AN ANALYSIS OF THE TWIN DEFICITS HYPOTHESIS WITH A VECM APPROACH IN TURKEY (1980-2013)

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This study analyzes the relationship between budget balance and foreign trade, using the example of Turkey. The data analyzed is annual and encompasses the years between 1980 and 2013. In order to determine the relationship between the variables and the direction of these relationships, the Jojansen co-integration and VECM error correction models have been applied. According to our empirical results, there is no short term relationship between budget deficits and trade deficits in the period under analysis. However, it is possible to talk about the existence of a long-term relationship. In these circumstances, there is a positive relationship between budget deficits and trade deficits. According to the results obtained by the study, the Traditional Keynesian Approach is supported and the Ricardian Equivalence Approach is rejected. In return for one unit change occurring in budget deficits in Turkey, the balance of trade has a 4.13% deficit. In addition, it is observed that 14% of the imbalance in the level of foreign trade caused by the budget deficit is corrected within a year.

JEL Classification: H62, C22, F40.

I. INTRODUCTION

The budget deficit, which is when public expenditure exceeds tax revenue, and the current account deficit (negative net exports value) which is when imports exceed exports in current accounts, are among the most important problems for national economies. Experiencing these two problems together and experiencing them from a budget deficit to a current account deficit, in other words when a positive relationship emerges between the budget deficit and the current account deficit, is called a twin deficit. Since a twin deficit brings the risk of possible crises in open economies, it is of utmost importance to determine when it is at risk of developing, and to take necessary preventive actions. In the 1970s and early 1980s, many countries encountered this problem, the US being foremost among them.

Although there can be a positive and mutually accelerating two-way relationship between the budget balance and the current account deficit, results of this situation can differ greatly. The connection between the two deficits is explained by three basic approaches. These approaches are the Traditional Keynesian Approach, the Ricardian Equivalence Approach and the Neoclassical Approach.

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Uncovering the relationship between the two deficits is very important from the perspective of the determination of economic policies. If the relationship is successfully determined it is possible to eliminate any problems by taking appropriate action and implementing relevant policies. With this in mind, and with this being such a significant problem for the US in particular, many countries have conducted studies on this subject.

Since the 1970s budget deficit has manifested itself as an important problem in Turkey as well. The fact that budget deficits were high and permanent had a negative effect on growth, as they decreased private sector investment and increased the rate of inflation (Yıldırım and Karaman, 2003, 6). With the policies of liberalization implemented after 1980, current account deficit problems have come to the fore. Many studies have also been conducted in Turkey, therefore, on the budget deficit, the current account deficit and the determination of the reasons behind these deficits.

In this study, the validity of the Twin Deficits Hypothesis will be tested using data for budget deficits and trade deficits from the period 1980-2013.

II. THEORETICAL FRAMEWORK AND LITERATURE

From the 1930s onward, the mainstream idea was that effective increases in demand would be attained alongside increased public expenditure, and public expenditure registered a continuous increase for years. In the 1970s and early 80s, many countries had the common problem of experiencing unemployment and inflation at the same time, which could not be explained by the Keynesian model. Therefore, on the basis of Supply Side Economics, a downsizing of the public sector was proposed and, beginning in the 1980s, theories which claimed that public expenditure should be reduced gained importance (Pehlivan, 2009, 74-77).

In some countries, and especially in the US, the public sector did spend at a very high rate annually during the 1980s and 1990s, and very high rates of budget deficit were encountered. The preferred method of financing these deficits was borrowing. In US federal budget regulations concerning public expenditure and tax-related legislation before 1930, economic balance was added to the single principle which stipulated that finance needed to be related to the activities of federal government. It was thought that many important macro variables could be attained through fiscal policies, sustainable growth, price stability and employment through the federal budget (Bade and Parkin, 2003, 603-606).

Despite being an important document and policy instrument, sometimes the budget cannot be controlled, and this causes a serious problem in the form of budget (public) deficits

that develop when public expenditure exceeds tax revenue. Persistent budget deficits end up increasing public debt (Yıldırım & Karaman, 2003, 6).

When one looks at the progress of public, private and foreign trade deficits in the US in the 1980s, it is seen that an increase in public deficits moved in the reverse direction from private sector deficits, and that net exports got a direction with respect to the sum of private and public sector deficits, and responded with a 2-year-lag in the same direction. The public deficit and the current account deficit move in similar directions; this is called a "twin deficit". This is dependent on an economy's capital mobility. Due to increasing expenditure in the US and the fact that taxes remained lower than this increase, total expenditure increased, but since the economy was close to full employment, production could not be increased by a significant amount. Attempts were made to meet the demand for extra goods and services that emerged from this increase from the rest of the world; in other words, imports increased dramatically. This in turn caused capital to flow into import payments. In these circumstances, no change occurred in saving and investment levels. A deficit in net exports followed the budget deficit with a 2-year lag (Parkin, 2005, 468).

