THE AVAILABILITY AND EFFICIENCY OF FINANCIAL RESOURCES OF CURRENT ACCOUNT DEFICITS

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Ömer Uğur BULUT
Asst. Prof.
Kafkas University
Kağızman School of Applied Science
bulut.o.u@gmail.com
ORCID ID: 0000-0002-6511-8187

ABSTRACT|The research seeks to analyze the current account deficit in Turkish economy between 2006 and 2018 on the financial resources by taking into account the sustainability conditions. To this end, we have not restricted the current account deficit with a single indicator. In the research, where four different Vector Autoregressive Models have been created, Zivot-Andrews unit root test has been utilized to see the impact of structural changes in the relevant period. The availability and effectiveness of the financing sources that impact the sustainability of the current account deficit as a policy tool have been analyzed by utilizing the method of Impulse-Response and Variance Decomposition in these models. The empirical findings have indicated that the current account deficit in Turkish economy between 2006-2018 was financed by rather hot money movements and short-term external debt that have speculative and fragile structure. These results indicate that growth should be disregarded for reducing current account deficit to sustainable level for Turkish economy.

Keywords: *The current account deficit, the current account deficit financing structures, VAR model*

Jel codes*: F32, G32, C22*
Scope: *Economics*
Type: *Research*

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CARİ İŞLEMLER AÇIĞININ FİNANSMAN KAYNAKLARININ KULLANILABİLİRLİĞİ VE ETKİNLİĞİ

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ÖMER UĞUR BULUT
Dr. Öğr. Üyesi
Kafkas Üniversitesi
Kağızman Uygulamalı Bilimler Yüksekokulu
bulut.o.u@gmail.com
ORCID ID: 0000-0002-6511-8187

ÖZ | Bu çalışmanın amacı 2006 ile 2018 yılları arası Türkiye ekonomisinde cari işlemler açığını sürdürülebilirlik koşullarını dikkate alarak finansman kaynakları üzerinden analiz etmektir. Bu amaç doğrultusunda cari işlemler açığı tek bir göstergeyle sınırlandırılmayıp dört farklı değişkenle daha tutarlı bilgiler elde edebilmek için analiz edilmiştir. Dört ayrı Vektör Otoregresif Model'in oluşturulduğu çalışmada ilgili dönemdeki yapısal değişmelerin etkisini görebilmek için Zivot-Andrews birim kök testi kullanılmıştır. Oluşturulan modellerde cari işlemler açığının sürdürülebilirliğinin sağlanmasına etki eden finansman kaynaklarının politika aracı olarak kullanılabilirliği ve etkinliği Etki-Tepki ve Varyans Ayrıştırması yöntemiyle araştırılmıştır. Ampirik bulgular, 2006 ile 2018 yılları arası Türkiye ekonomisinde cari işlemler açığının daha çok spekülatif ve kırılgan bir yapıya sahip olan sıcak para hareketleri ve kısa vadeli dış borçlar ile finanse edildiğini göstermiştir. Bu sonuçlar, Türkiye ekonomisinin cari işlemler açığının sürdürülebilir seviyelere indirebilmesi için büyümeyi göz ardı etmesi gerektiğini göstermektedir.

Anahtar Kelimeler: *Cari açık, cari açığın finansman yapısı, VAR modeli*

Jel kodları: *F32, G32, C22*
Alanı: *İktisat*
Türü: *Araştırma*

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1. INTRODUCTION

The current account deficit, which has become a significant problem after 1989 when the restriction on foreign capital movements was removed during the financial liberalization of the Turkish economy, has been transformed into a chronic variable as its share in the national income has been increasing on a continuous basis. This item, which constitutes the trading of all goods and services with other countries in the world, is one of the four main items in the balance of payments. However, by importance, it has a more important position than other items (such as capital, financial account, reserve assets, net errors and omissions). It is of importance that current account deficit should be in a sustainable level rather than offsetting fully for a country such as Turkey, which has insufficient investment and savings and has imbalances between the foreign trade and production structure. However, it is observed that the current account deficit has not been sustainable in the post-1989 period and become a significant indicator of the economic crisis (Kaymak, 2005, p. 86). The negative impact of the high-rate foreign capital outflow in the global crisis of 1994, 2000/2001 and 2008 on the current account deficit was inevitable. The financial structure of the current account deficit is of high importance for avoiding such a problem.

The foreign borrowing and direct foreign investments for developing countries are important against the basic macroeconomic problems such as current account deficit with the foreign tare and financial globalization in the world economy in the post-1980 period (Yılmazer, 2010, pp. 253-254). As the current account reflects the commercial structure and production power of the countries, it constitutes an important part of the balance of payments. As a developing country, Turkey is having a difficult time to keep the current account deficit at a reasonable and sustainable level as it has just financially liberalized, is foreign-dependent and has irregularities in production structure. It indicates that the current account deficit is the most fragile structure no matter how well the other macroeconomic indicators are.

Many developing countries, which are trying to increase their economic growth, adopt the policies of outward-oriented industrialization and support the entry of foreign direct investments into the country. Foreign direct investment refers to the establishment of a production facility or acquiring a production unit in another country overseas. It is acknowledged that that foreign direct investment supports economic growth by increasing resource use, infrastructure investments, manufacturing industry and technological progress, particularly in developing countries (Şahin, 2011, p. 50). Since the 1990s when the globalization has been picked up speed, the trend of foreign direct investment has also improved. The flow of foreign direct investments plays a significant role in

vitalizing the world economy. However, the recession during and after the 2008 crisis indicates that foreign direct investment will have a downward trend for a specific period of time. As it is presumed that direct foreign investments have a positive effect on the foreign trade and production, it can be observed that the decline in direct foreign investment flow in the international market will adversely impact the growth performance of the developing countries such as Turkey (Hotunluoğlu, 2009, pp. 229-230).

The main problem about the current account deficit in the post-1989 period for the Turkish economy is inefficient capital due to the limited domestic production. This main problem is required foreign capital and borrowing to close this deficit. As such borrowing is short-term and speculative, it creates a problem for financing the current account deficit, and it provides a temporary relief only. If there is an instant outflow in the foreign capital, such temporary relief would be reversed (Walter, 2002).

The rise in export and import in Turkey as well as the foreign capital inflow are the significant factors that increase the economic growth in Turkey. It is especially more evident in recent economic growth. However, as Turkey is foreign-dependent for goods and services production, we observe that import increases rapidly in the foreign trade balance (Karagöz, 2007, p. 933). Therefore, we can note that as the economic growth and exports pick up speed in Turkey, the import input increases, as well. The foreign deficit has been increasing in parallel with the production increase especially after 2001 in Turkey. However, such current account deficit could be financed by external sources through the positive effects of the international conjuncture. Since therefore, while there has been an external deficit, the economic growth has been picked up speed by increasing the import and export volume (Yentürk, 2005).

