Sustainability of current account deficit with high oil prices: Evidence from Turkey[1]

Erkan Özata

ABSTRACT

Current account deficit as a ratio of GDP is a commonly used measure that determines the sustainability of current account deficits. But other factors such as the composition of the current account deficit, the methods which are used to finance it, exchange rate policy, macroeconomic condition and global economic outlook may also have important implications about the future of current account deficits. The current account deficit in Turkey is regarded as structural because of the dependence of Turkish production and exports on imported intermediate goods. Another factor affecting the current account deficit is the changing oil prices which is a cyclical component. Turkey's reliance on energy imports is a major factor behind its bloated current account deficit. The traditional approach to investigate the improvement of the external imbalance is based on the import and export functions. Different from this approach in this study a Structural Vector-Autoregression (SVAR) model will be applied to investigate the effects of fuel imports and foreign exchange policy on Turkey's current account deficit and economic growth. This model will allow us for simultaneous examination of the link between real oil imports, real effective exchange rate, domestic income and the current account.

Key words: Current Account deficit, Sustainability, oil price, exchange rate, SVAR

JEL Classification: C32, E10, F21, F41

Author

Erkan Özata : Anadolu University Yunusemre Kampusü, 26470, Eskişehir, Turkey. Email:eozata@anadolu.edu.tr

Citation Erkan Özata (2014). Sustainability of current account deficit with high oil prices: Evidence from Turkey. International Journal of Economic Sciences, Vol. III, No. 2/2014, pp. 71-88.

[1] This paper is a revised version of the one presented during the 8th International Academic Conference, which was held in September 16-19 2013, in Naples Italy organized by IISES. I am grateful to the participants of the conference for their valuable suggestions and comments.

1. Introduction

Sustainability of current account deficits always drew attention of the economists. Current account deficit as a ratio of GDP is a commonly used measure that determines the sustainability of current account deficits. A widely used rule of thumb is that current account deficits above 5% of GDP begin to raise doubts about long-term sustainability. But other factors such as the composition of the current account deficit, the methods which are used to finance it, exchange rate policy, macroeconomic condition and global economic outlook may also have important implications about the future of current account deficits.

Turkey is an oil importing developing country and there is a close relationship between oil imports and current account deficit. As a growing economy that needs a lot of energy, ninety percent of the oil that Turkey uses has to be imported. Turkey's dependence on imported oil is hampering its growth and is likely to continue doing so as the country's prosperity increases. In this study a Structural Vector-Autoregression (SVAR) model will be applied to investigate the effects of fuel imports and foreign exchange policy on Turkey's current account deficit and economic growth. This model will allow us for simultaneous examination of the link between real oil imports, real effective exchange rate, domestic income and the current account.

The balance of payments of a country is a systematic record of all economic transactions between the residents of the reporting country and the residents of the rest of the world over a specified period of time. The balance of payments allows us to investigate the accounting relationships between international flows of goods, services and financial assets. The BOP consists of three parts: Current account (CA), Capital Account (KA) and Central Bank Reserves. When all components of the BOP accounts are included they must sum to zero with no overall surplus or deficit.

Current account also shows the foreign currency balance of a country. If there is a deficit in a country, this means that it is consuming more foreign currency than it is earning. This gap in the foreign currency can be closed either by receiving loans from other countries or by running down central bank reserves. The question if the current account deficit is harmful or not can be answered from different perspectives. Current account deficits may be beneficial because they may enable more investments than previously observed. The investments flowing in from abroad leads to higher productivity and higher living standards. Also investment inflows from abroad are an implicit vote of confidence by foreigners and can be regarded as a signal that investment is safe. On the other hand current account deficit may be harmful if increased stock of foreign owned assets in the country leads to capital flight during an economic downturn.

In countries having current account deficits policy makers and many economists worry that the deficits are too large. There are roughly two views concerning this idea: The first is known as the Lawson doctrine. According to this doctrine to the extent that current account deficits reflect private saving and investment decisions, that there are no distortions, and that expectations are rational, then there are no reasons for the

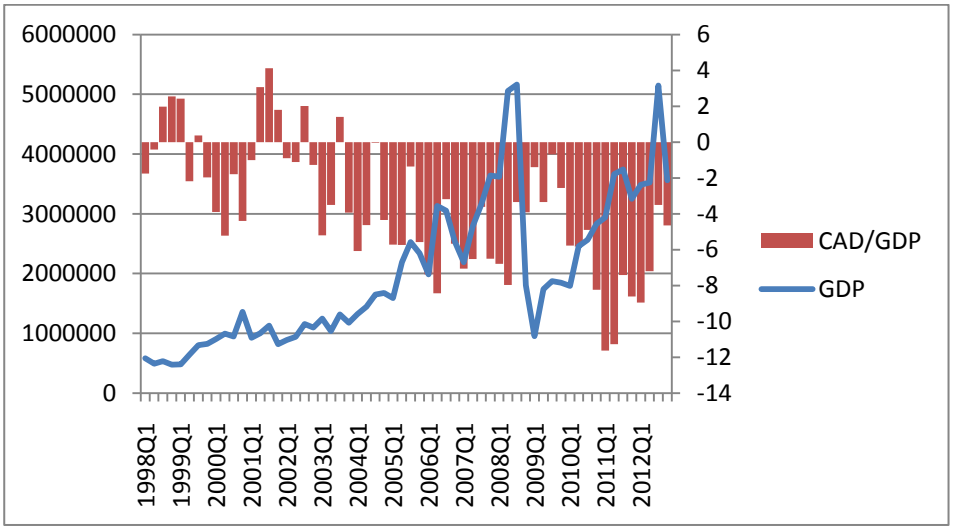
government to intervene The second view could be called the “prudential" or the “IMF" view. It is that, even if deficits reflected private saving and investment decisions, distortions are present and lead to deficits that are too large. Government intervention to reduce these deficits is desirable (Blanchard, 2006). So the answer to intervene or not can change according to the specific form of distortions in the economy.

