The Role Of Twin Deficit Problem In Sustainable Growth: An Econometric Analysis For Turkey

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Abstract

In economics literature the relationship between budget deficit and current account deficit is known as twin deficit hypothesis. The Keynesian Approach accepts a relationship between two deficits. In contrast to this, Ricardian Equivalence Hypothesis defends there is no relationship between these two deficits. Twin deficit has become the subject of several studies to test which of these hypotheses are reliable but no consensus has achieved. Some studies found a relationship from budget deficit to current account deficit but some of them had the opposite result. Especially after 1980 it is known that many developed and developing countries encountered with this twin deficit problem. Also Turkey has the problem of twin deficit. Therefore, it is important to find whether there is a causality between them and the direction of this causality.

In this study the relationship between budget deficit and current account deficit is examined by using Johansen Cointegration Analysis. This study is based on period 1996:Q1-2011:Q4. According to results of co-integration; variable coefficients are statistically significant and consistent with what we expected in hypotheses. CAD has a significant negative effect on BD. When there is a 1% increase in CAD, BD decreases 0,12%. This finding is consistent with economic theory because according to Keynesian Approach two deficits have

relationship with each other. However, in contrast to this approach, the direction is from CAD to BD and also coefficient is negative.

Keywords:Budget Deficit, Current Account Deficit, Sustainable Growth, Econometric Modeling, Turkey

1. INTRODUCTION

The Twin Deficit is referred to a situation where an economy is running both Current Account Deficit (CAD) and Budget Deficit (BD). According to Ricardian Equivalence CAD and BD are not correlated. Budget deficit is a result of tax cut which reduces public revenues and public saving (Alkswani, 2000: 4). Decrease in public savings will be compensated by an increase in private saving. Therefore national saving will not be affected and the budget deficit will have no effect on the current trade deficit (Alkswani, 2000: 4). On the other hand, according to Keynesian proposition the two deficits are linked and the direction is from BD to CAD. Because if there is a budget deficit, government has to borrow more and as a result the interest rates rise. The rise of interest rates leads inflow of money from abroad and then the local currency appreciates. The appreciation of currency results with increase in import and decrease in export. As a result, trade deficit increase and current account balance distorted.

The twin deficit has started to become a problem with the beginning of the 1980's in USA. Increase in military expenditures and decrease in income tax raised budget deficit. The increase in budget deficit caused increase in debt of US to the rest of the world and therefore caused distortion in balance of payments. After the global crisis in 2008, it is seen that not only in USA also in other developed and developing countries have the same macroeconomic problems. Especially in developed countries such as European countries faced with serious problems in their economies. Growth in developing economies such as China and India has become a danger for developed countries. Foreign trade worsened and caused decrease in balance of payments in western countries. Also high borrowing of governments deepened crisis in European countries.

In recent years, CAD has become the most discussed issue for Turkey's economy. According to Peker (2009) macroeconomic policies such as inflation targeting generally cause appreciation of local currency and thus stimulate import. Turkey has lack of savings like other developing countries. Because of this, growth in economy depends on import oriented production and consumption. Although Turkish economy performs high level of growth, the trade balance is worsening. In the last decade Turkish foreign trade has showed a large increase. However, increase in trade volume has become more than increase in export. Also increase of gas and oil prices in the world has increased Turkey's energy expenditure. Therefore trade balance and also current account balance worsened.

After the 1999 earthquake and 2001 crisis, fiscal policies tightened and to increase the revenues new tax policies implied. Especially new taxes such as Private Consumption Tax (ÖTV) on import oriented goods implied to help improving budget balance. Especially ÖTV revenues on petroleum products, almost totally import oriented, helped to finance the budget deficit. Tax burden is 20% in 2011 which was 13% in 1998. Also share of value-added taxes (VAT) from import in total value-added tax revenues raised to 17% which was 11% in 1999. The gap between domestic VAT and VAT from import is closed as of 2011.