It is necessary to consider the demand side of the economy, growth, production, exchange rate volatility, monetary policy credibility and dependence on foreign energy for a sustainable current account deficit. Furthermore, the type of capital or external source, borrowing structure, reserve and income accumulation and structural changes of the country economy have a vital impact on the sustainability of the current account deficit. This research seeks to present the impacts/possible impacts of the political measures to reduce the current account deficit and the structure of current account financing structure that has been created/will create on the Turkish economy. Therefore, the research aims to analyze the availability and efficiency of the political tools that have been used to reduce the current account deficit in Turkey to the reasonable levels for its sustainability by taking 2006-2018 period into account and by using monthly data for the relevant variables via VAR model. To summarize, this research mainly

seeks an answer to the question of "Is the current account deficit in the Turkish economy between 2006 and 2018 sustainable?". In the first section of the research, an overall literature review will be conducted. In the next section, the research will define the data and econometric method to be used. In the final section, it will provide the econometric results and interpretation of such results.

2. LITERATURE SUMMARY

Polak (1997) observes that the rise in exports will result in higher imports, paving the way for the temporary relief in the balance of payments, yet he doubts that it may spread over time. If imports exceed exports, there will be a deficit in foreign trade balance and such deficit will be met by a decrease in foreign exchange reserves. However, it is inevitable that the decrease in foreign exchange reserves will cause a change in the money supply. As a result of the rise in domestic credits, the rise in import and a decrease in foreign exchange reserves, the money supply may be drawn to the initial level. However, the country is still facing the current account deficit problem again.

There are different approaches related to the current account deficit in economy literature. Kaminsky, Lizondo and Reinhart (1998) conducted a large literature review and observed that current account balance is a prominent indicator of a crisis. The same study notes that in the event that a macroeconomic indicator exceeds a specific threshold value in a specific period by using the method of Signal Approach, it indicates a possible economic crisis within two years. Radelet and Sachs (2000) observe that the size of the current account deficit in a country is considered as the prominent indicator of a future exchange rate crisis. However, current account deficit cannot be an indicator of a crisis by its own for developing countries such as Turkey as the restrictions on foreign investments especially after 1989 were removed, it made the current account deficit to be affected by the foreign trade, hot Money movements, foreign capital inflows and outflows.

The general approach in economy literature is that foreign direct investments have a positive effect on economic growth. Razin (2002), in his analysis of 64 countries, has found that direct foreign direct investments have a more important impact both on capital accumulation and economic growth in comparison to financial investments.

Most studies analyzing relations between the current account deficit and economic growth in Turkey mostly found a linear relation. Erbaykal (2007) observes that economic growth plays a more influential role in the current account deficit than other factors and the basic reason for the current account deficit is economic growth. It further notes that short-term capital movements are determinant on the exchange rate and it determines the current account deficit

with delay.

Yao and Wei (2007) argue that foreign direct investments accelerate the growth of newly industrializing countries and China's rapid growth in recent years is the best example to explain it. They carried out an analysis of six OECD countries and observed that foreign direct investment positively impacts economic growth both directly and indirectly as a result of interaction with the labor force.

Telatar and Terzi (2009), as the majority of the developing countries, use import inputs on a high rate, the rise in growth rates and import input in parallel with the import-dependent growth paves the way for a decline in rate of exports meeting imports and disruption in foreign trade and the current account balance. In such periods when export revenues were often unable to meet the intermediate goods imports, the high increase in import volumes deteriorates the foreign trade balance and increases the current account deficit.

Telatar (2011) conducted a causality test between the current account deficit and loans. As a result, it has been indicated that there is a causal relationship between consumer loans and the current account deficit. It notes that consumer loans are one of the main reasons for the current account deficit.

Berument and Togan (2011) have concluded that the effect of loans and capital inflows on economic activity has a limited impact on the current account balance as the rise in real loans did not influence the real exchange rate. They found that while capital inflows increase the growth, the real exchange rate is appreciated. Therefore, the rise in capital inflows paves the way for growth in the current account deficit.

Ju, Shi and Wei (2012) notes that the foreign trade reforms and the imbalances in the current account balance are taken into consideration according to the Hecksher-Ohlin model. As a result, they observe that the liberalization in foreign trade may pave the way for capital outflows by decreasing capital intensive goods for the developing countries and such outflows may lead to current account deficits.

The relationship between current account deficit and crude oil imports is the subject of many studies. In these studies conducted on most of the countries which are foreign dependency in energy, a positive relationship is mentioned between these two variables. Dias (2013) has examined the effect of the rise in oil prices on current account deficit and found a positive relationship between them. Huntington (2015) also concluded that the decrease in crude oil imports caused a decrease in the current account deficit for the sample of 91 countries in his study.

Most of the research on current account deficit in economy literature are

related to the sustainability and causality of the current account deficit. There are also many researches on the financing structure and determinants of the current account deficit. However, the current account deficits and financing resources stipulated in the research have remained shallow and do not provide policy recommendations. Unlike the existing literature, this study addresses the current account deficit both in financial and political tools aspects. Furthermore, the current account deficit will not be limited to a single indicator but will be analyzed on four different factors, considering the conditions of sustainability. In identifying the indicators of the current account deficit, the study will focus on the demand side of the economy, monetary policy credibility and external dependence on energy. For financing resources, it will analyze the capital and external resource type, borrowing structure, reserve and income accumulation. The research differs from the existing literature in terms of the indicators based on the analysis.

3. DATA SET AND METHOD

Focusing on the relation between the current account deficit determinants and financing resources for Turkey's economy, unlike other research, it analyzes the current relationship through four separate current account deficit determinant chosen by taking into account the requirements for sustainability. The research includes the monthly data between 2006:M06 – 2018:M09 such data has been compiled from the webpages of Central Bank, Turkish Statistical Institute, State Planning Organization and IFS. Eviews 10+ package program has been used for analysis. Accordingly, the data analyzed are indicated in Table 1 and Table 2.

Table 1. Current Account Deficit Indicators

Total demand, Growth and Production of the Economy	Industrial Production Index (prod)
Credibility of Monetary Policy	Inflation (inf)
Foreign Dependency in Energy	Crude Oil Imports (oil)
Current Account Deficit	Current Account Balance (cab)

As indicated in the empirical research in economy literature, while the current account deficit has many indicators, this research focuses on the conditions of sustainability and analyzed the four current account determinants for the purposes of the study, as well. The first one of these, the industrial production index represents the total demand, growth and production of the economy and the rise in production is expected to increase the current account deficit. Another variable, the inflation rate, is accepted as the credibility measurement of monetary policy. In countries where high inflation is available, the exchange rate volatility will be higher and thus the current account deficit

may increase further as a result of the increase in import input costs. Crude oil imports, the third variable, represents foreign dependency in energy. The current account deficit will increase in parallel with the rise in the import volume in country economies where foreign dependency in energy is high. Such three variables in the research are the determinants of the current account deficit and indicate how sustainable the economy is.

Table 2. Financing Resources of Current Account Deficit

Capital and Outsourcing Structure	Hot Money Movements (hmm) Foreign Direct Invastments (fdi)
Borrowing Structure	Short-Term External Debts (sfd)
Reserve and Revenue Accumulation	International Reserves, (irez) Tourism Revenues (tour)

Table 2 provides the current account deficit financing resources. Hot money movements and short-term external debts represent the short-term financing resources. International reserves, tourism revenues and foreign direct investments represent long-term financing resources.

