TWIN DEFICIT HYPOTHESIS: EVIDENCE FROM THE TURKISH ECONOMY

İKİZ AÇIKLAR HİPOTEZİ: TÜRKİYE EKONOMİSİNDEN KANITLAR

Sabri AZGÜN
Yüzüncü Yıl University, Department of Economics
sabriazgun@yyu.edu.tr

ABSTRACT: The Turkish economy has functioned according to the outward-oriented growth model since 24 January 1980, when structural changes and transformation decisions were agreed upon. However, chronic external deficit problems have been encountered since the adoption of the outward-oriented growth model. The purpose of this study is to test the hypothesis of twin deficits for period 1980-2009 in Turkish economy. In this context, the relationship between budget deficits and current account deficits have been examined theoretically. And the direction of this relationship has been analyzed empirically by means of the VAR Granger causality test and regression analysis. The findings reveal that there is in fact a causality relationship from the budget deficits towards current account deficits.

Keywords: Budget Deficits; Current Account Deficits; Causality

JEL Classification: C22; F41; H62

ÖZET: *Türkiye Ekonomisinde,24 Ocak 1980'de kabul edilen yapısal değişim ve dönüşüm kararları ile dışa açık büyüme modeli benimsenmiştir. Dışa açık büyüme modelinin benimsenmesi ile birlikte kronik dış ticaret açıkları ile karşılaşılmıştır. Bu çalışmanın amacı, Türkiye Ekonomisi için ikiz açıklar hipotezini 1980-2009 arasındaki dönem için test etmektir. Bu kapsamda, bütçe açıkları ve cari işlemler açıkları arasındaki ilişki ve bu ilişkinin yönü VAR Granger testi ve regresyon aracılığı ile araştırılmıştır. Elde edilen bulgular, bütçe açıklarından cari işlemler açıklarına doğru nedensellik ilişkisinin olduğunu ortaya koymaktadır.*

Anahtar kelimeler: *Bütçe Açıkları; Cari İşlemler Açıkları; Nedensellik*

1. Introduction

Since the beginning of the 1980s, the United States budget deficits have been in existence. These deficits have not only decreased economical activity, but have also caused significant increases in current account deficits. This condition has allowed for the hypothesis of twin deficits, which expresses the relationship between the budget deficit and current account deficit, to find a place within the economic literature (Khalid and Guan, 1999). The twin deficits hypothesis can be explained as the determination of whether there is a causality relationship between public sector deficits, current account deficits and capital movements. It is generally accepted in the financial literature that the direction of causality is from public sector deficits towards current account deficits. In financial literature, twin deficits are basically explained through two approaches: 1) Conventional approaches, which express that public sector deficits cause current account deficits (i) The Keynesian income-spending approach and ii) The Feldstein chain approach. 2) The Ricardian equivalence hypothesis, which expresses that public sector deficits do not cause current account deficits. Until the 1980s, a large proportion of the public sector took

part in Turkish economic activity, due to the existence of public economic enterprises. Together with the structural changes and transformation program of 1980, the outward-oriented growth model was adopted and current accounts began to show signs of significant deficits. The purpose of this study is to determine whether the twin deficits hypothesis is valid in Turkey from the period of 1980-2009. It is possible to analyze the literature related to the hypothesis of twin deficits within two groups. Studies of the first group consist of studies that acquire findings that support the hypothesis of twin deficits within the framework of conventional approaches (Darrat, 1988), (Zietz and Pemberton, 1990), (Bachman, 1992) (Pahlavani and Saleh, 2009), (Khalid and Guan, 1999) (Vamvoukas, 1999), (Akbostancı and Tunç, 2002). Studies of the second group are the studies that support the (Enders and Lee, 1990) Ricardian equivalence hypothesis.

This study consists of five sections. The first section is the introduction to the study. In the second section, the relationship between budget deficits and current account deficits is presented within a conceptual framework. In the third section, the econometric method, which provides the relationship in question, is given. In the fourth section, analysis is carried out and the findings acquired are presented. The fifth and final section is the conclusion in which the findings acquired are assessed.