The growth in economy and tightened fiscal policies reduced the vulnerability to crisis of Turkish economy. However, good performance of budget balance had no positive effect on balance of payments. Export-import ratio was under 70% except 2001 and 2009. After 2001 Trade deficit increased continuously and in period 1997-2004 CAD/GDP ratio was 1,1% but in period 2005-2010 the ratio raised to 5,1%.

 Graph 1 shows the relation of BD and CAD in the last 15 years.

Figure 1. Budget Deficit and Current Account Deficit in Turkey, 1996-2011

(millions of $)
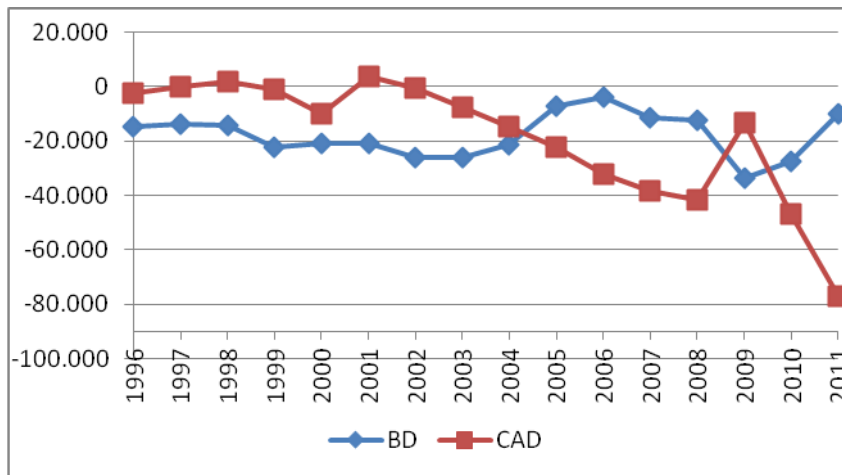
Source: Electronic Data Delivery System (EDDS), CBRT, 2012.

As seen in the figure, especially after the 2001, Current Account Balance continuously worsens. However, in this period Turkish economy experienced high growth rates. With the global financial crises in 2009 CAD decreases sharply. After that it increases sharply too. In this period BD moves in the opposite direction. According to graph, BD did not rise over 30 billion dollars except 2009. Shrink in economy and decrease in foreign trade decreased budget revenues in 2009. However in the last decade BD/GDP ratio decreased continuously and become -1.4% as of 2011. This ratio is less than 3% which is the reference value in Maastricht Criteria. As of 2011 most of the EU member countries do not meet this criterion.

In this paper it is discussed whether CAD and BD has a correlation with each other and if there is, in which direction is this relationship. According to hypothesis of this paper there is a correlation between these two deficits and it is negatively correlated. Because the increase in trade deficit increases the budget tax revenues and this help to decrease budget deficit.

2. LITERATURE

In economic literature, there are many empirical researches that focused on twin deficit problem. In 1980's United States faced with increase in federal trade deficit (TD) and federal budget deficit together. After that the relationship between trade deficit and budget deficit has become an important subject for researchers.

Darrat (1988) tried to find the linkage between TD and BD by using data period 1960:I to 1984:IV for United States. He found the evidence of causality from budget deficit to trade

260

deficit and stronger causality from trade to budget deficit by using multivariate Granger Causality Test.

In the other study for the U.S., Enders and Lee (1990) searched the relationship between BD and CAD in period 1947 to 1987 by using VAR analysis. They found that government spending innovation generates a persistent current account deficit.

Also, Abelln (1990) examined the relationship between federal budget deficits and merchandise trade deficit for U.S. He used multivariate time series within autoregressive model for period 1979:02 through 1985:02. He found that indirectly budget deficits affect trade deficits.

Another work on US budget deficit and current account deficit linkage is study of Bahmani-Oskooee (1989). He examined the linkage in period 1973-1985 and concluded that the budget deficit contribute to current account deficit.

Not only U.S. but also other countries are faced with this twin deficit issue. Therefore, there are studies about other countries too. Islam (1998) examined the casual relationship between budget deficits and trade deficits of Brazil from 1973:1Q through 1991:Q4. The results suggested that there is a bilateral causality between them.