The entire data, which has been empirically analyzed in the research, has been seasonally adjusted with "Moving Average" and taken their natural algorithms. To identify whether these variables are static or not, "Zivot-Andrews Unit Root Test" has been applied, which considers the structural breaks in the relevant period, and to specify how and what way the current account deficit financing resources impact the determinants of the current account deficit, VAR Model Impulse-Response functions and Variance Decomposition tables have been created on the stationary levels of variables by considering the Zivot-Andrews unit root test.

Vector autoregressive (VAR) models are often chosen as standard analysis tools that analyze the dynamic relations between macroeconomic variables and are utilized extensively in applied econometrics (Lovrinovic & Benazic, 2004, p. 30). VAR technique is utilized where the variables in macroeconomic models are not exactly known whether they are external by default. The VAR approach analyzes all chosen variables together in system integrity without any restriction on the structural model (Özgen & Güloğlu, 2004, p. 95). In this context, four different VAR models have been created with a view to identifying the relationship between the current account deficit and the financing resources. In this context, in addition to the five financing resources such as TOURt, SFDt, HMMt, IREZt, FDIt, in four different equations where one determinant of current account deficit has been added; the change of the series in the four different VAR models, each of which is a dependent variable, over time is affected by the current and previous values of the other series. In other words,

the variables are affected by the delayed values of each other in such a system. For example, a VAR model to be created with six variables is the same as 1,2,3 and 4 equations by delaying by 1. In that case, et average is zero, the covariance with its own delayed values is zero and variances are static and has a regular distribution and indicates the random error terms.

$$CAB = C(1,1)*CAB(-1) + C(1,2)*FDI(-1) + C(1,3)*HMM(-1) + C(1,4)*TOUR(-1) + C(1,5)*SFD(-1) + C(1,6)*IREZ(-1) + e_{1t} \quad (1)$$

$$OIL = C(1,1)*OIL(-1) + + C(1,2)*FDI(-1) + C(1,3)*HMM(-1) + C(1,4)*TOUR(-1) + C(1,5)*SFD(-1) + C(1,6)*IREZ(-1) + e_{1t} \quad (2)$$

$$PROD = C(1,1)*PROD(-1) + + C(1,2)*FDI(-1) + C(1,3)*HMM(-1) + C(1,4)*TOUR(-1) + C(1,5)*SFD(-1) + C(1,6)*IREZ(-1) + e_{1t} \quad (3)$$

$$INF = C(1,1)*INF(-1) + + C(1,2)*FDI(-1) + C(1,3)*HMM(-1) + C(1,4)*TOUR(-1) + C(1,5)*SFD(-1) + C(1,6)*IREZ(-1) + e_{1t} \quad (4)$$

In equations 1, 2, 3 and 4; variables are considered to be static (Barışık & Kesikoglu, 2006, p. 67). There are basically two tools in the VAR technique. The stability of the series is first tested in the system and the findings from the "impulse-reaction analysis" and "variance decomposition" analysis are assessed and insights are provided accordingly (Çekerol & Gürbüz, 2004, p. 3).

This research seeks to make a political analysis from the interaction and shocks between the financial resources and current account deficit by considering the conditions of sustainability in the economy. As the objective in the VAR model is political analysis, it is a suitable method. It measures the impacts of shocks in variables on other variables. As it deals with shocks, it is not of importance whether the stability level of variables is equal. The stability must be ensured in order for shocks to be clear and their own properties are not disrupted (Sevüktekin & Nargeleçekenler, 2010, p. 116).

The variables must be stable for empirical findings to be accurate and consistent in the econometric analysis. As a result of the analysis that is carried out with a non-steady time series, the theoretically invalid relations may emerge in the economy literature (Temurlenk & Oltulular, 2007). This issue should not be disregarded in the econometric analysis and the level of the stability of the variables to be used in the analysis must be known. (Enders, 1995). Therefore, prior to VAR estimation, it is necessary to test whether the series are steady. Otherwise, such estimates will provide deviant results and a false regression problem will be encountered (Yamak & Tanrıöver, 2009, pp. 47-48).

Zivot-Andrews (ZA) unit root test, which considers the structural breaks in the relevant periods of the analysis, was used in the research. "This test internally identifies the structural breaks in time series (Zivot & Andrews, 2002, p. 67). The Zivot-Andrews test is based on the estimation of equations 5,6, 7 in

the model that contains stability and trend. This unit root test estimates the regression equation and t statistics is calculated for parameters that have been estimated. (DUt (λ)) indicates the steady breaks and (DTt (λ,)) refers to the trendy breaks (Korkmaz, Zaman & Çevik, 2008, p. 25).

$$TOUR_t = \mu^C + \theta^C DU_t(\lambda) + \beta^C t + \gamma^C DT_t(\lambda) + \alpha^C TOUR_{t-1} + \sum_{j=1}^{k} c_j^C \Delta TOUR_{t-j} + \varepsilon_t \quad (5)$$

$$CAB_t = \mu^C + \theta^C DU_t(\lambda) + \beta^C t + \gamma^C DT_t(\lambda) + \alpha^C CAB_{t-1} + \sum_{j=1}^{k} c_j^C \Delta CAB_{t-j} + \varepsilon_t \quad (6)$$

$$IREZ_t = \mu^C + \theta^C DU_t(\lambda) + \beta^C t + \gamma^C DT_t(\lambda) + \alpha^C IREZ_{t-1} + \sum_{j=1}^{k} c_j^C \Delta IREZ_{t-j} + \varepsilon_t \quad (7)$$

H_0 : $\alpha = 1$ Series has a unit root (Non-Stationary)
H_1 : $\alpha = 0$ Series has not a unit root (Stationary)

In this research, t = 1, 2.3.....T refers to the estimation period, λ indicates the breakpoint. All models are estimated from the J = t to j = (T-1) / T with the Least Squares Method (OLS). For each value of λ, the number of k delay is identified and I=1 is tested by t statistics. If t statistic calculated is greater than the Zivot-Andrews critical value within the absolute value, H_0 is rejected (Korkmaz et al., 2008, p. 25)).

The use of delayed values of dependent variables in VAR models makes it possible to make reliable and proper predictions for the future (Sevüktekin & Nargeleçekenler, 2010, p. 113). In this context, the optimum delay length in VAR models created hereunder; Final Prediction Error Criteria (FPE), Akaike Information Criteria (AIC), Schwarz Information Criteria (SC), Hannan-Quinn Information Criterion (HQ) and Likelihood Ratio (LR) criteria have been identified (Kumar, Robert & John, 1995).

4. ECONOMETRIC FINDINGS

According to the Zivot-Andrews unit root test results by applying Schwarz criteria for choosing delay length and in which steady term and trend are used as a form of test for financial resources and current account deficit in Table 3, industrial production index (prod) and hot money movements (hmm) current account deficit (cab), crude oil imports (oil), foreign direct investments (fdi), international reserves (irez), short-term external debts (sfd) and tourism

(tour) have become steady in the first difference, and inflation (inf) series have become steady in the second difference. Therefore, this research takes such a level of stability of the variables in creating the VAR model.