The relationship between the budget deficit and the current account deficit can be explained by the national income calculation method. In an open economy, the national income equation from an expenditure perspective is as follows:

$$Y \equiv C + I + G + (X - M)$$

where national income is (Y), the sum of consumption expenditure is (C), the sum of goods and services purchases made by the government is (G), and the value of net exports is (NX=X-M).

In this formula the (X-M) value gives the difference between exports (X) and imports (M). In case the net exports (balance of trade) value is negative, this value gives the current account deficit.

Likewise, the national income equation from an earnings perspective is as follows:

$$Y \equiv C+S+T$$

where individuals' saving is (S), and government net tax revenue is (T) (Branson, 1995, 16-32).

Since the sum of the variables gives the national income level when looked at from these two perspectives, the national income equation can be denoted as follows:

$$C + I + G + (X - M) \equiv Y \equiv C+S+T$$

There is an important relationship between income level and expenditure. Disposable income (YD) is obtained by subtracting taxes (T) from the income of individuals:

$$YD \equiv Y - T \qquad => Y = YD + T$$

Disposable income is either saved or consumed by individuals. This means that:

$$YD \equiv C + S$$

When the national income equation is written by taking disposable income equation into account, we obtain the following equation:

$$YD + T \equiv C + I + G + (X - M) \equiv C + S + T$$

$$C + S + T = C + I + G + (X - M)$$

$$S - I = (G - T) + (X - M)$$

In the last equation (G-T) represents the difference between public expenditure and public revenue. In other words, it is the budget deficit. (X-M), on the other hand, denotes the current account deficit. Here we see that the sum of the budget deficit and the current account deficit is equal to (S-I), which is the portion of private sector savings that exceeds investments (Dornbusch, Fisher and Startz, 2007, 34-35). This equation shows that in the balance between private sector savings and investments, the deterioration that emerges in the public (budget) balance will also cause a worsening in the balance of current accounts. In other words, in the presence of the private sector balance, an increase in the budget deficit results in a current account deficit at the same rate, and this is called a twin deficit and explained within the framework of the Keynesian Approach.

The opinion that there exists no relationship between budget deficit and current account deficit is explained by the Ricardian Approach. The Neoclassical Approach is an alternative to the Classical Keynesian Approach and claims that continuous budget deficits will affect current account deficits. These approaches are shaped with respect to the effects of the financing of budget deficits.

1. Traditional (Keynesian) Approach

Although there are different explanations for the Twin Deficit Theory, Keynes claims that there is a positive relationship between the balance of trade and the budget deficit. A budget deficit causes a trade deficit. A trade deficit improves only when there is a budget surplus. In the Mundell/Fleming model, in the presence of international capital mobility, public expenditure and deficits increase (Siddique, 2010). In the Traditional Approach, with

assumptions regarding wealth effects and underemployment, it is accepted that debt expenditure reflects more on production than on prices (Paya, 1997, 360).

If there is a budget deficit in the economy, this comes to the surface through increasing public expenditure and decreasing taxes. In the Keynesian Approach, budget size and balance are considered among the variables that affect total demand. According to this theory, in some cases, general economic balance is preferred over budget balance.

According to the Keynesian income-spending model, individuals tend to spend their current disposable income. If public expenditure increases, this expenditure is financed through taxation or borrowing. In case of borrowing, the funds received as debt will have to be paid back, and if these funds cannot be used for investments that pay for themselves, the tax load in the future will be heavier. However, households are short-sighted in perceiving this situation. Even when they understand it, they behave selfishly and attempt to escape taxes. Public debt is considered a part of net wealth. When the present day's taxes are transferred to the future, a temporary tax reduction for individuals causes a sudden and high increase in total demand.

Since production cannot be increased further in the case of full employment, an increase in demand causes a decrease in savings. In a closed economy, this causes an increase in real interest rates and a crowding-out effect in private investment, resulting in capital stock remaining low in the long run. In the case of an increase in total demand that comes to light as a result of decreased taxes, if the economy is in underemployment (as Keynes assumes), the crowding-out effect does not occur. Despite rising interest rates, investments increase and, with the multiplier effect, reflect on national income.