Vamvoukas (1999) used annual data in period between 1948 and 1994 for Greece. He used error correction model for the analysis and found that budget deficit has short and long run positive and significant causal effects on trade deficit.

Alkswani (2000) studied on twin deficit problem in petroleum economy by using Saudi Arabia annual data from 1970 to 1999. In his empirical analysis he used ECM, Johansen cointegration and Granger bivariate causality tests and as a result found that trade deficit causes budget deficit.

Also in Turkey, there are many studies focusing on Turkey's twin deficit problem. Some of these studies are Ay, et al.(2004), Uğur and Karatay (2009), Aksu and Başar (2005), Utkulu (2003), Yücel and Ata (2003), Kutlar and Şimşek (2001), Zegin(2000), Sever and Demir (2007), Akbostancı and Tunç (2002). Some of them used current account deficit variable and some used trade deficit variable in their empirical studies. Most of them used quarterly data for Turkey.

Akbostancı and Tunç (2002) used quarterly variables between 1987:Q1 and 2001:Q3. They used Budget balance and trade balance as a percentage of GDP. By using ECM and Cointegration analysis the empirical results show that there is a long run relationship between two and in the short run worsening of budget balance worsens trade balance.

Sever and Demir (2007) used quarterly data between the years 1987 and 2006 to examine the relationship of budget deficit with current account deficit. By using stationarity test, granger causality test and VAR analysis they found that budget deficit influence current account deficit indirectly.

Şimşek and Kutlar (2001) used budget deficit and trade balance seasonally adjusted data in log form in period 1984(4) through 2000(2). In the analysis stationarity test, granger causality test, misspecification test, cointegration test and ECM used and found that there is a positive relationship between two variables and trade deficit increase budget deficit.

Zengin (2000) used seasonally adjusted quarterly data for period 1987:I through 1998:I. The main variables are trade deficit and consolidated budget deficit as ratios to GNP. In the

analysis VAR, Variance decompositions and impulse response function used. The result of the empirical analysis is that budget deficit influence trade balance.

Yücel and Ata (2003) used yearly data from 1975 to 2002. The variables are current account deficit an budget deficit both in log form. The result of the empirical analysis is that there is a cointegration between CA and BD and there is a long run positive relationship. Granger causality test results say that causality is from BD to CA in lag(1) and causality is from CA to BD in lag (3,4 and 7).

Utkulu (2003) used budget deficit and trade deficit variables as yearly data in period between 1950 and 2000. By using cointegration analysis and ECM, he found that there is a two sided long run causality between budget and trade deficits.

Ay et al.(2004) used monthly data between 1992 and 2003 for the empirical analysis to find the linkage between BD and CAD. The variables used in the empirical analysis were in percentage of GDP. They used Granger Causality test and regression analysis. According to the empirical analysis there is reciprocal relationship between two variables. According to two regression analysis the coefficients are positive.

3. MODEL, METHOD AND DATA SET

In this section, a multivariate model has established to investigate twin deficit problem in Turkey.

BD = β0 + β1 CAD + Ut   (1)

Where BD, CAD, are budget deficit and current account deficit respectively. Budget deficit (BD) is generally defined as an amount by which some measure of government expenditure and some measure of government revenue. BD is dependent variable, whereas, current account is independent variable in this model. And current account deficit (CAD) Current account deficit includes foreign trade in goods, services and transfers. Current account occurs when a country's total import of goods, services and transfers is greater than total export of goods services and transfers. Many studies in the literature use BD as an independent variable. But in this study BD is used as dependent variable unlike other studies.