Table 3. Zivot-Andrews Unit Root Test Results

Series	Constant	Trend	Constant & Trend
cab	-4.102279 (2008:M08)	-3.095529 (2009:M06)	-4.102279 (2008:M04)
oil	-3.880062 (2010:M04)	-3.221623 (2009:M05)	-3.966241 (2010:M04)
inf	3.288065 (2016:M04)	0.489911 (2008:M12)	0.843423 (2016:M04)
prod	-5.205422 (2016:M05)	-4.378912 (2016:M05)	-5.295099 (2016:M05)
hmm	-6.056193 (2010:M01)	-5.530569 (2010:M02)	-6.319482 (2010:M12)
fdi	-4.044207 (2009:M04)	-3.896238 (2009:M05)	-4.977301 (2009:M04)
tour	-4.561227 (2008:M03)	-3.226544 (2008:M01)	-4.691360 (2008:M06)
irez	-4.744171 (2008:M07)	-3.319478 (2009:M05)	-5.690619 (2008:M07)
sfd	-3.307068 (2016:M11)	-3.154459 (2016:M12)	-3.593503 (2016:M10)
dcab	-11.64504 (2008:M07)	-11.61878 (2008:M06)	-11.81883 (2008:M08)
doil	-6.364500 (2010:M04)	-6.139494 (2010:M03)	-6.464834 (2010:M04)
dinf	0.490810 (2016:M04)	-1.336949 (2016:M02)	-1.336175 (2016:M03)
dfdi	-12.24337 (2009:M04)	-12.12489 (2009:M03)	-12.22758 (2009:M05)
dtour	-8.009278 (2008:M03)	-7.375899 (2008:M02)	-8.238306 (2008:M04)
direz	-6.643428 (2008:M06)	-6.221806 (2008:M08)	-6.621026 (2008:M07)
dsfd	-5.757281 (2016:M11)	-5.016693 (2016:M12)	-5.955028 (2016:M10)
ddinf	-7.120108 (2016:M04)	-7.851603 (2016:M03)	-8.073415 (2016:M04)

In Table 3, the values at the 1%, 5% and 10% significance levels for the break point in constant are respectively -5,34, -4,93 and -4,58; for the trend at the same significance levels are -4.80, -4.42 ve -4.11 and for the constant and trend at the same significance levels are -5,57, -5,08 and -4,82. The dates in parantheses show the break point years. Furthermore, dcab, doil, dinf, dfdi, dtour, direz, dsfd indicate the first differences, ddinf indicates the second differences.

4.1. The Interaction of Current Account Balance as a Current Account Deficit Determinant and Financial Resources

In analyzing Table 4 and Table 5, according to the FPE and AIC, which are the most suitable delay length in the model, is two. The research has experienced variance and autocorrelation problems with two delay lengths. There is no problem of instability in the model with eight delays, the model is stable and steady.

Table 4. Lag Length Criteria Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-6876.841	NA	8.47e+36	102.0569	102.3152*	102.1619
1	-6813.559	119.0637	5.66e+36	101.6527	102.6857	102.0725*
2	-6770.464	77.25238	5.11e+36*	101.5476*	103.3553	102.2822
3	-6739.642	52.51152	5.57e+36	101.6243	104.2068	102.6738
4	-6709.611	48.49408	6.18e+36	101.7128	105.0700	103.0770
5	-6684.490	38.33364	7.45e+36	101.8739	106.0059	103.5530
6	-6663.442	30.24649	9.67e+36	102.0954	107.0021	104.0894
7	-6630.343	44.62161	1.07e+37	102.1384	107.8198	104.4472
8	-6595.160	44.30479	1.16e+37	102.1505	108.6067	104.7741
9	-6569.305	30.26007	1.49e+37	102.3008	109.5317	105.2393

***** indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.

Table 5. The Stability Tests of VAR(8) Model

VAR(8) Residual Serial Correlation Lagrange Multiplier Tests	
Lag	Probability
1	0.5452
2	0.1919
3	0.5375
4	0.3597
5	0.1402
6	0.4595
7	0.3840
8	0.1369
9	0.6038

VAR(8) Residual Heteroskedasticity Tests (Levels and Squares)	
Chi-Square	Probability
2036.479	0.6279

VAR(8) Residual Normality Test	
Jarque-Bera	Probability
20.23648	0.2627

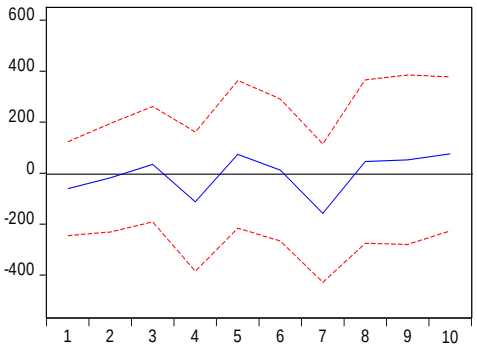
Graphic 1 illustrates the responses of the current account deficit to the

shock in financing resources. In spite of the shock to short-term external debts, the current account deficit strongly responds negatively in the first, second, fifth and ninth months. What's more, in analyzing the hot money movements and international reserves for ten periods, the current account deficit is negatively affected in general terms and the degree of negative responses given by the current account deficit is strong as it is in the short-term external debts. However, the response of the current account deficit to one-unit shock to the tourism revenues is significantly negative in the fourth and seventh periods. Foreign direct investments, on the other hand, have a positive effect on the current account deficit, however, they lose their impacts at the end of ten periods. According to Graph 1, we observe that short-term external debts, hot money movements and international reserves have the most significant impact on reducing the current account deficit.

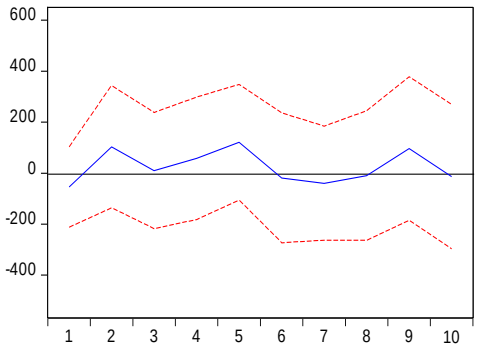
In analyzing the results of the Variance Decomposition in Table 6, the research notes that it is the most significant variable that explains the current account deficit at the end of ten periods. At the end of the tenth month, 63% of the shock that is emerged in the current account deficit is accounted for by itself. The ratio of tourism revenues and foreign direct investment in the current account deficit is low compared to other resources of financing. In this context, short term foreign debts, hot money movements and international reserves account for 15%, 8.7% and 8.3% of current account deficit respectively. Such results support Impulse-Response analysis.