The remaining part of the paper has been organized as follows. The current account deficit problem of Turkey will be summarized in the next part. Then the literature review about the sustainability of current account deficits will be given. In the next parts the econometric method, the data and the model will be explained. After the estimation results and their interpretations the last section concludes.

1.1. Current Account Deficit Problem of Turkey

Turkey has experienced impressive economic growth following substantial reforms after the 2001 economic crisis. One remaining concern is the very large current account deficit, which threatens the sustainability of this growth. Looking at the current account over 1990-2012, Turkey experienced relatively small current account deficits and even occasional surpluses during 1990s; on average the current account balance was a little smaller than -1% GDP, falling to -3.2% and -3.7% in the years before the 1994 and 2001 crises respectively. A different trend emerged after 2002, with large persistent current account deficits, which peaked in 2011 near -10% a level never before seen by the country (Zaidi, 2012). Current account balance had surpluses only in crises years of 1994, 1998 and 2001 where the lessening in the GDP decreases the imports for considerable amounts and narrows the trade deficit (İnsel and Kayıkçı, 2012). The current account deficit is the economy’s biggest vulnerability even as it reduced the shortfall to about 6 percent of gross domestic product in 2012 from 10 percent in 2011. The cumulative deficit has widened in 2013 as growth gained momentum and is forecast to reach 6.9 percent of GDP in 2013.

Figure 1: Current Account Balance (% of GDP)



Source: Central Bank of the Republic of Turkey

As much as the ratio of current account deficit to GDP, financing methods of the deficit is also important. The current account deficit can be financed by capital flows. These capital flows can be in the form of foreign direct investments which can be regarded as permanent, the currencies coming to buy stocks and bonds, foreign loans or unidentified money which can be collected in the net errors and omissions. If the amount of foreign currency exceeds the demand for foreign exchange, the national currency will appreciate, imports will increase and the current account deficit problem will continue to grow even more in the following period. Also the danger of the flight of short term speculative capital out of the country in case of some emergency is always expected. Foreign capital inflows that are short term and speculative in nature, however, may leave Turkey especially vulnerable to economic shocks if they result in sudden stops in capital inflows (Zaidi, 2012). In Turkey there were negative developments about the way of financing of the current account deficit in the last years. The share of debt instruments in financing has increased against Foreign Direct Investment. FDI inflows, which are long-term and relatively stable, comprised a significant portion of capital inflows earlier in the decade but have since declined to only 50% of their 2006 peak.

According to the savings investment identity, investment must be financed by some combination of private domestic savings, government savings (surplus), and foreign savings (foreign capital inflows). But if the private domestic savings are not enough the investment heavily relies on foreign capital inflows which results in current account deficit. For the last thirty years Turkey's national savings rate has been lower than that for countries with similar levels of income. Since 1998 this trend has led to a widening savings-investment gap. While investment has hovered around 20% of GDP on average, savings as a per cent of GDP declined from 24% in 1998 to 12% in 2011. Improved access to consumer credit reduces private savings and negatively affect the current account.

Turkey's growing current account deficit depends on the import of cheap consumption and intermediate goods. The sustained appreciation of the lira during the past decade – which made imports cheaper – coupled with the shift of the economy towards a more capital-intensive production increased the demand for intermediate inputs and worsen the trade imbalance (Zaidi, 2012). When the increase in imports is more than the increase in exports, the result is a huge current account deficit. To overcome this problem, measures can be taken to cut the domestic demand growth of the economy can be slowed by sacrificing from high growth rates. As a result when imports of consumption and intermediate goods decrease, a temporary solution to the current account deficit problem can be found. However to solve the current account problem permanently, some structural changes in the production that ends the dependency of the economy to cheap imported inputs has to be realized.

The main reason for the growth of the current account deficit is the use of more imported goods by consumers and producers as a result of cheap foreign exchange. Also the fall in interest rates and expansion of credit facilities are the other factors that increase the demand for imported goods. To solve this problem, some structural changes in both production and consumption have to be made. First of all in the agricultural

and industrial production use of domestic inputs rather than imported inputs should be encouraged. Also consumption of domestic goods instead of imported goods must be stimulated. However, as long as the foreign exchange is plentiful and cheap self-realization of this transformation is not possible. For a sustainable production structure, the creation of a realistic exchange rate policy is necessary. If the producers and consumers believe that this policy will be permanent, they can change their choices from imported goods to domestic production.

In Turkey the proponents of non-intervention thinks that the current account deficit has resulted from high growth rates of the economy. Kasman et.al. (2005) provide empirical evidence about the ongoing discussion on the possible causes of current account deficit and show that overvalued TL and economic growth are the main causes. But as long as the foreign assets would like to finance this growth there will not be any problem. Another thesis of them is about the sources of current account deficit. They think that the current account deficit is not stemming from the public sector but from the private sector and the dynamic structure of the private sector can solve the problem by taking the necessary measures if required. Other than these ideas the next important defense is about the exchange rate system. In the floating exchange rate system if the current account deficits increase to the dangerous levels, exchange rate will automatically make the necessary correction with an increase.

Turkey's heavy reliance on imported energy and intermediate goods is a key challenge for reducing the current account deficit. According to the Central Bank of the Republic of Turkey every 10 dollar increase in oil prices increases current account deficit by $ 5.6 billion and pull down the growth rate by 0.5 percent. Depending on developments in the Middle East, Syria and Iran, oil prices in 2013 are expected to be high. For this reason it is not possible for Turkey to decrease the current account deficit without reducing the non-energy current account deficit. To this end, the economy has to be slowed down and growth has to be sacrificed. In the current situation, it does not seem very possible to decrease current account deficit with high growth rates and high oil prices. A current account deficit of about %10 of the national income always creates a question mark on the international investors. This high rate may result in the escape of hot money which is used to finance the current account deficit.