This paper adopted the method of co-integration first found by Engle-Granger (1987), developed by Johansen (1988) and applied by Johansen and Juselius (1990). This method depends on direct investigation of co-integration in the vector autoregressive (VAR) representation and produces maximum likelihood estimators of the unconstrained co-integration vector, but it allows one to explicitly test for number of co-integration vectors. Johansen's methodology takes its starting points in the vector auto regression (VAR) of order p given by;

yt= A1   yt-1 + ……. Apyt-p + Bxt + Ɛt,   (2)

Where yt is a k vector of non-stationary variables I(1), xt is a d vector of deterministic variable; and Ɛt indicates an innovation vector. This VAR can be written as;

p-1

Δyt= π yt-1 + Σ τiΔyt-I + Bxt + Ɛt,   (3)

i-1

where

p

$$\pi = \Sigma \ Ai - I, \ \ \tau i = - \Sigma \ Aj. \hspace{4cm} (4)$$

I=1

Where cointegration hypothesis defined as a reduced rank of the matrix π is stated in the form of $\pi = \alpha\beta$. α and β represent the two matrix which have (kxr)-dimensional and r rank. r is the number of co-integration (rank), β is a co-integration vector showing long-term effects of variables in the equilibrium relations and α indicates speed of adjustment in error correction model. Accordingly an matrix π is estimated from an unrestricted VAR in Johansen method and tested that specified conditions with reduced rank of π rejected or not. And determined by the help of Johansen method's test statistics (λtrace and λmak) how many rank of the matrix π has.In this context, the data set of the variables used to determine the twin deficit problem in Turkey belong to1996:Q1-2011:Q4 period. All data were taken from Electronic Data Delivery System (EDDS) published by the Central Bank of the Republic of Turkey (CBRT). And Econometric Views (Eviews 5.1) software program was used for all tests and estimates.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1. Pre Tests

Before constructing the Johansen method, it is important to make some process and pre-tests. Firstly the independent variables were transformed into logarithmic form and variables are understood to have seasonal effect deseasonalized by using moving average method. Then checked the univariate time series of variables by using a unit roots test. Here checked unit roots of variables by adopting the Augmented Dickey Fuller (ADF) (1979) test. ADF unit root test results can be seen in Table 1.

Variables were initially tested with first-level values and then tested with the levels of receipt of the first differences. Accordingly determined that all variables are integrated in the same order I(1). Therefore the necessary pre-condition for co-integration is provided.

Table 1. ADF Unit Root Test

		Critical Values
Variables	ADF Test	1 %
BD	-2.318258 [3]	-4.1118
CAD	-3.353061 [1]	-4.1104
ΔBD	-9.694507 [2]	-3.5440
ΔCAD	-4.617754 [6]	-3.5526

Note: Trend and intercept term is used as test type for BD and CAD variables, but only intercept term is used for the first differences of variables (Δ). The values in square brackets indicates appropriate length of delay according to AIC.

It is necessary to determine an appropriate number of delay to apply Johansen method. There are many measurements in the literature to determine the length of delay; Akaike Info Criterion, Schwarz Info Criterion, Hannan-Quin Criterion and Recent Forecast Error Criterion are the most commonly used (Johansen, 1995; Enders, 1995). But these criterions are not enough on their own. Also there should not be econometric problems in the length of delay selected with info criterions. According to this, in this model the length of delay is determined as two. In this context the model presented in Table 2 shows forecasting of diagnostic test is successfully;

Table 2: Diagnostic Test Results

White Heteroskedasticity		
Chi-sq	Df	Prop
14.897	18	0.669
Normality Test		
Jarque-Bera	Df	Prop
0.203535	2	0.9032
0.633672	2	0.7285

4.2. Cointegration Analysis

After checking univariate of all time series variables, now can be tested co-integration among these two variables (BD and CAD). The purpose of the co-integration test is to determine whether a group of non-stationary series are co-integrated or not.

According to Table 1, all variables are I(1), that means co-integration relation between unemployment and independent variables can be investigated by helping of Johansen Co-integration Method. The results of λtrace and λmak statistics are presented in Table 3. λtrace and λmak statistics helps to find existence of co-integration and number of vectors. According to the statistics; the null hypothesis (there is no co-integration relation between variables), is rejected against to alternative hypothesis (there is at least one co-integration relationship between the variables). In this case, should be concluded the existence of at least one co-integration relationship at 5 % critical value.