Graphic 1. Response to Cholesky One Standard Deviation Innovations ± 2 Standard Error

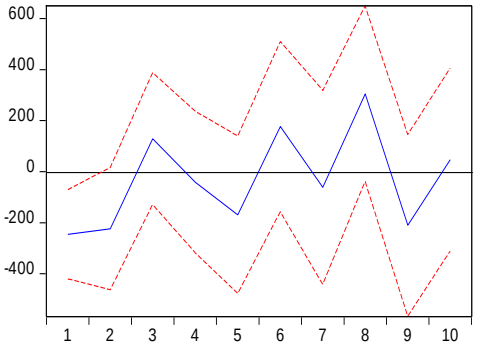
Response of DCAB to DTOUR



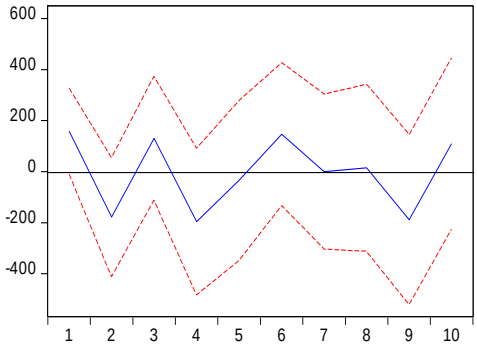
Response of DCAB to DFDI



Response of DCAB to DSFD



Response of DCAB to HMM



Response of DCAB to DIREZ

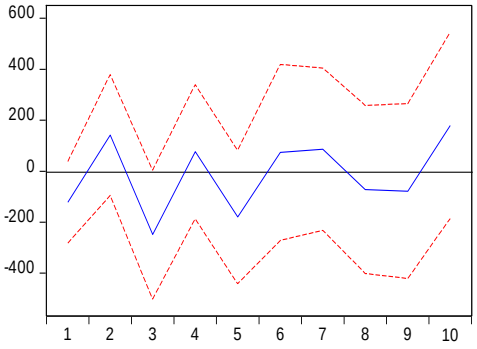


Table 6. Variance Decomposition Results

Period	DTOUR	DFDI	DSFD	HMM	DIREZ	DCAB
1	0.368877	0.294540	5.994048	2.514532	1.473365	89.35464
2	0.295333	1.001792	8.086881	4.163154	2.564383	83.88846
3	0.349915	0.919726	8.488406	4.947440	6.466872	78.82764
4	1.141111	1.092256	8.216451	7.156986	6.548894	75.84430
5	1.411898	1.923051	9.543685	6.866312	8.166020	72.08903
6	1.355363	1.855938	10.91095	7.791851	8.106059	69.97983
7	2.604328	1.815944	10.37927	7.266299	7.960403	69.97376
8	2.556132	1.714764	14.49445	6.853220	7.755954	66.62548
9	2.520052	2.046601	15.64606	8.081976	7.540665	64.16465
10	2.676723	1.971121	15.10337	8.299334	8.697527	63.25192

Cholesky Ordering: DTOUR DFDI DSFD HMM DIREZ DCAB

4.2. The Interaction Between Industrial Production Index as a Current Account Deficit Determinant and Financial Resources

In analyzing Table 7 nad Table 8, according to the FPE and HQ, which are the most suitable delay length in the model, is two. The research has experienced variance and autocorrelation problems with two delay lengths. There is no problem of instability in the model with ten delays, the model is stable and steady.

Table 7. Lag Length Criteria Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-6159.463	NA	2.05e+32	91.42908	91.68732*	91.53402
1	-6110.418	92.27638	1.69e+32	91.23582	92.26881	91.65560
2	-6029.205	145.5814	8.70e+31*	90.56601	92.37373	91.30062*
3	-5994.350	59.38400	8.92e+31	90.58296	93.16542	91.63240
4	-5965.966	45.83453	1.02e+32	90.69579	94.05300	92.06006
5	-5949.241	25.52033	1.39e+32	90.98135	95.11330	92.66046
6	-5929.580	28.25409	1.84e+32	91.22341	96.13009	93.21735
7	-5893.862	48.15327	1.95e+32	91.22758	96.90901	93.53636
8	-5868.550	31.87478	2.45e+32	91.38592	97.84209	94.00952
9	-5820.982	55.67154	2.28e+32	91.21455	98.44546	94.15299
10	-5780.927	43.31886	2.43e+32	91.15447	99.16012	94.40774
11	-5746.749	33.92449	2.94e+32	91.18147	99.96186	94.74957

***** indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn

information criterion.

Table 8. The Stability Tests of VAR(10) Model

VAR(10) Residual Serial Correlation Lagrange Multiplier Tests	
Lag	Probability
1	0.7815
2	0.1131
3	0.6925
4	0.1980
5	0.2792
6	0.1640
7	0.2027
8	0.2430
9	0.8498
10	0.3262
11	0.6909
VAR(10) Residual Heteroskedasticity Tests (Levels and Squares)	
Chi-Square	Probability
2600.357	0.2937

VAR(10) Residual Normality Test	
Jarque-Bera	Probability
24.07328	0.1199

Graphic 2 illustrates the responses of the industrial production index to the shock that is occurred in the financial resources. Industrial production index reacts positively to the shock that occurs in the direct foreign investments during the ten periods. The research observes that the industrial production index provides an uncertain response to the hot money movements in the first three periods, yet taking other periods into consideration, it notes a negative reaction. Furthermore, short-term external debt stock and international reserves strongly impact the industrial production index. While the industrial production index has a significant negative impact on short-term external debts in the first period, such negative impact has been transformed into positive in two periods and a significant positive effect is observed especially in the third and eighth periods. Furthermore, international reserves have a positive effect on the industrial

production index in the third period. However, tourism revenues do not have a significant impact on the industrial production index save for the fourth period and there is a negative response to the industrial production index if we take ten periods into account. According to Graphic 2, the industrial production index illustrates the most important and robust responses to short-term foreign debts and international reserves.

Table 9. Variance Decomposition Results

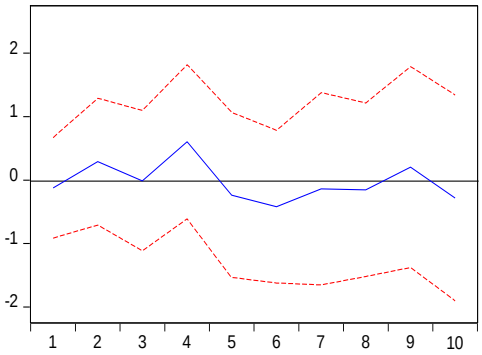
Period	DTOUR	DFDI	DSFD	HMM	DIREZ	PROD
1	0.076085	1.991519	4.428781	0.015172	0.835530	92.65291
2	0.448938	2.438986	6.642596	0.017296	4.102995	86.34919
3	0.302336	1.762186	5.104664	0.018190	7.041489	85.77114
4	1.299480	1.821446	5.723567	0.744376	6.595679	83.81545
5	1.306006	1.928536	5.136736	1.049800	5.940365	84.63856
6	1.572155	2.246915	5.558414	1.128277	5.874764	83.61947
7	1.466012	2.051195	5.182461	1.514687	6.316244	83.46940
8	1.412431	3.186966	5.981634	1.787275	7.550420	80.08127
9	1.450701	3.115133	5.897269	1.740569	7.377674	80.41865
10	1.537234	3.136691	6.659410	1.886737	7.996576	78.78335

Cholesky Ordering: DTOUR DFDI DSFD HMM DIREZ PROD

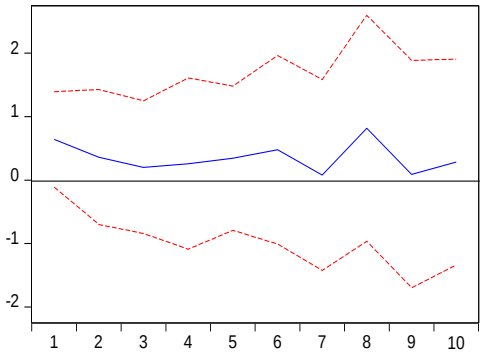
In analyzing the results of the Variance Decomposition in Table 9, the research notes that it is the most significant variable that explains the industrial production index at the end of ten periods. At the end of the tenth month, 78% of the shock that is emerged in the industrial production index is about itself. The ratio of foreign direct investments, tourism revenues and hot money movements in the industrial production index is low compared to other resources of financing. In this context, the percentage of short-term external debts and the international reserves account for the industrial production index is about eight percent and seven percent respectively. Such results support Impulse-Response analysis.