2. Literature Review

The current account deficits of Turkey are mainly the result of foreign trade deficits rather than anything else. As mentioned by İnsel and Kayıkçı (2012) these kinds of deficits are more dangerous in terms of sustainability and more open to debate about balance of payment crises since they indicate structural weaknesses in international trade and competitiveness. Dalgin (2012) finds that long term sustainability of the Turkey's current account is "very questionable" but concludes there is no immediate risk assuming Turkey can maintain its current growth. Özlale and Pekkurnaz (2010) analyzes the impact of oil prices on the current account balances for the Turkish economy using a structural vector autoregressive model. The results

show that the response of current account ratio to oil price shock increases gradually up to the first three months and then starts to decrease, which indicates a significant effect of oil price shocks in the short run.

During the last decade studies about the sustainability of current account deficit have focused mainly on cointegration relationship between imports and exports. (Narayan and Narayan 2005; Arize, 2002; Irandoust and Ericsson, 2004). If there is a cointegration relation between exports and imports then foreign trade deficit is temporary and the current account deficit is sustainable in the long run. Also different empirical approaches have been used to measure the seriousness of the current account deficit problem. Glick and Rogoff (1995) rely on structural estimation of the model and focus on the estimated responses to various types of shocks. Ghosh and Ostry (1995) use vector autoregression analysis to estimate the consumption smoothing current account. Edwards (2005) assigns particular importance to the debt to GNP ratio and nominal GNP growth rate. He notes that very few countries have had persistently high current account deficits for more than five years and that historically imbalances tend to be short lived and followed by current account adjustment.

Narayan (2013) uses a four dimensional SVAR model to investigate the implications of fuel imports and devaluation policy on Fiji's current account deficits and economic growth. The paper finds that short term deterioration of the current account is partly due to higher fuel imports. Zaouali (2007) investigated the chinese economy and find that increasing oil prices have modest effects on the current account since the economy could attract foreign capital and investment. Baharumshah, lau and Fountas (2003) examines the sustainability of the current account imbalances for four ASEAN countries (Indonesia, Malaysia, the Phillippines and Thailand) over the 1961-1999 period. They found that the current accounts of these countries were unsustainable and did not move towards external account equilibrium. Moreover, the persistent current account deficits might serve as a leading indicator of financial crises. The evidence also suggest that action to prevent large appreciations should have taken prior to the 1997 crises.

Milesi-Ferretti and Razin (1996) found that a specific threshold on persistent current-account deficits (such as 5 percent of GDP for three to four years) is not in itself a sufficiently informative indicator of sustainability. The size of current-account imbalances should instead be considered in conjunction with exchange-rate policy and structural factors such as the degree of openness, the levels of saving and investment, and the health of the financial system. Mussa (2005) has emphasized that large persistent US external payments deficits on the order of 5 percent or more of US GDP are not sustainable in the longer term and that important macroeconomic adjustments will be needed, in the United States and in the rest of the world, in order to bring these external imbalances down to sustainable levels.

3. The SVAR Method

In this part firstly the empirical model will be introduced. Then the conceptual framework of the relationships between current account deficit, oil imports, real income and real exchange rate will be drawn.

The effect of oil prices on the current account deficit and national income will be investigated by using Structural Vector Autoregression (SVAR) method. SVAR models are used to examine the relationship between the macroeconomic variables and dynamic effects of stochastic shocks on the systems of equations. In the SVAR method to identify the system, not ordinary constraints but, constraints from macroeconomic models that are consistent with the theory are used. Thus to overcome the problem of identification, instead of illogical constraints, constraints with theoretical background are used and more meaningful results are obtained.

The SVAR method utilized here will provide us to investigate the relationship between oil imports (OIM), real effective exchange rate (REER), Gross Domestic Product (GDP) and Current account (CA).
SVAR model requires to apply enough number of constraints to obtain the structural components of the error term. If we start with the reduced form VAR model

$$Y_t = A_1 Y_{t-1} + ... + A_p Y_{t-p} + u_t \qquad (1)$$

Here Y_t is the variables vector of 4x1. The variables used in the model are OIM_t which is the ratio of oil imports to total imports, $REER_t$ which is the real effective Exchange rate, $RGDP_t$ which is the real gross domestic product, CA_t which is the ratio of Current account deficit to national income. All the variables used in the analysis are stationary. (RGDP becomes stationary after we take the first difference. So it is used in the first difference form) A_i's are coefficient matrixes of ($K \times K$) and p represents the lag length of the VAR model. u_t is a 4x1 vector and represents the residuals derived from the model.

The error term of the reduced form VAR model u_t, can be written as a linear combination of structural shocks

$$u_t = A^{-1} B \varepsilon_t, \qquad (2)$$

Here B represents the structural form parameter matrix. After putting equation (2) in equation (1) and making some arrangements, we can get the structural form of the reduced form equation (1) :

$$AY_t = A_1^* Y_{t-1} + ... + A_p^* Y_{t-p} + B\varepsilon_t \qquad (3)$$

Here A_j^* is 4×4 coefficient matrix and defined as $A_j = A^{-1} A_j^*$ $(j = 1, 2, ... p)$. ε_t is a 4x1 vector which represents structural shocks and have the property of $\varepsilon_t \sim (0, I_K)$. Therefore structural covariance matrix $\Omega = E(\varepsilon_t \varepsilon_t')$ is an identity matrix. This model is known as AB model and written as:

$$Au_t = B\varepsilon_t, \qquad \varepsilon_t \sim (0, I_K) \qquad (4)$$

With four endogenous variables OIM, REER, RGDP and CA; the structural shocks can be defined as oil price shocks, exchange rate shocks, national income shocks and current account shocks. In A and B matrices

which are symmetrical of order 4x4 there are 32 ($2K^2$) unknowns. Therefore in order to determine unknowns in the A and B matrices $2K^2 - \frac{1}{2}K(K+1)$ additional constraints are necessary.