In international capital markets, the effect of budget deficits on real interest rates is valid for large economies. In open economies, if a public expenditure increase is financed through (external) borrowing, again, consumption increases. If there is full employment, import volume increases to meet the increased demand and causes a current account deficit. In the case of big countries or when the lender countries apply higher interest rates, interest rates in the country go up and the crowding-out effect comes into play. Budget deficits and real interest rate increases that are observed across the world cause the crowding-out effect in every country in which they occur (Yıldırım and Karaman, 2003, 398-399; Ataç, 2012, 97, 224).

In order to better understand the effects of this in open economies, capital mobility has been added to the Keynesian IS-LM Analysis. The resulting approach, the Mundell-Fleming

Model, was developed to analyze the effects of monetary and fiscal policies. This model underlies the Traditional Approach. In the presence of economic balance, an increase in public expenditure causes domestic interest rates to exceed foreign interest rates, and this leads to capital flow to the country. In a flexible exchange rate system, this capital flow to a country increases foreign currency supply and causes the national currency to appreciate. When the national currency gains value, imports become cheaper and exports become more expensive. Thanks to increased imports, total demand and investments decrease, and the economy reaches equilibrium at an income level that is lower than its initial income level (Akdiş, 2011, 437-440). There is a negative relationship between interest rates and net exports. Policies that cause interest rates to rise also introduce a current account deficit (Mishkin, 2011, 529). This shows that when an expansionary fiscal policy is implemented in a flexible exchange system, the country will have a budget deficit along with a current account deficit.

2. Ricardian Approach

In general, the Ricardian Approach proposes that there is no relationship between budget deficit and current account deficit. Ricardo assumes that when future interest rate payments are taken into account, the private sector is aware that an increase in public debt will increase the tax burden. Given this, he suggests that in financing public expenditure there is no difference between taxation and borrowing.

When an individual lends to the state, he exchanges his money for government bonds and no change occurs in the individual's wealth. When purchasers of government bonds think, nevertheless, that their wealth has increased it causes an increase in expenditure. However, according to Ricardo's assumption, if consumers think that public debts will increase the tax burden in the future, individuals reduce their spending. When the state spends borrowed revenue, the funds reach the private sector again. With the assumption that prices are constant, the monetary value of individuals is the same as in the past and since they have more government bonds in their portfolio, a perception of wealth increase is created (Paya, 1997, 359-360). Consumers who know that the tax burden will increase in the future increase their savings instead of spending their present-day income, as there is no change in their wealth throughout their lives. This increase in private sector savings is equal to the decrease in public savings, i.e. to the current budget deficit. Hence national saving stays constant. A fixed savings volume prevents interest rates from rising and prevents investments from crowding-out in a closed economy. In open economies, an increase in private savings takes precedence

over borrowing. Thus the economy does not have a budget deficit or a current account deficit. If public expenditure is financed through taxes or borrowing, no effect is observed on national income and employment (Ataç, 2012, 226-228).

3. Neoclassical Approach

Ricardo's thoughts have been reassessed by Barro. According to Ricardian thought, with an increase in their current period portfolio, individuals consider themselves to be wealthier. However, those who pay more taxes for future interest payments will feel equally poor. While the Ricardian approach does not take limited life-span into account, this approach does. Unlike the Keynesian approach, it assumes that there is equilibrium in the markets at all times.

Barro mentions that inheritances that people leave to their children are important and people are concerned about the tax burden on their children. As a result of this, despite tax reductions, taxpayers reduce their savings and increase the inheritances they would otherwise leave. Thus, while a tax reduction in a current period does not have an effect on consumption, investment and interest rates, it does increase savings. However, this approach is dependent on unlimited life-span and the possibility of wealth transfer between generations (Yıldırım and Karaman, 2003, 400).

The Neoclassical Approach stipulates that for individuals who take the future into account with the assumption of a limited life-span, transferring the tax burden to the future increases lifelong consumption. Since it assumes full employment, this increase causes a decrease in savings and an increase in interest rates. In other words, when governments resort to borrowing to finance budget deficits, in a closed economy, interest rates increase and investments are excluded. However, according to the Mundell-Fleming Model, in the presence of the movement of international capital, net exports are excluded in open economies. A decrease in net exports yields an increased current account deficit and this in turn increases foreign debt, usable income and future interest payments (Ataç, 2012, 225-227). Public deficits result in a current account deficit.

The Neoclassical Approach is different from the Classical Approach in that it differentiates between the effects of temporary and permanent deficits. Permanent deficits increase consumption, which is a component of national income, whereas temporary deficits increase savings, not consumption (Bernheim, 1989).