Graphic 2. Response to Cholesky One Standard Deviation Innovations ± 2 Standard Errors

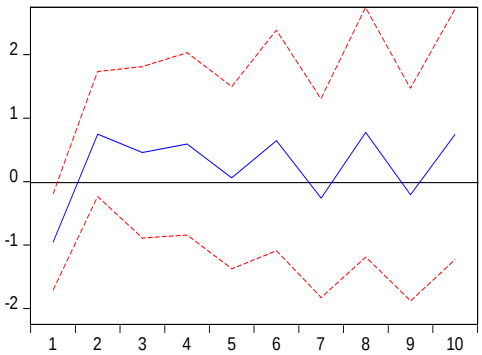
Response of PROD to DTOUR



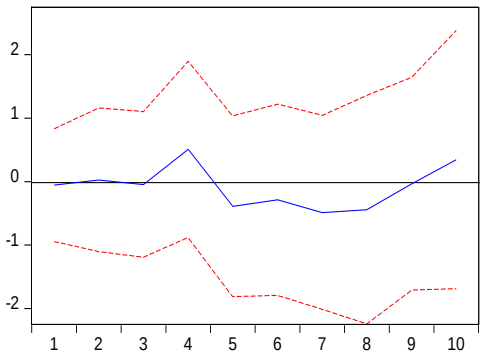
Response of PROD to DFDI



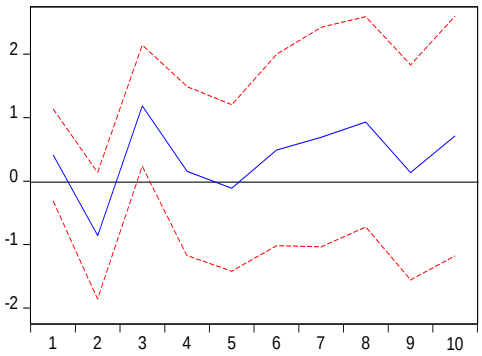
Response of PROD to DSFD



Response of PROD to HMM



Response of PROD to DIREZ



4.3. The Interaction of Crude Oil Imports as a Current Account Deficit Determinant and Financial Resources

In analyzing Table 10 and Table 11, according to the FPE and AIC, which are the most suitable delay length in the model, is three. The research has experienced variance and autocorrelation problems with two delay lengths. There is no problem of instability in the model with nine delays, the model is stable and steady.

Table 10. Lag Length Criteria Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-7614.966	NA	4.75e+41	112.9921	113.2503*	113.0970
1	-7556.323	110.3349	3.40e+41	112.6566	113.6896	113.0764*
2	-7503.087	95.43106	2.64e+41	112.4013	114.2090	113.1359
3	-7465.374	64.25262	2.60e+41*	112.3759*	114.9584	113.4253
4	-7433.457	51.53913	2.81e+41	112.4364	115.7936	113.8007
5	-7413.976	29.72639	3.68e+41	112.6811	116.8131	114.3602
6	-7393.708	29.12598	4.83e+41	112.9142	117.8209	114.9081
7	-7361.806	43.00922	5.42e+41	112.9749	118.6563	115.2837
8	-7336.462	31.91442	6.83e+41	113.1328	119.5889	115.7564
9	-7300.762	41.78156	7.56e+41	113.1372	120.3681	116.0757
10	-7266.042	37.54917	8.74e+41	113.1562	121.1618	116.4095

***** indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.

Table 11. The Stability Tests of VAR(9) Model

VAR(9) Residual Serial Correlation Lagrange Multiplier Tests	
Lag	Probability
1	0.3239
2	0.4344
3	0.9354
4	0.3584
5	0.1303
6	0.2504
7	0.2921
8	0.4330
9	0.1161
10	0.1575

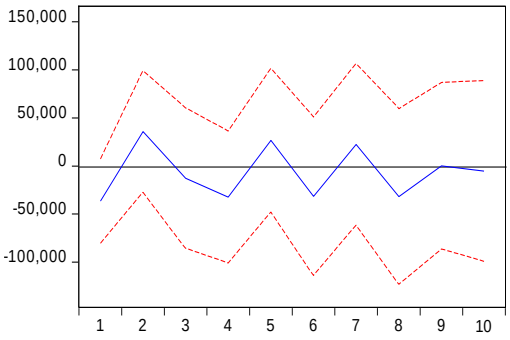
VAR(9) Residual Heteroskedasticity Tests (Levels and Squares)	
Chi-Square	Probability
3589.572	0.4706
VAR(9) Residual Normality Test	
Jarque-Bera	Probability
23.29693	0.1556

Graphic 3 illustrates the response of crude oil imports to the shock in the financing resources. Crude oil imports' response to the shock of tourism revenues and foreign direct investments is unstable and low. Such two financing resources for the current account deficit impact the crude oil import in a negative or positive way and in low ratios taking ten periods into account. Furthermore, crude oil imports have been positive in the fifth period upon being unresponsive to short-term external debts during the first four periods, and significantly negative responses comparing to significant tourism revenues and foreign direct investments in the sixth and eighth periods. Crude oil imports provide the most evident responses to the international reserves and hot money movements within the financial resources of the current account deficit. The research observes that while the international reserves are positive and powerful in the third, fifth and ninth periods, are negative in the second, fourth, sixth and tenth period, and significantly impacts the crude oil import. The most evident responses given to the hot money movements are negative in the second period and positive in the ninth period.

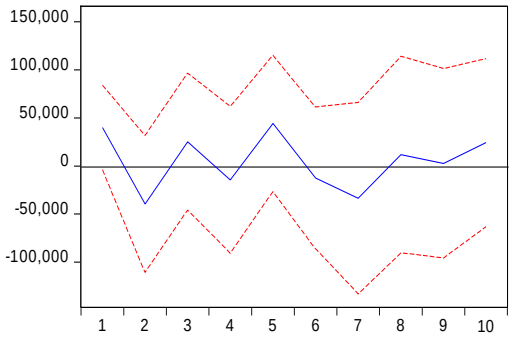
In analyzing the results of the Variance Decomposition in Table 12, the research notes that it is the most significant variable that explains the crude oil import at the end of ten periods. At the end of the tenth month, 60% of the shock that is emerged in the crude oil import is about itself. The ratio of foreign direct investments, tourism revenues and short-term external debt in the industrial production index is low compared to other resources of financing. In this context, the percentage of the international reserves and hot money movements account for the industrial production index is about 14 percent and 9 percent respectively. Such results support Impulse-Response analysis.