In the model with 32 unknowns maximum 10 parameters can be determined by the system. Therefore we need 22 additional constraints to just identify the system. These constraints are provided by zeros and ones in the matrices. In order to estimate the model zero exclusion constraints are used and the elements of the matrix estimated by the system are represented by λ 's. The other values in A and B matrices are constant. Sims (1980) makes the matrix A lower triangular by ordering the elements of it. The elements in the main diagonal of matrix A are 1 and all the entries above the main diagonal are 0.

Economists have adopted two approaches as a basis in determining the additional constraints. These are the use of short term and long term constraints. Sims (1980) preferred the short term constraints and determines the elements of matrix A above the main diagonal as zero. Because he thought that the effects of economic shocks have a natural timing. For example after a shock in price level the lack of instant response from the monetary policy can be represented by putting zeros to the appropriate places in matrix A. Similarly the timing of tax collection can be used as a corporate constraint for identification (Blanchard & Perotti, 2002). The popularity of long term constraints is provided by Blanchard and Quah (1989). They have investigated the effect of demand and supply shocks on unemployment and output. They have identified the models by using the long term constraints such as demand shock do not have any long term effect on unemployment and output but although supply shock do not have an effect on unemployment in the long run, it may have an effect on the level of output.

3.1 Variable Definitions and Data Sources

Quarterly data between the first quarter of 1998 and the fourth quarter of 2012 is used in the analysis. The variable called OIM is the ratio of crude oil imports to total imports of Turkey. The value of crude oil imports until the year 2002 is obtained from Turkish Statistical Institute (TUIK). But value of crude petroleum has not been shared because of the confidentiality since the beginning of 2002. So the data after 2002 is calculated manually by using the quantity of crude oil imports in barrels and the price of crude oil per barrel in the world market. Total imports of Turkey are obtained from the central Bank of the Republic of Turkey and are used for calculating the ratio. REER is the real effective exchange rate index that measures the movements in Turkish Lira with respect to the countries which are in a commercial relationship with Turkey. The data for REER is obtained from the Central Bank of the Republic of Turkey. RGDP is the real Gross Domestic Product of Turkey calculated with 1998 prices. The data which is obtained for this series from the Central Bank is in Turkish Liras. The data is then converted to US Dollars by using the average exchange rate of US Dollar/TL. As seasonality is observed in the national income series, it is seasonally adjusted with Tramo Seats before using in the analysis. CA is the ratio of Current account deficit to GDP and it is calculated with the data obtained from the Central Bank of the Republic of Turkey. All the variables except the CA is used in the natural logarithm form.

3.2 Descriptive Statistics

The descriptive statistics of the variables used in the model are reported in table 1. As can be seen from the table during 1998-2012 period the ratio of current account to GDP is -3,6 % on average. There was an ongoing deficit in the current account after the year 2001. In the same period the ratio crude oil imports to total imports of Turkey was 7,07 % on average. According to the results of Jarque Bera Test all the series are normally distributed.

Table 1: Descriptive Statistics

	OIM	CA	REER	RGDP
Mean	7.071768	-3.641421	151.0167	22289411
Median	6.899184	-3.903641	155.1000	21676140
Maximum	11.87021	4.117167	192.0000	31666774
Minimum	3.489183	-11.65465	98.50000	14436129
Std. Dev.	1.712086	3.576352	24.98672	4645358.
Skewness	0.373185	0.111983	-0.159952	0.130957
Kurtosis	2.942731	2.548664	1.843846	1.940728
Jarque-Bera	1.400869	0.634662	3.597576	2.976644
Probability	0.496370	0.728090	0.165499	0.225751
Observations	60	60	60	60

In order to have some prior information about the relationship among the variables the correlation matrix in table 2 is calculated. According to this matrix, a positive correlation between oil imports and current account, a stronger negative correlation between national income, real effective exchange rate and current account is determined.

Table 2 : The Correlation Matrix

	CA	OIM	RGDP_SA	REER
CA	1.000000	0.227202	-0.740150	-0.690915
OIM	0.227202	1.000000	-0.282060	-0.285953
RGDP_SA	-0.740150	-0.282060	1.000000	0.867504
REER	-0.690915	-0.285953	0.867504	1.000000

3.3 Unit Root Test

The assumptions of the classical regression model necessitate that the time series that are used in the model must be stationary and the errors have a zero mean and a finite variance. In the presence of nonstationary variables, there might be what Granger and Newbold (1974) call a spurious regression. To test for unit root

we apply Augmented Dickey Fuller (ADF) test on each variable. The ADF test consists of estimating the following regression:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-i} + \varepsilon_t \qquad (1)$$

Where ε_t is a pure white noise error term. The null hypothesis of the ADF test is $\delta = 0$ which means that the series has a unit root and is non-stationary. The alternative hypothesis is $\delta < 0$ which means that the series is stationary. As SVAR method requires that all the variables used in the analysis to be stationary, standard Augmented Dickey Fuller test is applied to learn the unit root properties of the series. The former letter L represents the natural logarithm of the series and D represent the first difference of the series which is considered. The table summarizes the results of the ADF tests for the 4 variables used in the analysis.

Table 3: ADF Unit Root Test

Variable	ADF Test Statistic [lag length]
LOIM	-3.230045** [0] (Constant)
LREER	-3.490885** [0] (Constant linear trend)
LRGDP	-2.595568 [1] (Constant linear trend)
D(LRGDP)	-6.039353* [0] (Constant linear trend)
CA	-3.403914** [4] (Constant)

Notes: Fort the test the lag length is chosen using Schwarz Information Criterion (SIC) with a maximum of 10 lags. The ADF test for LOIM and CA were run with just a constant, and the ADF test for LREER and LRGDP were run with constant and linear trend as both of these series seems to have positive trends. The critical values that apply for LOIM and CA series at the 1 percent, 5 percent and 10 percent levels are -3,54, -2,91 and -2,59. The critical values that apply for LREER and LRGDP series at the 1 percent, 5 percent and 10 percent levels are -4,12, -3,48 and -3,17.
* denotes the significance of the test statistics at %1 level ** denotes the significance of the test statistics at %5 level

According to the test results LOIM, LREER and CA series are stationary at their levels. In other words these series are I(0). LRGDP series becomes stationary when we take the first difference of the series. So LRGDP is integrated of order one or shortly I(1). Hence only this series will appear in the SVAR model in the first difference form and the other 3 series will appear in their levels.