III. EMPRICAL LITERATURE

In order to determine and steer countries' macroeconomic policies, the movement of macro variables must be analyzed. The imbalance between the two instruments, i.e. taxes and public expenditure, which are the most important instruments of fiscal policy, should be determined. In particular, the relationship between budget deficits and macro variables, as well as the relationship between frequently-encountered budget deficit increases and macro variables, should be determined. With the purpose of giving direction to policy-making, many studies have been conducted on the macro effects of budget deficits.

In order to test the Twin Deficits Hypothesis, which shows the positive relationship between budget deficits and current account deficits, many studies have been undertaken in Turkey and in the rest of the world. In many countries the macro data encompassing different periods has been analyzed by different methods. Some of these studies supported the Keynesian Approach and showed the validity of the Twin Deficits Hypothesis, whereas some other studies supported the Ricardian Approach and concluded that there was no relationship between the two deficits. On the other hand, some studies found a relationship preceding from current account deficit to budget deficit, and fell outside of both Keynesian and Ricardian Approaches.

The table 1 provides information about some studies showing these results.

Table 1. Studies Related to the Twin Deficits Hypothesis

Author	**Country and Period**	**Method**	**Conclusion**
Darrat (1988)	USA-1960:1984:4	Granger Causality Test	There is a bilateral causal relationship between budget deficit and balance of trade.
Diboğlu (1997)	USA-1960:1-1994:4	VAR Analysis	There is a relationship between budget deficit and real interest rates, international terms of trade and current account deficit
Chinn & Prasad (2000)	For 18 Developed Countries, 71 Developing Countries 1971-1995	LS – Fixed Effects Method -Panel Analysis	There is a positive relationship between budget deficits and trade deficits.
Zengin (2000)	Turkey-1987-1999 quarter	Causality Test - VAR(Impulse-Response)	There is a positive relationship between budget deficit and trade deficit.

Kutlar & Şimşek (2002)	Turkey-1984-2000	Johansen Co-integration Analysis-Granger Causality Test	There is a positive relationship between budget deficit and trade deficit.
Utkulu (2003)	Turkey 1950-2000 (annual)	Johansen Co-integration Analysis-Granger Causality Test-VECM	There is a bilateral causal relationship between budget deficit and current account deficit in the long term.
Ata & Yücel (2003)	Turkey-1975:1-2002:4	Johansen Co-integration Analysis-Granger Causality Test	There is a bilateral causal relationship between budget deficit and current account deficit in the long term.
Salvatore (2006)	G7 countries-1973-2005	Regression Analysis-Correlation	Budget deficits cause current account deficits.
Barışık & Kesikoğlu (2006)	Turkey-1987:1-2003:4	VAR Analysis – Granger Causality Test VAR(Impulse-Response)	There is a bilateral causal relationship between budget deficits and current account deficits.
Erdinç (2008)	Turkey-1950- 2005	Johansen Co-integration Analysis-Granger Causality Test	There is co-integration – There is a one-way causal relationship from budget deficits to the current account deficit.
Siddique (2010)	Pakistan-1971-2008	Johansen Co-integration Analysis	There is a long term relationship between budget deficit and trade deficit.
Kosteletou (2013)	Southern Euro Region Countries (Greece-Germany) 1991-2011	Panel Analysis	The Twin Deficits Hypothesis is supported.
Enders & Lee (1990)	USA 1947:3-1987:1.	VAR Analysis	There is no direct relationship between budget deficits and current account deficits.
Kim & Roubini (2008)	USA-1973:1-2004:1	VAR Analysis	There is a co-movement between current account balance and budget balance. The effects of a budget deficit are partly based on the Ricardian approach and linked to savings, investment and interest rates.
Tunçsiper & Sürekçi (2011)	Turkey-1987:01-2007:03	VAR Model	The Twin Deficits Hypothesis is not valid in Turkey.
Bolat, Belke &Aras-(2011)	Turkey - 1998:1-2010:4	ARDL Test	There is no relationship between budget deficit and current account deficit in the long term (there is a relationship in the short term).

Kılavuz & Dumrul (2012)	Turkey-2006:1-2010:12 (Budget deficit & Current account deficit)	ARDL Test, VAR Analysis, Granger Causality Test	According to ARDL test results, there is no relationship between budget deficit and current account balance in the long term. (VAR Analysis: there is a two-way relationship in the short term.)
Anoruo & Ramchander (1998)	Asian Economies: India & Philippines, 1957-1993. Indonesia, 1970-1993, Korea, 1967-1993, Malaysia, 1960-1993.	Granger Causality Test – VAR Analysis	Trade deficits are the cause of budget deficits; however, budget deficits are not the cause of trade deficits.

