9	0.336	44.689	15.302	1.273	38.735	9	0.329	0.774	3.397	0.895	94.934
10	0.342	0.086	5.488	0.704	93.721	10	0.341	44.833	15.367	1.239	38.560	10	0.339	0.784	3.505	0.867	94.845
11	0.350	0.088	5.598	0.683	93.631	11	0.345	44.955	15.401	1.217	38.427	11	0.347	0.791	3.593	0.845	94.771
12	0.357	0.089	5.689	0.665	93.557	12	0.348	45.032	15.425	1.200	38.343	12	0.355	0.798	3.666	0.826	94.710

Table 5 shows the results of the decomposition analysis of variance for the trade balance of consumption goods. Accordingly, striking results have been obtained especially in the high regime. According to the high regime obtained with the TVAR model, it is seen that only 38% of the model is explained by out-of-model factors. It is noteworthy that oil prices account for 45% of the consumption trade goods balance in the high regime. After the oil price, the real exchange rate index explains consumption goods trade balance with a 15% share and the industrial production index with only 1.2%.

Figure 8. The Responses of Investment Goods Trade Balance To Real Oil Price Shocks



The threshold value for the balance of trade in investment goods, also determined according to the TVAR model, was only = 0.01%. This value, which is very low compared to other trade balances, indicates that the trade balance of investment goods is very sensitive or less tolerant to oil price increases.

8. CONCLUSION AND POLICY IMPLICATIONS

Volatility of oil price may increase due to structural changes in the supply and demand of oil, unexpected fluctuations in financial markets, large oil price shocks, speculative transactions in international commodity markets, uncertainties increasing with macroeconomic and regional geopolitical risks, epidemic diseases, etc.

This paper examines the asymmetric effects of oil prices on the trade balance of Turkey with particular focus on the role of exchange rates and industrial production in determining these effects. The existence of an asymmetric response of trade balance to oil price shocks is investigated by regime-dependent impulse-response functions and forecast error variance decompositions based on a two-regime TVAR model.

Our main findings indicate oil price shocks have a greater effect on trade balances when the changes exceeds optimal threshold level. The linear VAR and low regimes has similar responses and therefore may not be sufficient to measuring the real effect.

According to the TVAR model results, the threshold value for the total trade balance was determined as 7.3%. An oil price increase exceeds that threshold value creates a disruptive impact on Turkey's trade balance. This deterioration in the trade balance reached its highest level in the fifth month.

The non-oil and gas trade balance cushions the deterioration in the total trade balance by showing an improvement until the third month after the shock. However improvement does not take long as in the study of Bodenstein et al (2011), which emphasizes wealth transfer to oil importers to exporters. According to that study reduced wealth and real depreciation of exchange rate lead to a nonoil balance improvement for oil exporters. However findings suggests that this does not work for Turkey’s non-oil and non-gas trade balance. The main reason for this, the large portion of Turkey’s non-oil and non-gas import consists of mainly petroleum-based raw materials such as coal, petrochemical and refineries.

Intermediate goods trade deficit in Turkey's economy is about twice the size of the total trade deficit. Therefore, oil price shocks have more permanent and effective impact on the intermediate goods trade balance as expected.

Considering the negative and long-term impacts of oil price shocks on Turkey’s overall trade balance, non-oil and non-gas trade balance and intermediate goods trade balance, Turkey should implement significant reforms for both energy sector and raw material imports. Turkey should take necessary actions to reduce the rate of imported intermediate goods in the economy. Moreover, Turkey should take actions for improvement of the effectiveness of monetary policy to achieve and maintain price stability, stimulate economic growth and keep financial markets stable.

The most striking results were obtained consumption trade balance. Consumption trade balance is found to be more tolerant of oil price fluctuations than other trade balances. At the same time, the consumption trade balance is the best described by the oil price shocks than the other trade components according to the forecast error variance decomposition results. In addition, the asymmetric effect is most strikingly seen in the consumption trade balance. Oil price shocks has positive impact on the consumption trade balance in the high regime while has negative and limited impact in the low regime and linear VAR. In addition, it is seen that this positive effect of oil price increases on the consumption trade balance is permanent in the long term.