2. Conceptual Framework

In this section, the basic hypotheses that describes the twin deficits hypothesis, the mechanism via which public deficits affect trade deficit is discussed. According to the Keynesian-income spending approach, open budget policies that occur as a result of a decrease in taxes or an increase in public expenditures cause an increase in the national income. The increase in the national income enhances the import sector and this condition results in the increase of current account deficits. The Feldstein chain, on the other hand is explained within the framework of the relation of exchange, hot money and interest. According to this thesis, if the flexible exchange rate policy and perfect capital mobility are in question, public sector deficits that occur as a result of the increase of public activity cause a decrease in national savings. In order to recover the internal savings deficit, the interest rate is increased and external possessions are drawn into the country. Together with the external possessions, national assets are increasingly overvalued and this results in a deterioration of net export. In other words, public sector deficit causes the increase in the local interest rate and enables the capital inflow into the country. Capital inflow, on the other hand, leads to the appreciation of the national currency. This situation causes the growth of current account deficit (Feldstein, 1992)

Another approach that explains the relation between the balance of budget and current account deficits is the Ricardo equivalence hypothesis. According to the hypothesis in question, there is no causal relationship between budget deficits and current account deficits. In cases where the budget deficit is met by a loan, taxes are increased in order to facilitate the debt in question in the future. Economically astute individuals direct the increase in their disposable incomes towards possession rather than towards consumption, together with the reduction in taxes (Barro, 1989:38–39). Accordingly, budget deficits are not effective when it comes to current account deficits, since increased income due to the expansionary fiscal policy is not channeled into consumption.

The operation mechanism of the conventional approach is determined by means of a basic national accounting identity. In this context, the identity of a national income could be written as follows.

$$Y = C + I + G + NX \tag{1}$$

In (1)-(5), TA denotes the taxes, TR denotes the transfer expenditures, I denotes the investment expenditures of the private and public sectors and NX denotes the net export. The relationship between national revenue and disposable income is obtained through deducting taxes (TA) from the national income and adding transfers (TR). Disposable income (YD=Y+TR-TA) is subject to consumption or saving; disposable revenue consumption plus savings. YD=C+S. Approaching the two latter expressions together, the following equation is obtained.

$$C + S \equiv YD \equiv Y + TR - TA \tag{2}$$

The equation (2) could be expressed as follows as the alternative.

$$C \equiv YD - S \equiv Y + TR - TA - S \tag{3}$$

If equation (3) is put in equation (1), equation (4) is obtained.

$$Y \equiv (Y + TR - TA - S) + I + G + NX \tag{4}$$

If equation (4) is arranged, the following equation which gives the relation between public sector deficit and current account deficit is acquired.

$$S - I \equiv (G + TR - TA) + NX \tag{5}$$

The identity, which is expressed with equation (5), displays the basic interaction mechanism between public sector deficits and current account deficits. If the government spends more than its income, it is supposed to take on debt for this spread from either the private sector or from other countries. Using external possessions, current account deficits enable the country to spend more than its income. If the private sector does not have possession surplus, the budget deficit, which is expressed in the first term on the right side of equation (5), could be met by a current deficit. Although the public sector also acquires debts in the private sector, this generally is not sufficient to meet public deficits and the balance of current accounts always has a deficit (Yıldırım et al, 2007:423).

3. Econometric Method
On the point of depicting the variable of budget deficits (BD) and the variable of current accounts deficits (CA), the causality relation between the variables BD and CA is explained below. It is determined through using the causality relation between two or more variables, the Engle- Granger causality test, the Vector Autoregressive Model (VAR) and the Vector Error Correction Model (VECM). The causality relation between two variables is established by using the Engle-Granger Causality test if all the variables are stable I (0) (Enders 2004). Variables BD and CA being I (0), the causality relation between them is expressed by the equations below:

$$BD_t = \beta_{10} + \sum_{i=1}^{N_{11}} \beta_{11} BD_{t-i} + \sum_{j=1}^{N_{12}} \beta_{12} CA_{t-j} + u_{1t} \tag{6}$$

$$CA_t = \beta_{20} + \sum_{i=1}^{N_{21}} \beta_{21} BD_{t-i} + \sum_{j=1}^{N_{22}} \beta_{12} CA_{t-j} + u_{2t} \qquad (7)$$