3.4 VAR Lag Order Selection

The choice of the lag length of the VAR model is based on the five principal criteria which are Likelihood Ratio Statistic (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ). As shown on the table 3 criteria indicates that the lag length should be 5. But according to Schwarz and Hannan Quinn criteria 1 lag is better. So we relied on the majority and used 5 lags in the estimation of the SVAR model.

Table 4: VAR Lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	31.81364	NA	4.11e-06	-1.049571	-0.900870	-0.992388
1	100.2762	124.0077	5.69e-07	-3.029291	-2.285785*	-2.743375*
2	109.6045	15.48847	7.41e-07	-2.777528	-1.439217	-2.262878
3	117.4471	11.83783	1.04e-06	-2.469700	-0.536584	-1.726317
4	139.9314	30.54479	8.55e-07	-2.714393	-0.186471	-1.742276
5	175.9104	43.44630*	4.40e-07*	-3.468316*	-0.345590	-2.267466
6	191.1710	16.12448	5.21e-07	-3.440417	0.277115	-2.010833

* indicates lag order selected by the criterion

4. Empirical Results

In the Structural Vector Autoregression Models it is necessary to impose some restrictions on the systems of equations to identify the effects of structural shocks. In order to estimate the parameters of the structural model and to investigate the effects of shocks we have to utilize economic theory. The restrictions imposed on the model to estimate the parameters can be summarized as follows:

1) Oil prices are assumed to be given. Under the assumption of Turkey being a small and oil importing country which is an open economy, none of the shocks in the Turkish economy can affect the oil prices in the world. Oil prices are determined with its own stochastic process and domestic conditions and variables do not have any effect on this. Under these assumptions we are ready to impose one of the restrictions which we can use in our structural model. Oil prices have a stochastic process in which oil prices are affected from just oil price shocks.

$$\Delta OIM = c_1 * \varepsilon^{OIM}$$

2) Real effective exchange rate can be defined as the nominal exchange rate that takes the inflation differentials among the countries into account. It is the weighted average of a country's currency relative to an index or basket of other major currencies adjusted for the effects of inflation. The weights are determined by comparing the relative trade balances, in terms of one country's currency, with each other country within the index. The real exchange rate can be defined in the long run as the nominal exchange rate (e) that is adjusted by the ratio of the foreign price level (Pf) to the domestic price level (P) (Kıpıcı and Kesriyeli, 1997). Mathematically, it can be shown as

$$r = e\frac{P_f}{P}$$

In terms of this definition, the decline in the r can be interpreted as the real appreciation of the Turkish Lira and an increase in r can be interpreted as the real depreciation of Turkish Lira. As the oil prices affect production costs, real effective exchange rate is also affected from oil price shocks. National income and current account deficit do not have any effect on the real effective exchange rates. With these theoretical explanations our second constraint for the structural model will be as follows:

$$\Delta REER = c_2 * \varepsilon^{OIM} + c_3 * \varepsilon^{REER}$$

3) According to the third line in the systems of equations the national income is affected from oil price shocks and exchange rate shocks. When there is a change in oil prices both supply and demand sides of the economy are influenced from this change. Therefore our third constraint is

$$\Delta RGDP = c_4 * \varepsilon^{OIM} + c_5 * \varepsilon^{REER} + c_6 * \varepsilon^{RGDP}$$

4) The fourth line in the systems of equations shows the factors and shocks that are effective on the current account deficit. In the theoretical models the most important determinants of the current account deficit are terms of trade, output and exchange rates. In Turkey, as a result of the dependency of the production to imported raw materials and oil, oil prices has also important influence on the current account deficit. In this study, the effects of oil imports, real effective exchange rates and output on the current account deficit will be analyzed. Therefore, according to the fourth line of the systems of equations, the shocks that affect the current account deficit are oil price shocks, exchange rate shocks and production shocks coming from national income. Current account is the most endogenous variable in the system which is effected from all the shocks. The ordering is made from exogenous to endogenous according to the responses of the variables to the temporary shocks. So our fourth constraint will be

$$\Delta CA = c_7 * \varepsilon^{OIM} + c_8 * \varepsilon^{REER} + c_9 * \varepsilon^{RGDP} + c_{10} * \varepsilon^{CA}$$

5) By using the 4 restrictions the theoretical model and its estimation results are as follows

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ \lambda_{21} & 1 & 0 & 0 \\ \lambda_{31} & \lambda_{32} & 1 & 0 \\ \lambda_{41} & \lambda_{42} & \lambda_{43} & 1 \end{bmatrix} \begin{bmatrix} u_t^{OIM} \\ u_t^{REER} \\ u_t^{RGDP} \\ u_t^{CA} \end{bmatrix} = \begin{bmatrix} b_{11} & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 \\ 0 & 0 & b_{33} & 0 \\ 0 & 0 & 0 & b_{44} \end{bmatrix} \begin{bmatrix} \varepsilon_t^{OIM} \\ \varepsilon_t^{REER} \\ \varepsilon_t^{RGDP} \\ \varepsilon_t^{CA} \end{bmatrix}$$

λ_{21} Shows the effect of oil imports on real effective exchange rate,

λ_{31} Shows the effect of oil imports on the national income

λ_{32} Shows the effect of real effective Exchange rate on the national income

λ_{41} Shows the effect of oil imports on the current account deficit

λ_{42} Shows the effect of real effective exchange rate on the current account deficit