Graphic 3. Response to Cholesky One Standard Deviation Innovations ± 2 Standard Error

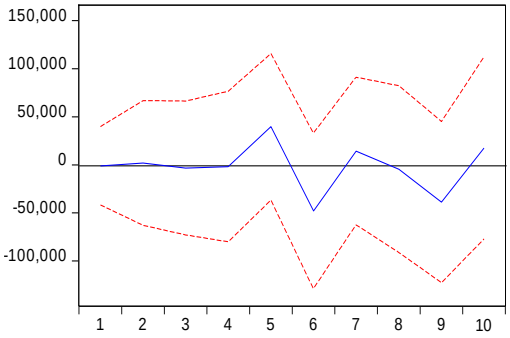
Response of DOIL to DTOUR



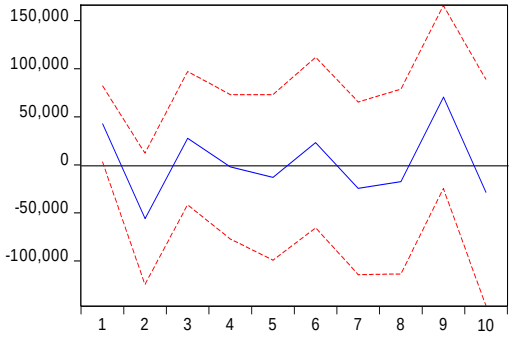
Response of DOIL to DFDI



Response of DOIL to DSFD



Response of DOIL to HMM



Response of DOIL to DIREZ

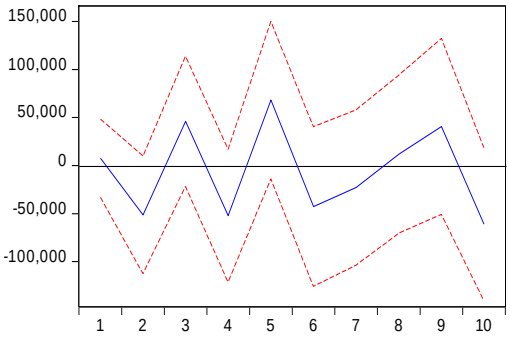


Table 12. Variance Decomposition Results

Period	DTOUR	DFDI	DSFD	HMM	DIREZ	DOIL
1	2.188730	2.648558	0.001712	3.026823	0.095322	92.03886
2	2.968087	3.589285	0.005438	5.640002	3.049146	84.74804
3	3.009838	4.121012	0.017384	6.219490	5.216525	81.41575
4	3.919936	4.110540	0.020008	5.881383	7.701416	78.36672
5	4.215553	5.546354	1.479372	5.488159	11.28763	71.98294
6	4.835826	5.357117	3.395686	5.638513	12.21544	68.55742
7	5.003994	6.017745	3.392506	5.845152	12.02429	67.71631
8	5.760068	6.051101	3.363409	6.016298	11.97424	66.83489
9	5.399929	5.678399	4.308010	9.460705	12.49638	62.65658
10	5.198321	5.880148	4.358343	9.681277	14.72707	60.15484

Cholesky Ordering: DTOUR DFDI DSFD HMM DIREZ DOIL

4.4. The Interaction of Inflation as a Current Account Deficit Determinant and Financial Resources

In analyzing Table 13 and Table 14, according to the LR and AIC, which are the most suitable delay length in the model, is twelve. The research has experienced variance and autocorrelation problems with twelve delay lengths. There is no problem of instability in the model with ten delays, the model is stable and steady.

Table 13. Lag Length Criteria Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-5976.878	NA	2.66e+31	89.38624	89.64575*	89.49170*
1	-5926.675	94.41190	2.15e+31	89.17426	90.21229	89.59608
2	-5865.344	109.8474	1.48e+31*	88.79618	90.61273	89.53437
3	-5831.694	57.25567	1.55e+31	88.83125	91.42633	89.88580
4	-5803.589	45.30228	1.77e+31	88.94909	92.32270	90.32002
5	-5782.047	32.79573	2.26e+31	89.16488	93.31701	90.85217
6	-5761.540	29.38371	2.96e+31	89.39611	94.32677	91.39977
7	-5732.642	38.81803	3.48e+31	89.50212	95.21129	91.82214
8	-5699.473	41.58438	3.91e+31	89.54438	96.03208	92.18077
9	-5672.449	31.46164	4.94e+31	89.67834	96.94456	92.63110
10	-5623.380	52.72993	4.63e+31	89.48329	97.52804	92.75242
11	-5578.442	44.26811	4.78e+31	89.34987	98.17315	92.93537

***** indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.

Table 14. The Stability Tests of VAR(10) Model

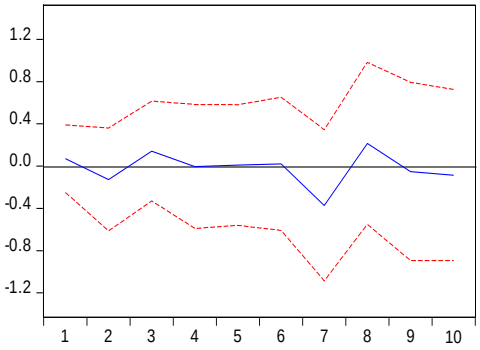
VAR(10) Residual Serial Correlation Lagrange Multiplier Tests	
Lag	Probability
1	0.1212
2	0.3720
3	0.2752
4	0.2337
5	0.8758
6	0.5777
7	0.6572
8	0.1198
9	0.2316
10	0.3173
VAR(10) Residual Heteroskedasticity Tests (Levels and Squares)	
Chi-Square	Probability
2589.238	0.3488

VAR(10) Residual Normality Test	
Jarque-Bera	Probability
26.29693	0.1436

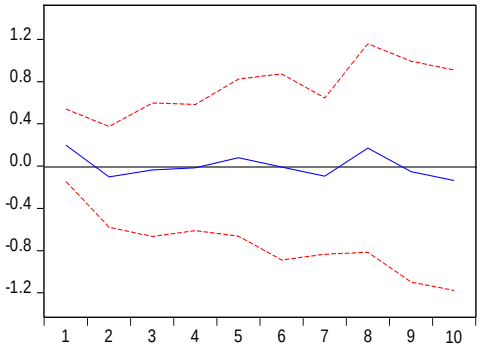
Graphic 4 illustrates the response of inflation rates to the shock in the financing resources. Taking the inflation rates into account for overall ten periods against the shock that is emerged in the direct foreign investments and international reserves, its responses are vague and nearly zero throughout the entire period. Furthermore, as the determinant of the current account deficit, the inflation rates give evident responses to the short-term external debts and hot money movements throughout the period. The research observes that while the short-term external debts are positive and significant in the third, sixth and ninth periods, they are negative in the second, seventh and tenth period, and significantly impacts the inflation. While the most evident responses to the hot money movements are positive in the second and fifth period, they are negative in the fourth and seventh period.