In the equation (6) and (7), β_{10} and β_{20} is constant parameters. In the equations, error terms u_{1t} and u_{2t} is the white noise process with the zero mean and the fixed variance. N_{11}, N_{12}, N_{21} and N_{22} show the optimal lag lengths. The following hypotheses are used for the equation (6):

$H_0 : \beta_{12j} = 0 \qquad$ j=1… N_{12}
$H_1 : \beta_{12j} \neq 0 \qquad$ at least for a single j

If H_0 hypothesis is denied for at least a single j, then the variable CA is the Granger cause of the variable BD. On the other hand, the following hypotheses are set for equation (7):

$H_0 : \beta_{21i} = 0 \qquad$ i=1… N_{21}
$H_1 : \beta_{21i} \neq 0 \qquad$ at least for a single i

If the basic H_0 hypothesis is denied for at least one i, then the variable CA is the Granger cause of the variable BD. If the basic hypothesis of $H_0 : \beta_{12j} = 0$ and $H_0 : \beta_{21i} = 0$ are denied respectively for equation (6) and (7), a bi-directional causality relation is in question between the variables CA and BD.

If the series of CA and BD are non-stationary and there is no co integration relationship among them, in this case, the causality relation between the variables CA and BD is estimated with the VAR model. The VAR model for the variables CA and BD is depicted as in the equations (8) and (9) below:

$$\Delta BD_t = \mu_{10} + \sum_{i=1}^{N_{11}} \mu_{11i} \Delta BD_{t-i} + \sum_{j=1}^{N_{12}} \mu_{12j} \Delta CA_{t-j} + u_{1t} \qquad (8)$$

$H_0 : \mu_{12j} = 0 \qquad$ j=1… N_{12}
$H_1 : \mu_{12j} \neq 0 \qquad$ at least for a single j

If the H_0 hypothesis is denied for at least one j, then there is a causality relation from the variable CA through variable BD.

$$\Delta CA_t = \mu_{20} + \sum_{i=1}^{N_{21}} \mu_{21i} \Delta BD_{t-i} + \sum_{j=1}^{N_{22}} \mu_{22j} \Delta CA_{t-j} + u_{2t} \qquad (9)$$

On the other hand, the following hypotheses are set for the equation (9):

$H_0 : \mu_{21i} = 0 \qquad$ i=1… N_{21}
$H_1 : \mu_{21i} \neq 0 \qquad$ at least for a single i

If the H_0 hypothesis is denied for at least one i, then there is a causality relation from the variable CA through the variable BD.

If there is a long-term co integration relationship between the variables of CA and BD, although they are not stationary, in this case, the convenient estimation method to determine the causality relation between the variables in question is the Vector Error Correction (VEC) Model (Engle-Granger, 1987) because although co integration gives at least a one-directional causality relationship, it does not show the direction of causality. The Vector error correction model is expressed with the equations (10) and (11), below:

$$\Delta BD_t = \lambda_{10} + \sum_{i=1}^{N_{11}} \lambda_{11i}\Delta BD_{t-i} + \sum_{j=1}^{N_{12}} \lambda_{12j}\Delta CA_{t-j} + \lambda_{13}\varepsilon_{t-1} + u_{1t} \qquad (10)$$

$$\Delta CA_t = \lambda_{20} + \sum_{i=1}^{N_{21}} \lambda_{21i}\Delta BD_{t-i} + \sum_{j=1}^{N_{212}} \lambda_{22j}\Delta CA_{t-j} + \lambda_{23}\varepsilon_{t-1} + u_{2t} \qquad (11)$$

In the equations (10) and (11) Δ means the difference, N means the lag length, λ means the estimated parameters , u_{1t} and u_{2t} means the error terms without autocorrelation and the ε_{t-1} means the error correction terms that are obtained from the following long term co-integration relationship between the BD_t and CA_t which is specified for the equity (12) below.