λ_{43} Shows the effect of national income on the current account deficit

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0,057 & 1 & 0 & 0 \\ -0,032 & -0,045 & 1 & 0 \\ 2,068 & -4,370 & 18,16 & 1 \end{bmatrix} \begin{bmatrix} u_t^{OIM} \\ u_t^{REER} \\ u_t^{RGDP} \\ u_t^{CA} \end{bmatrix} = \begin{bmatrix} 0,163 & 0 & 0 & 0 \\ 0 & 0,086 & 0 & 0 \\ 0 & 0 & 0,022 & 0 \\ 0 & 0 & 0 & 1,089 \end{bmatrix} \begin{bmatrix} \varepsilon_t^{OIM} \\ \varepsilon_t^{REER} \\ \varepsilon_t^{RGDP} \\ \varepsilon_t^{CA} \end{bmatrix}$$

Table 5: Estimates of the Structural VAR Model

	Coefficient	Std. Error	p-value
λ_{21}	0,057	0,072	0,429
λ_{31}	-0,032**	0,0185	0,080
λ_{32}	-0,045	0,034	0,187
λ_{41}	2,068*	0,939	0,027
λ_{42}	-4,370*	1,738	0,012
λ_{43}	18,163*	6,705	0,0068
b_{11}	0,163*	0,015	0,0000
b_{22}	0,865*	0,0083	0,0000
b_{33}	0,022*	0,0021	0,0000
b_{44}	1,089*	0,1047	0,0000

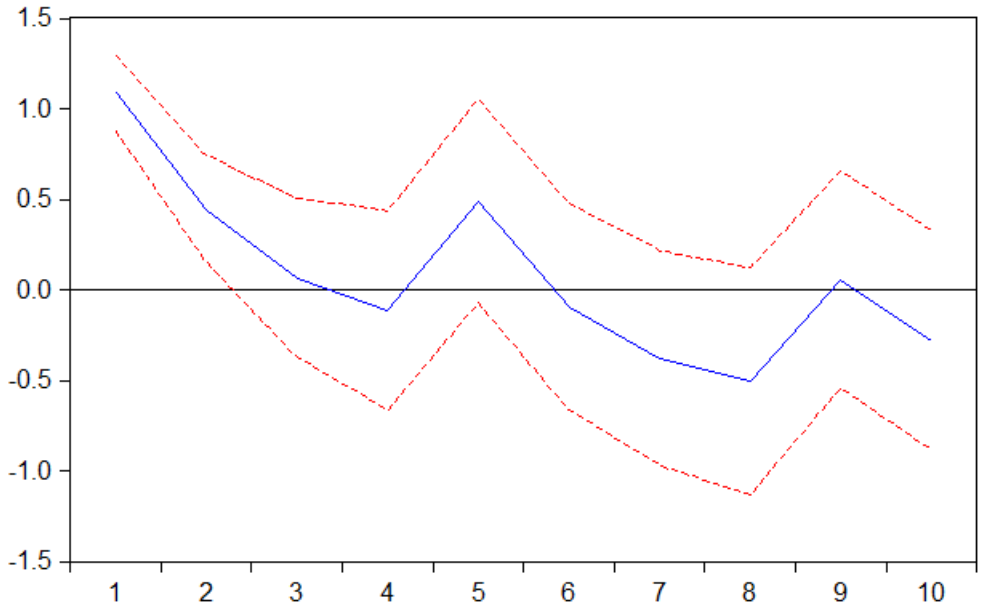
*: Significant at %5 **: Significant at %10

Although the coefficient estimates from the structural model are not very important, the investigation of the signs of the parameters may provide us some theoretical implications. As the subject of the analysis focus on the current account, primarily the effect of the other variables on the current account will be analyzed. Consistent with this purpose, we realize that oil imports have significant positive effect on the current account deficit. This is an expected result for a developing country that is dependent on foreign energy and using imported oil in the production process, public and private consumption. Another variable that effects the current account deficit is the real effective exchange rate. In the analysis a negative significant effect of REER on the current account deficit is determined. After a decrease in the real exchange rate the national currency Turkish Lira appreciates, imported goods will become relatively cheaper when compared to the domestic goods, and imports will increase. During this process current account deficit will continue to increase. But an increase in the real exchange rate will result in a depreciation of the Turkish Lira, decrease in imports and decrease in the current account deficit. Real income has a significant positive effect on the current account deficit. This is an indicator that shows us Turkish economy can grow by increasing the current account deficit. In order to decrease the current account deficit, high growth rates should be sacrificed to slow down the economy. In the current situation it is not possible to decrease the current account deficit with high oil prices and high growth rates.

4.1 Structural Impulse Response Analysis

One of the important tools which have made VAR models so attractive is the impulse response functions (IRF). IRF summarizes the dynamic reaction of a variable to a specific shock. The figures below shows the dynamics of the effects of three types of shocks on the current account deficit.

Figure 2: Response of Current Account to Structural 1 Standard Deviation Oil Price Shock



As can be seen from figure 2, a one standard deviation shock on oil prices effects the current account negatively and this effect continues until the fourth quarter. There is a small recovery lasting for one quarter but the deterioration in the current account position continues after that. Although it is getting smaller the effect of the shock do not fade away. This is an important finding about the sustainability of the current account deficit. As a developing economy which demands a lot of energy and oil for the productive activities, it is not possible to sustain current account deficit with increasing oil prices.