Based on these finding, it should be aimed to increase the weight of consumption goods in the total trade balance. The production of high-tech industrial products in Turkey should be improved. For avoiding from oil and real exchange rate shocks and achieving a sustainable growth, Turkey should improve its capability to produce its advanced technology products with high added value and should take the necessary steps to export these products..

REFERENCES

Altıntaş, 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.

Altissimo, F. and Violante, G. L. (2001) "The Non-Linear Dynamics of Output and Unemployment in the U.S.", Journal of Applied Econometrics, 16(4), 461-486.

Atanasova, C. (2003) "Credit Market Imperfections and Business Cycle Dynamics: A Nonlinear Approach", Studies in Nonlinear Dynamics and Econometrics, 7(4), 1558-3708.

Backus, D. K. and Crucini, M. J. (2000) "Oil prices and the terms of trade", Journal of International Economics, 50, 185–213.

Bahmani-Oskooee, M. (1991) "Is there a long-run relation between the trade balance and the real effective exchange rate of LDCs?", Economics Letters, 36(4), 403-407.

Balke, N. S. (2000) "Credit and Economic Activity: Credit Regimes and Nonlinear Propagation of Shocks", The Review of Economics and Statistics, 82(2), 344-349.

Bodenstein, M., Erceg, C. J. and Guerrieri, L. (2011) "Oil shocks and external adjustment", Journal of International Economics, 83(2), 168-184.

Bruno, M., and Sachs, J. (1982) "Input Price Shocks and the Slowdown in Economic Growth: The Case of U.K.Manufacturing", Review of Economic Studies, 51(159), 679-706.

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

Çatık, A. N., and Önder, A. Ö. (2013) "An asymmetric analysis of the relationship between oil prices and output: The case of Turkey", Economic Modelling, 33, 884-892.

Darby, M. R. (1981) "The Real Price of Oil and the 1970s World Inflation", NBER Working Paper(629), 825—3343.

Doroodian, K., and Boyd, R. (2003) "The linkage between oil price shocks and economic growth with inflation in the presence of technological advances: a CGE model", Energy Policy, 31(10), 989-1006.

Faria, J. R., Mollick, A. V., and Albuquerque, P. H. (2009) "The effect of oil price on China's exports", China Economic Review, 20(4), 793–805.

Fazzari, S. M., Morley, J., and Panovska, I. (2014) "State-dependent effects of fiscal policy", Studies in Nonlinear Dynamics and Econometrics, 19(3), 285-315.

Ferraresi , T., Roventini, A., and Fagiolo, G. (2014) "Fiscal Policies and Credit Regimes: A TVAR Approach", Journal of Applied Econometrics, 30(7), 1047-1072.

Gavin, M. (1990) "Structural adjustment to a terms of trade disturbance: The role of relative prices", Journal of International Economics, 28(3-4), 217-243.

Gavin, M. (1991) "Income effects of adjustment to a terms of trade disturbance and the demand for adjustment finance", Journal of Development Economics, 37(1-2), 127-153.

Gisser, M., and Goodwin, T. H. (1986) "Crude Oil and the Macroeconomy: Tests of Some Popular Notions: Note", Journal of Money, Credit and Banking, 18(1), 95-103.

Griffin, J. M., Nardari, F., and Stulz, R. M. (2007) "Do Investors Trade More When Stocks Have Performed Well? Evidence from 46 Countries", The Review of Financial Studies, 20(3), 905-951.

Grynkiv, G., and Stentoft, L. (2018) "Stationary Threshold Vector Autoregressive Models", Risk and Financial Management, 11(45) doi:doi:10.3390/jrfm11030045

Hamilton, J. D. (1983) "Oil and the Macroeconomy since World War II", The Journal of Political Economy, 91(2), 228-248.

Hamilton, J. D. (1988) "A Neoclassical Model of Unemployment and the Business Cycle", Journal of Political Economy, 96(3), 593-617.

Hamilton, J. D. (1996) "This is what happened to the oil price-macroeconomy relationship", Journal of Monetary Economic, 38(2), 215-220.