Graphic 4. Response to Cholesky One Standard Deviation Innovations ± 2 Standard Error

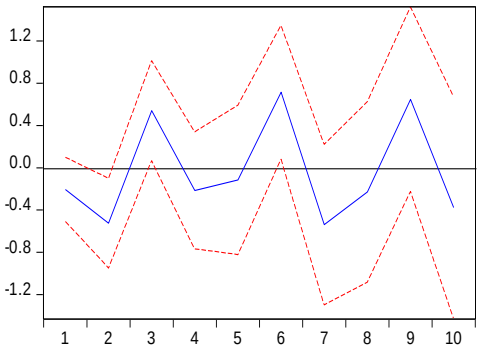
Response of DDINF to DTOUR



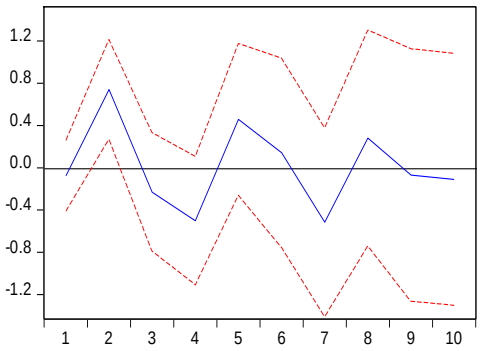
Response of DDINF to DFDI



Response of DDINF to DSFD



Response of DDINF to HMM



Response of DDINF to DIREZ

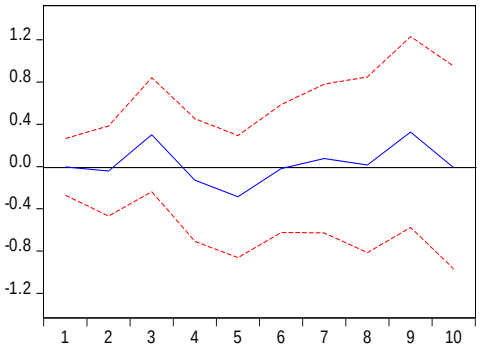


Table 15. Variance Decomposition Results

Period	DTOUR	DFDI	DSFD	HMM	DIREZ	DDINF
1	0.153723	1.225696	1.310248	0.177852	0.000228	97.13225
2	0.420162	0.996318	6.356466	11.14690	0.036012	81.04414
3	0.672521	0.828802	9.926469	9.906810	1.514295	77.15110
4	0.529434	0.655093	8.395862	11.00878	1.403533	78.00729
5	0.504770	0.700318	8.148206	13.03475	2.329534	75.28242
6	0.442317	0.607712	12.46873	11.50903	2.022679	72.94953
7	1.661882	0.613746	13.55109	12.49651	1.818173	69.85860
8	2.022498	0.856267	13.62329	12.84793	1.768136	68.88188
9	1.810060	0.779024	15.37435	11.39515	2.408373	68.23304
10	1.837092	0.910834	16.22550	11.30600	2.370356	67.35022

Cholesky Ordering: DTOUR DFDI DSFD HMM DIREZ DDINF

In analyzing the results of the Variance Decomposition in Table 11, the research notes that it is the most significant variable that explains the inflation rates at the end of ten periods. At the end of the tenth month, 67% of the shock that is emerged in the inflation is about itself. The ratio of foreign direct investments, tourism revenues and international reserves in the inflation is low compared to other resources of financing. In this context, the percentage of the short-term external debts and hot money movement account for the industrial production index is about 16 percent and 11 percent respectively. Such results support Impulse-Response analysis.

5. CONCLUSION AND EVALUATION

The research has sought to analyze the dynamic relations between current account deficit and financial resources in the Turkish economy by taking into account the conditions of sustainability by creating four different VAR models with a dataset that contains monthly data and covers the period of 2006-2018. It has sought to identify the existence of structural breaks in the relevant period with the help of Zivot-Andrews unit root test and the dynamic relations between the series with the help of "variance decomposition" and "impulse-response" functions in the VAR models that are created. This research provides clearer policy results and recommendations, unlike the existing literature.

The VAR model results of Impulse-Response functions and Variance Decomposition, in which the industrial production index of the economy where represents the demand, growth and production for a sustainable current account deficit is analyzed, indicate that the industrial production index provides the most evident and robust responses to the short-term external debts and international reserves. It notes that the responses given to other financing resources are vague and low. Analyzing the direction of response of the industrial production index, the research has concluded that there is a positive trend that is, an impact that

increases the current account deficit. It concludes that short-term foreign debts and international reserves are effective as a policy tool yet such impact is not stable and sustainable according to the empirical findings. In theoretical terms, this degree of efficiency of the international reserves in the economy leaves the country economies vulnerable to possible foreign exchange crises. As a resource of external financing, the intensive use of short-term external debts has an increasing impact on the vulnerabilities in the economy.

The crude oil import, which is another current account determinant that represents the sustainability condition, is an indicator of external dependence in energy in line with the VAR model that has been created. The results of the impulse-response functions and Variance Decomposition in this model illustrate that the financial resources that impact the crude oil import the most are the international reserves and hot money movements. Taking the relevant period into account, the direction of the responses is negative and towards reducing the current account deficit in general terms yet follows an unstable course. Crude oil imports have a strong positive response to hot money movements and international reserves in the fifth and ninth periods. In this perspective, the research can argue that international reserves and hot money movements are not reliable financing resources for sustaining current account deficit at low levels.

Inflation rates, which are measure of credibility of the monetary policy in the economy and that have a significant impact on the exchange rate changes, are a variable that is analyzed in the VAR model as another determinant for sustainability of the current account deficit. According to VAR model impulse-response functions and variance decomposition results, the research observes that short term external debts and hot money movements have an important and robust impact on inflation. The impact of tourism revenues and foreign direct investments is uncertain as in the other VAR models. As the financing resources for the current account deficit, as the short term external debts and financing resources have an unstable yet significant impact on inflation series, they make it difficult for current account deficit to remain sustainable at low levels.

The common result to take away from the four different VAR models, which are created for this research, is that the most powerful and evident policy tools for financing resources of current account are short-term external debts, international reserves and hot money movements. The responses of four different current account deficit determinants, which are chosen for sustainability, to the financing resources are not reliable and stable. The impact of tourism revenues and direct foreign investments on the current account deficit determinants, which are chosen, is vague and close to zero. According to the results, this research concludes that the Turkish economy should abandon the short-term external

debts, international reserves and hot money movements, which are used extensively, to reduce the current account deficit to a reasonable and sustainable level. As these financing resources have a speculative and fragile structure, they cause instability on the current account deficit. The extensive use of international reserves on country economies results in vulnerability against the exchange rate crisis. Furthermore, tourism revenues and direct foreign investments provide more permanent stability on the current account deficit in comparison to other financing resources. However, high economic growth may need to be disregarded at this point. As the rise in foreign direct investments will increase the indirect growth in parallel with the rise in production, which in turn leads to a rise in the current account deficit as long as intermediate goods imports continue. In conclusion, either economic growth should be disregarded or the need for intermediate goods will be met domestically.

7. REFERENCES

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