Figure 3: Response of Current Account to Structural 1 Standard Deviation Real Exchange Rate Shock

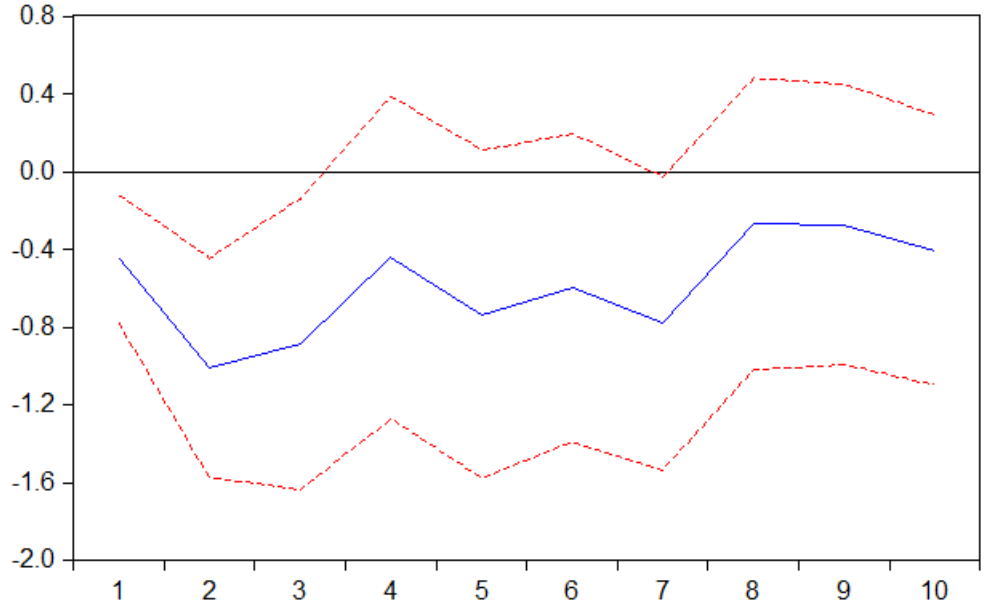


Figure 3 shows the impulse response of the current account to a one standard deviation shock in the Real Effective Exchange Rate. A depreciation of the Turkish Lira leads to a deterioration of the current account

immediately in the first two quarters after the shock. But a recovery comes after that which is consistent with the J-curve phenomenon. According to the theory following depreciation of a country's currency (e.g., due to devaluation), initially the trade balance deteriorates but eventually it improves, assuming other things are the same (Krugman & Obstfeld, 1994). This recovery continues until the tenth quarter and the overall effect of the devaluation of the Turkish Lira on the current account position is an improvement.

Figure 4: Response of Current Account to Structural 1 Standard Deviation Real GDP Shock

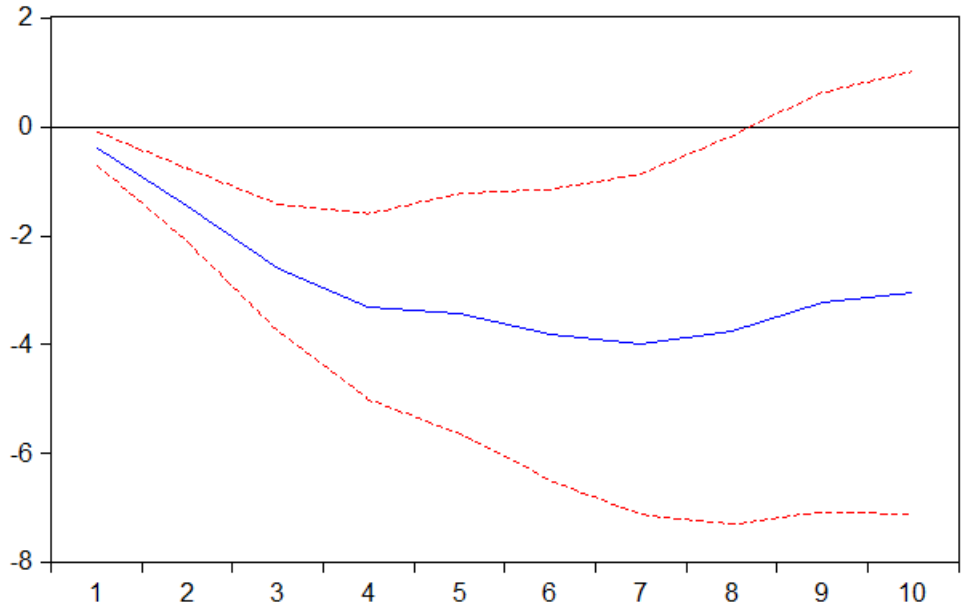


Figure 4 shows the impulse response of the current account to a one standard deviation shock in the Real GDP. We can see from the figure that the cumulative effect of an income shock on the current account is negative. An increase in real income will result in an increase of the current account deficit. This is not a surprise for a country whose production is bound to the imports of intermediate goods. As the growth rates increase, the demand for imported raw materials will increase and the current account balance deteriorates more. Besides, with the increase in real income, the demand for imported consumer goods will also increase when saving rates are decreasing. If we add up these two forces, the result is an increasing current account deficit.

4.2 Variance Decomposition

The variance decomposition of the effects of the four types of shocks on the Current Account is presented in table 6. Shock 1, shock 2, shock 3 and shock 4 are oil price shock represented by increases in oil prices, real exchange rate shock which is an appreciation of the exchange rate and depreciation of the Turkish Lira, Real GDP shock which is represented by an increase in real income and the current account shock itself. The factors effecting the forecast error variance is different in the short and long run. In the first quarter about 70 percent of the current account forecast variance is explained by the shock to the current account itself. But in the long run, at the end of 10 quarters, the distribution has completely changed and the share of current

account shock has decreased to 18 percent. The other shocks gained power in explaining the forecast error variance. In the long run 17 percent of the variance is explained by oil price shock, 34 percent of the variance is explained by real exchange rate shock and 30 percent of the variance is explained by real gdp shock. So in the long run the most important factors effecting the current account position are the real exchange rate and real gdp. Oil price shock is coming after them.