Hooker, M. (2002) "Are Oil Shocks Inflationary? Asymmetric and Nonlinear Specifications versus Changes in Regime", Journal of Money, Credit and Banking, 34(2), 540-561.

Hooker, M. A. (1996) "What happened to the oil price-macroeconomy relationship?", Journal of Monetary Economics, 38(2), 195-213.

Huang, B.-N., Hwang, M. J., and Peng, H.-P. (2005) "The asymmetry of the impact of oil price shocks on economic activities: An application of the multivariate threshold model", Energy Economics, 27(3), 455-476.

Jibril, H. M. (2016) "Oil Prices and the Trade Balance of Sub-Saharan African Countries: The Roles of Oil Price Volatility, Real Exchange Rates, and Financial Integration", University of Leeds.

Jobling, A., and Jamasb, T. (2017) "Price volatility and demand for oil: A comparative analysis of developed and developing countries", Economic Analysis and Policy, 53, 96 - 113.

Kilian, L., and Vigfusson, R. J. (2011) "Nonlinearities in the oil price–output relationship", Macroeconomic Dynamics, 15(S3), 337 - 363.

Kilian, L., Rebucci, A., and Spatafora, N. (2009) "Oil shocks and external balances", Journal of International Economics, 77, 181-194.

Koop, G., and Potter, S. M. (1999) "Dynamic Asymmetries in U.S. Unemployment", Journal of Business and Economic Statistics, 17(3), 298-312.

Le, T.-H., and Chang, Y. (2013) "Oil price shocks and trade imbalances", Energy Economics, 36, 78–96.

Lee , J., and Strazicich, M. C. (2003) "Minimum Lagrange Multiplier Unit Root Test with Two Structural Breaks", The Review of Economics and Statistics, 85(4), 1082-1089.

Lee, K., Ni., S., and Ratti, R. (1995) "Oil shocks and the macroeconomy: The role of price variability", Energy Journal, 39.

Li, J. S.-H., Ng, A. C., and Chan, W.-S. (2015) "Managing financial risk in Chinese stock markets: Option pricing and modeling under a multivariate threshold autoregression", International Review of Economics and Finance, 40, 217–230.

Mork, K. A. (1989) "Oil and the Macroeconomy When Prices Go Up and Down: An Extension of Hamilton's", Journal of Political Economy, 97(3), 740-744.

Mork, K., and Olsen, O. (1994) "Macroeconomic responses to oil price increases and decreases in seven OECD countries", Energy Journal, 4, 19.

Narayan, P. K., and Sharma, S. S. (2011) "New evidence on oil price and firm returns", Journal of Banking and Finance, 35, 3253–3262.

Ostry, J. D., and Reinhart, C. M. (1992) "Private Saving and Terms of Trade Shocks: Evidence from Developing Countries", International Monetary Fund, Staff Papers, 39(3), 495.

Robays, I. V. (2012) "Macroeconomic uncertainty and the impact of oil shocks", Frankfurt: European Central Bank: ECB Working Paper No. 1479.

Schmidt, J. (2013) "Country Risk Premia, Endogenous Collateral Constraints and Non-linearities: A Threshold VAR Approach", Geneva: Graduate Institute of International and Development Studies (IHEID) .

Shen, C.-H., and Chiang, T. C.-N. (1999) "Retrieving the vanishing liquidity effect—a threshold vector autoregressive model", Journal of Economics and Business, 51(3), 259-277.

Tsay, R. S. (1998) "Testing and Modelling Multivariate Treshold Models", Journal of the American Statistical Association, 93(443), 1188 - 1202.

Weise, C. L. (1999) "The Asymmetric Effects of Monetary Policy: A Nonlinear Vector Autoregression Approach", Journal of Money, Credit and Banking, 31(1), 85-108.

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Hakem Değerlendirmesi: Dış bağımsız.

Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemiştir.

Finansal Destek: Yazarlar bu çalışma için finansal destek almadığını beyan etmiştir.

Teşekkür: -

Peer-review: Externally peer-reviewed.

Conflict of Interest: The authors have no conflict of interest to declare.

Grant Support: The authors declared that this study has received no financial support.

Acknowledgement: -