$$BD_t = \alpha_0 + \alpha_1 CA_t + \varepsilon_t \qquad (12)$$

α_0 is the long term parameters in the equity (12) and ε_t is the long term error term. Both the delayed values of BD_t and CA_t variables and the instabilities (ε_t) of the previous terms cause the change in the dependent variable in the each equation of the equality (10) and equality (11). The existence of short and long term causality could be tested through the Vector Error Correction Model. If parameters (λ_{12}) which are estimated by the lagged values of the variable CA in the equation (10) and parameters (λ_{21}) which are estimated by the lagged values of the variable BD in equation (11) are statistically meaningful according to F(Wald) test, then there is a causality relationship from the variable CA through the variable BD for equation (10). Similarly, there is a causality relationship from the variable BD through the variable CA for the equation (11). The existence of the long-term causality relationship between the variables BD and CA, on the other hand, is determined according to the parameters of the error correction term. The error correction parameter is (λ_{13}) for equation (10) and (λ_{23}) for equation (11). And these parameters are tested whether they are meaningful for the t-test or not. If (λ_{12}) s and (λ_{13}) are meaningful together for equation (10) as a result of the F-Test, then there is a strong relationship from the variable CA through the variable BD. Similarly, if (λ_{21}) s and (λ_{23}) are meaningful together for equation (11) as a result of the F-Test, then there is   a strong relationship from the variable BD through the variable CA

5. Analysis and Findings
In this section, an attempt is made to determine the relationship between budget deficits and current account deficits. In the study, the period of 1980-2009 is analyzed by annual data. The period in question is the period during which an outward-growth model was applied to the Turkish economy together with the

structural change and transformation program of 1980. While BD describes the ratio of public expenditures to public income, CA defines the ratio of current account expenditures to current account incomes. All the variables are expressed in logarithm. The data sources are Turkish Statistical Institute (TUİK) and State Planning Organization. The budget revenue and expenditure data is in thousand Turkish liras and the current account data is in millions of US dollars, converted into Turkish liras using the nominal exchange rate.

Table 1. ADF (Augmented Dickey- Fuller) Test Results

Variable	ADF Test Statistics	Critical Values (%5)	(C; T; L)	Prob.
BD	-1.954885	-2.971853	C;-; 0	0.3039
CA	0.292950	-1.953858	-;-;1	0.7633
ΔBD	-6.954967	-1.953858	-;-; 0	0.0000
ΔCA	-6.205428	-1.954414	-;-;1	0.0000

(C; T;L) denotes, respectively, constant, trend, lag

Summary statistics of the unit-root and the co-integration tests related to financial deficit variable BD and external deficit variable CA, which are used in the study, are presented in Table 1 and Table 2. Although there is non stationary in the level values of variables BD and CA acquired from the budget series and the current account series, it shows that they become stable in their first difference. In this case, there might be a long-term balance relationship between these two series. In order to determine whether there was a long-term balance relation or not, the co-integration test was applied.

Table 2. The Johansen Co-integration Rank Test

Variables	H_0	H_1	λ_{trace}	Critical Value (%5)	Prob
BD CA	$r = 0$	$r > 0$	8.2998	12.3209	0.2144

From Table 2, it is understood that there is no co integration relationship between these two variables. The causality relationship between the non-stationary variables, which have no co-integration relationship between themselves at the same time, is studied with the help of the VAR Granger causality relationship. A summary of the statistics related to the test in question are given in the upper section of Table 3.

Table 3. VAR Granger Causality and Regression Analysis

Direction of Causality	Chi-sq (d.f.)	P value	Result
$BD \rightarrow CA$	6.108961 (2)	0.0471	Acceptance
$CA \rightarrow BD$	0.614043 (2)	0.7356	Rejection
Model: $CA_t = \hat{\alpha}_0 + \hat{\alpha}_1 BD_t + \hat{u}_t$			
Parameter	**Coefficient**	**Std. Error**	**t-statistic**	**Prob.**
$\hat{\alpha}_1$	0.284136	0.121301	2.342390	0.0265

On the other hand, to determine the relationship between the budget deficit and current account deficit, the variables have been subjected to regression on first differences. The results obtained are given in the sub-section of Table 3. Regression analysis, also, supports the results of causality analysis.

Table 4. Lags Under Different Criteria For the Bivariate VAR Model

Lag	Log L	AIC	SIC
1	74.49567	-4.528685	-4.052892
2	74.40159	-.4.723839	-4.440952
3	72.38910	-4.325119	-3.653203
4	69.92336	-3.994105	-3.123115

To determine the degree of the length of the delay of the VAR model, the AIC and BIC criteria has been applied. The results are presented in Table 4. Both the Schwarz (SIC) and Akaike information criterion (AIC) suggest the two delays. The test results have been obtained according to the 5% confidence level.