Table 6: Variance Decomposition Results

Period	Standard Error	Shock 1	Shock 2	Shock 3	Shock 4
1	0.163067	8.725519	11.94935	9.489588	69.83554
2	0.185072	3.708365	30.48648	31.16857	34.63658
3	0.209913	4.052807	32.26748	41.32605	22.35366
4	0.211887	4.021541	31.66758	44.14345	20.16742
5	0.217351	5.036331	34.82721	39.22780	20.90865
6	0.227086	9.623084	35.04781	36.63113	18.69798
7	0.237859	14.58135	36.12109	31.82986	17.46770
8	0.244446	14.20117	35.41309	31.23478	19.15096
9	0.249744	15.26070	34.36493	32.11464	18.25973
10	0.252706	17.06686	34.08027	30.82318	18.02969

5. Conclusion

Sustainability of current account deficit is always an important subject for economists. Current account deficit as a ratio of GDP is a commonly used measure that determines the sustainability of current account deficits and deficits above %5 of GDP are considered as dangerous. But other factors such as the composition of the current account deficit, the methods which are used to finance it, exchange rate policy, macroeconomic condition and global economic outlook may also have important implications about the sustainability of current account deficits. Turkey has experienced impressive economic growth following the substantial reforms after 2001 but the current account deficit is the economy's biggest vulnerability. Turkey is an oil importing developing country and there is a close relationship between oil imports and current account deficit. In this study, a structural Vector Autoregression (SVAR) model is used to investigate the effects of fuel imports and foreign exchange policy on Turkey's current account deficit and economic growth. We found that overvalued TL and economic growth are the main causes of current account deficit. This is resulting from the dependency of the production on the imported intermediate goods and increase in the private consumption of imported goods.

From the coefficient estimates of the structural model, we found that oil imports have significant positive effect on the current account deficit. This is an expected result for a developing country that is dependent on foreign energy and using imported oil in the production process. Another variable that affects the current account deficit is the real effective exchange rate. In the analysis a negative significant effect of REER on the

current account deficit is determined. With the appreciation of the TL (a decrease in the real exchange rate) current account deficit will continue to increase.

Finally real income has a significant positive effect on the current account deficit. This is an indicator that shows us Turkish economy can grow by only increasing the current account deficit. In order to decrease the current account deficit, high growth rates should be sacrificed to slow down the economy. The impulse response analysis also reinforces these findings. A shock on oil prices affects the current account deficit negatively and the effect of the shock does not fade away. This is an important finding about the sustainability of the current account deficit. As a developing economy which demands a lot of energy and oil for the productive activities, it is not possible to sustain current account deficit with increasing oil prices.

References

Arize, A. (2002), Imports and exports in 50 countries: tests for cointegration and structural breaks, International Review of Economics and Finance, 11 , 101-15.

Baharumshah, A.Z., Lau, E. and Fountas, S. (2003), On the sustainability of current account deficits: evidence from four ASEAN countries, Journal of Asian Economics, 14, pp. 465-487.

Blanchard, O. & Perotti, R. (2002), An Empirical Characterization Of The Dynamic Effects Of Changes In Government Spending And Taxes On Output, The Quarterly Journal of Economics, MIT Press, vol. 117(4), pp. 1329-1368, November.

Blanchard, O.J. and D. Quah (1989), The Dynamic Effects of Aggregate Demand and Supply Disturbances, American Economic Review 79, pp. 655-673.

Blanchard, O. (2006), Current Account Deficits in Rich Countries" Polak Annual Research Conference.

Dalgin, M.H. & Gupta, K. (2012), How Relevant is Turkey's Current Account Deficit?, International Research Journal of Finance and Economics, 97, 14-22.

Edwards, S. (2005), The End of Large Current Account Deficits, 1970-2002: Are there Lessons for the United States?, NBER Working Paper No. 11669.

Ghosh A. R. and Ostry J. D., (1995), The Current Account in Developing Countries: A Perspective from the Consumption-Smoothing Approach, World Bank Economic Re-view, Vol. 9, No. 4, pp. 305-333.

Glick, R. and Rogoff, K. (1995), Global versus Country-Spe- cific Productivity Shocks and the Current Account, Journal of Monetary Economics, Vol. 35, No. 1, pp. 159-192.

Irandoust, M. and Ericsson, J. (2004), Are imports and exports cointegrated? An international comparison, Metroeconomica, 55, 49-64.

İnsel, A.& Kayıkçı, F. (2012), Evaluation of Sustainability of Current Account Deficits in Turkey, Modern Economy, 3, pp. 43-50.

Kasman, A. Turgutlu, E. and Konyalı, G. (2005), Cari açık büyümenin mi aşırı değerli TL'nin mi sonucudur?, İktisat İşletme ve Finans, Ağustos, pp. 88-98.

Kıpıcı, A.N., & Kesriyeli, M., (1997), The Real Exchange Rate Definitions and Calculations, Central Bank of the Republic of Turkey, Research Department Publication No: 97/1.

Krugman, P.R. & Obstfeld M., (1994), International Economics: Theory and Practice 3d ed. Harper Collins, New York, p.465.

Milesi-Ferretti, G.M. & Razin, A. (1996), Current Account Sustainability, Princeton Studies in International Finance No 81.

Mussa, M. (2005), Sustaining global growth while reducing external imbalances, The United States and the World Economy: Foreign Economic Policy for the Next Decade, p.175–207.

Narayan, P. K. and Narayan, S. (2005), Are exports and imports cointegrated? Evidence from 22 least developed countries, Applied Economics Letters, 12, 375-78.

Narayan, S. (2013), A Structural VAR model of the Fiji Islands, Economic Modelling, 31, pp. 238-244.

Özlale, Ü. and Pekkurnaz, D. (2010), Oil Prices and Current Account: A Structural anaysis for the Turkish Economy, Energy Policy, 38, pp. 4489-4496.

Sims, Christopher A, (1980), Macroeconomics and Reality, Econometrica, Econometric Society, vol. 48(1), pages 1-48, January.

Zaidi, I. (2012), The External Current Account in the Macroeconomic Adjustment Process in Turkey, The Woodrow Wilson School's Graduate Policy Workshop

Zaouali, S. (2007), Impact of higher oil prices on the Chinese economy, OPEC Review, 31 (3), pp. 191-214.