Table 3: Co-integration Test

Null Hypothesis (H_0)	Alternative Hypothesisis (H_1)	Eigenvalue	Trace and Mak Statistics	5% Critical Value

λTrace			λTrace statistic	
r = 0	r > 0	0.309956	23.57399	15.49471
r ≤ 1	r > 1	0.009183	0.571998	3.841466
λMak			λMak statistic	
r = 0	r = 1	0.309956	23.00199	14.26460
r = 1	r = 2	0.009183	0.571998	3.841466

The co-integration equation is presented in Table 4. According to results of co-integration; variable coefficients are statistically significant and consistent with what we expected in hypotheses. CAD has a significant negative effect on BD. When there is a 1% increase in CAD, BD decreases 0,12%. This finding is consistent with economic theory because according to Keynesian Approach two deficits have relationship with each other. However, in contrast to this approach, the direction is from CAD to BD and also coefficient is negative.

Table 4: Co-integration Equation

	BD	CAD
Normalized Co-integration coefficient (β')	1.000	0.122535 (0.08580)
Adaptation rates coefficient (α)	-0.000427 (7.68E-05)	-5.23E-05 (0.00019)
Co-integration Equation	*BD= 5001.857 - 0.122535CAD*	

4.3. Error Correction Model

If there is a co-integration relationship among non-stationary variables, there has to be an error correction representation (Engle & Granger, 1987) which illustrates the dynamic convergence of the system to the long-run equilibrium. A precondition for the existence of co-integration is that all the variables are integrated of the same order. If this is fulfilled, then the residuals from the long-run estimates can be used as the error correction term (ECT) to explain the short run dynamic. The error correction variable in a short run

dynamic relationship indicates the proportion of the disequilibrium from one period that is adjusted in the next period (Cholifihani, 2008; 74).

Error correction model (vector error correction: VEC) was established in order to investigate the short-run dynamics of variables acting together in the long-run and the results are presented in Table 5. As seen in Table 5; coefficient of error correction term (EC_{t-1}) is statistically significant and negative. If the error correction term is negative, that means deviations in the short-run will be eliminated and series converges to the long-run equilibrium value again among the series moving together in the long-run. Namely error correction term is good working. According to the result approximately 87 % of deviations from the long-run equilibrium value eliminate in each period.

Table 5: Error Correction Model Estimation Results

$\Delta BA_t = \beta_0 + \beta_1 \Delta CA_{t-1} + \alpha EC_{t-1} + u_t$		
Variables	*Coefficient*	*t-statistic*
ΔBA_{t-1}	-0.049275	-0.33937
ΔCA_{t-1}	-0.247044	-1.45152
EC_{t-1}	-0.874470	-4.69637
Invariable term	-138.1142	-0.31490
$R^2 = 0.46$ $\quad \overline{R}^2 = 0.44$ $\quad$ F = 17.12		

5.CONCLUSION

In this paper we tested whether there is a relationship between BD and CAD in Turkey with the framework of growth. In the last decade, Turkey's economy performed well. After the 2001 crisis new economic policies strengthened the economy against crises. With the help of tight fiscal policies, government did not compromise on the budget. However increase in consumption, appreciated currency, lack of savings and rise in price of energy products caused increase in trade deficit. As a result current account deficit rose. According to empirical results there is a significant negative correlation between BD - CAD and the direction is from CAD to BD. When there is a 1% increase in CAD, BD decreases 0,12%. Many studies on Turkey do not cover last decade's data. However this study reflects the effects of structural changes in Turkish Economy after the period 2001 in terms of BD and CAD. In this regard empirical results of this study differ than other papers. That is to say, an increase in CAD helps to fix the budget balance. 2/3 of tax revenues come from indirect taxes which means most of tax revenues in Turkey come from consumption tax.

It seems that economic growth in Turkey based on consumption which results with CAD. This is not a sustainable situation. Because, in period of slowdown in the economy cause not only decrease in CAD but also deterioration of budget balance. This situation reduces the credibility of the government and the economy. Therefore Turkish economy has to cope with

CAD not with tax policies but with increasing production facilities. If not, the economy may face with both deficits at the same time.

REFERENCES

Abell, J. D. (1990) Twin Deficits During the 1980's: An Emprical Investigation, Journal of Macroeconomics, 12, 81-96.