6. Conclusion

The explanation in the Literature regarding the hypothesis of twin deficits   was mainly attempted through the Keynesian approach, which accepts that there is a causality relationship between budget deficits through current account deficits- the Feldstein chain and Ricardian equivalence hypothesis; however, no relationship whatsoever between budget deficits and current deficits can be assumed. In this study the hypothesis of twin deficits is tested in relation to Turkey. High foreign trade deficits have been experienced in Turkey since 1980, during which an outward growth model was adopted. The increasing foreign trade deficits brought about the economic problems that lead to the two big financial crises of 1994 and 2001. As a result of these crises, high devaluations were executed. The deficits in question still continue to be a matter of debate.

The analysis concentrates on the period from 1980 when the growth strategy of today, directed at import substitution, was first implemented. Together with the structural changes and transformation decisions of 24th January 1980 in the Turkish economy, a growth model directed at export was adopted. Thus, a free market economy was assumed   along with its regulations and liberation for foreign trade. During the period in question, the public sector share within economy decreased as of the 1990s. Likewise, obstacles in front of capital movements were removed. Since the 1980s, foreign trade deficits began to increase along with economic growth. To determine the role of the inadequacy of domestic savings in the increasing foreign trade deficits, regression and causality analysis is undertaken. The results of the analysis lend support to the twin deficit hypothesis. Consequently, in the Turkish economy, especially after the 1990s, external deficits were financed by the input of hot money based on high interest-low exchange rate. It has contributed to Turkey's economic growth by stimulating imports, import-dependent economic growth and current account deficit financing, based on the entry of hot money, has the potential to create long-term problems. For long-term sustainable economic growth, export sectors which have the potential for global competition must be supported. On the other hand, it is necessary to reduce Turkey's   dependency on imports for its   economic growth. In the short-term, external deficits to be financed by long-term financing methods could enhance the Turkish economy's resilience to any external crisis.

References
AKBOSTANCI, E. & TUNÇ, G.İ. (2002). Turkish twin deficits: an error correction model of trade balance. *ERC Working Papers in Economics*, No: 01/06.

BACHMAN, D.D. (1992). Why is the US current account deficit so large? evidence from vector autoregressions. *Southern Economic Journal*, 59(2), 232-240.

BARRO, R.J. (1989). The Ricardian approach to budget deficits. *Journal of Economic Perspectives*, 3 (2), 37-54.

DARRAT, A.F. (1988). Have large budget deficits caused rising trade deficits. *Southern Economic Journal*, 54 (4), 879–887.

ENDERS, W. (2004). *Applied econometric time series, (Wiley series in probability and statistics)*, 2nd ed., New Jersey.

ENGLE, R.F., GRANGER, W.J. (1987). Co-integration and error correction: representation, estimation and testing. *Econometrica,* 55(2), 251-176.

FELDSTEIN, M. (1992). The Budget deficit and trade deficit aren't eeally twins. *NBER working paper*, No:3966.

KHALID, A.M., GUAN, T.W. (1999). Causality tests of budget and current account deficits: cross- country comparations. *Empirical Economics*, 24 (3), 389–402.

PAHLAVANI, M., SALEH, A.S. (2009). Budget account deficits in the philippines: a causal relationship?. *American Journal of Applied Sciences*, 6 (8), 1515-150.

VAMVOUKAS, G.A. (1999). The twin deficit phenomenon: evidence from Greece. *Applied Economics*, 31 (9), 1093–1100.

YILDIRIM, K., KARAMAN, D., TAŞDEMİR, M.(2008), *Makroekonomi*.8. bs., Ankara: Seçkin.

WALTER, E., LEE, B.S. (1990). Current account and budget deficits twins or distant cousins?. *The Review of Economics and Statistics*, 72 (3), 373-381.

ZIETZ, J., PEMBERTON, D.K. (1990). The budget deficits and trade deficits: a simultaneous equation model. *Southern Economic Journal*, 57 (1), 23-34.