Akbostancı, E. ve G.İ. Tunç (2002) Turkish Twin Deficit: An Error Correction Model of Trade Balance, Middle East Technical Universty, ERC workingpapers, 1–17.

Aksu, H ve S. Başar (2005) İkiz Açıklar Hipotezi'nin Türkiye Açısından Araştırılması, İktisat, İşletme ve Finansa Dergisi, (20), 109–114.

Alkswani, A.M. (2000) Twin Deficit Phenomenon in Petroleum Economy: Evidence from Saudi Arabia, Seventh Annual Conference, Economic Research Forum, Amman.

Ata, A. Y. ve F. Yücel (2003) Eş-Bütünleşme ve Nedensellik Testleri Altında İkiz Açıklar Hipotezi: Türkiye Uygulaması, Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 12(12).

Ay, A., Z. Karaçor, M. Mucuk, S. Erdoğan (2004) Bütçe Açığı - Cari İşlemler Açığı Arasındaki İlişki: Türkiye Örneği (1992-2003), Selçuk Üniversitesi, Sosyal Bilimler Enstitüsü Dergisi, 12, 75–82.

Bahmani-Oskooee, Mohsen (1989) Effects of the US Government Budget on its Current Account: An Empirical Inquiry, Quarterly Review of Economics and Business, 29, 76-91.

Cholifihani, M. (2008) A Cointegration Analysis of PublicDebt Service and GDP in Indonesia, Journal of Management and Social Sciences, 4(2): 68-81.

Darrat, D.A. (1988), Have Large Budget Deficit Caused Rising Trade Deficit?, Southern Economic Journal, 54, 879–887.

Dickey, D. and Fuller, W. A. (1979) Distribution of the Estimates for Autoregressive Time Series with a Unit Root, Journal of the American Statistical Association, 74, 427-431.

Engle, R. F. and Granger, C. W. (1987) Co-integration and Error Correction Representation, Estimation and Testing, Econometrica, 55, 251-276.

Enders, W. (1995) Applied Econometric Time Series First Edition, Wiley New York.

Enders, W. ve B. S. Lee (1990) Current Account and Budget Deficits : Twins or Distant Cousing, The review of Economics and Statistics, 72(3), 373- 381.

GİB (2012) "Gelir İdaresi Başkanlığı, Vergi İstatistikleri", www.gib.gov.tr

Johansen, S. (1988) Statistical Analysis of Cointegration Vectors, Journal of Economic Dynamic and Control, 12, 1988: 231-254.

Johansen, S. (1995) Likelihood Basic Inference in Cointegration Vector Autoregressive Models, Oxford University Press, New York.

Kutlar, A. ve M. Şimşek (2001) Türkiye'de Bütçe Açıklarının Dış Ticaret Açıklarına Etkileri, Ekonometrik Bir Yaklaşım: 1984–2000, Dokuz Eylül Üniversitesi, İİBF Dergisi, 16 (1), 1–13.

Peker, O. (2009) Türkiye'deki Cari Açık Sürdürülebilir mi? Ekonometrik Bir Analiz, Kocaeli Üniversitesi Sosyal Bilimler Enstitüsü Dergisi 17(1), 164-174.

TCMB (2012) Elektronik Veri Dağıtım Sistemi (EVDS), www.tcmb.gov.tr

Utkulu U. (2003) Türkiye'de Bütçe Açıkları ve Dış Ticaret Açıkları Gerçekten İkiz mi? Koentegrasyon ve Nedensellik Bulguları", D.E.Ü. İİBF Dergisi, 1(18), 45–61.

Sever, E. And M. Demir (2007) Türkiye'de Bütçe Açığı ile Cari Açık Arasındaki İlişkilerin VAR Analizi ie İncelenmesi, Eskişehir Osmangazi Üniversitesi İİBF Dergisi,2(1),47-63.

Vamvoukas, G. (1999) The Twin Deficits Phenomenon: Evidence From Greece, Applied Economics,31, 1093-1100.

Zengin, A. (2000) İkiz Açıklar Hipotezi (Türkiye Uygulaması), Gazi Üniversitesi Ekonomik Yaklaşım Dergisi,11(39), 37–67.