IV. DATA AND MODEL

The objective of this study is to explore whether there is a relationship between budget deficits and trade deficits in Turkey. To this end, budget deficit and trade deficit series pertaining to the Turkish economy for the period 1980-2013 have been used. The data for the budget series comes from the Budget and Fiscal Control Administration (BFCA) and contains annual data. The foreign trade deficit series comes from the Republic of Turkey Central Bank's Electronic Data Distribution System database and is made up foreign trade balance data. Both series have been deflated.

$$DTA_t = \beta_0 + \beta_1 BA_t + \varepsilon_t \quad (1)$$

Unit Root Test

In order to analyze the time series characteristics of the variables, not to encounter spurious regression problems and to be able to talk about econometrically significant relations between the variables, their stationarity should be determined in the first instance. Various unit root tests are performed, therefore, to determine whether the variables are stationary and, if stationary, at which level they are stationary. The unit root tests that we used in the study are the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests. The ADF type regression equation is as follows:

$$\otimes y_t = \alpha + \beta t + (\rho - 1) y_{t-1} + \sum_{i=1}^{k} \eta_i \otimes y_{t-i} + \varepsilon_t \quad (2)$$

In Equation (2) y_t denotes any time series, t represents the trend component with respect to time and $\otimes$ denotes the difference operator. In this case, for any y_t time series,

the

null hypothesis of (ρ=1) unit root is tested against the alternative hypothesis of stationarity. In Equation (2), to eliminate the dependency probability between error terms, the p lag number is added to the ADF analysis. In order for the y_t series to be stationary (ρ-1) should be statistically different from zero and take on a negative value.

Johansen Co-integration Analysis

Through the difference taking method, a co-integration analysis does not allow for a loss of short term and long term information between the variables. This analysis shows that in cases where series belonging to variables are not stationary, the linear combination of these series can be stationary and this can be determined econometrically. If there is no relationship between the two time series that belong to the two variables X_t and Y_t, these two series diverge from each other. If there is a long term relationship between two non-stationary series, graphs of these two series do not diverge from each other. In this case, deviations are expected to be temporary. In turn, if the deviations are temporary, the variables are co-integrated. In recent years, the Multivariate Likelihood Co-integration Analysis method, which was introduced by Johansen (1988), Johansen and Juselius (1990) and Johansen (1995), is widely used by researchers and allows for testing economic theories within a broad perspective. This method shows that the linear combinations formed between economic variables that are integrated of the same order do not have time-dependent unrestricted drift propensity. In addition, through error correction modelling the method is an indicator of a stationary position that converges to equilibrium conditions in the long term.

Let us take a z_t vector which is made up of n endogeneous variables that are integrated of the same order. Using a predetermined k-lag number that is determined by various model selection criteria, this vector can be written in an unrestricted vector auto regression / VAR model as follows :

$$z_t = \prod_1 z_{t-1} + \prod_2 z_{t-2} + \ldots + \prod_k z_{t-k} + \varepsilon_t \quad (1)$$

z (nx1) and $\prod$ (nxn) denote coefficient matrices. Equation (1) can be expressed as a vector error correction (VEC) model as follows :

$$\otimes z_t = \mathbf{\Gamma}_1 \otimes z_{t-1} + \mathbf{\Gamma}_2 \otimes z_{t-2} + \ldots + \mathbf{\Gamma}_{k-1} \otimes z_{t-k+1} + \prod z_{t-k} + \varepsilon_t \quad (2)$$

where:

$$\Gamma_i = I - \prod_1 + \ldots + \prod_i \ (i = 1, 2, \ldots, k-1) \text{ ve } \prod = I - \prod_1 - \prod_2 - \ldots - \prod_k \quad (3)$$

In order to obtain Equation (2) z_{t-1} should be subtracted from both sides of Equation (1) and the terms should be added over z_{t-1} and $-(\prod_1 - 1)X_{t-1} + (\prod_1 - 1)X_{t-1}$ should be added. Repeating

this process for the terms of Equation (1) will obtain Equation (2). Expressing the co-integrated system in this way allows for the uncovering of short term and long term information contained in the z_t variable vector through an estimation of the Γ and $\prod$ terms.

In the equation system above,

$$\prod = \alpha\beta' \tag{4}$$

α denotes speed of adaptation to equilibrium for the deviations from the long term equilibrium relationship and constitues the error correction terms matrix. On the other hand, β denotes the number of r co-integrated vectors that facilitate the converging of the z_t variables vector to long-term stationary equilibrium conditions. Expressed as $0 < r \leq (n\text{-}1)$, r shows the long term coefficients matrix pertaining to co-integrated relationships that are contained in the multivariate vector. Since the terms containing the $\otimes z_{t-i}$ coefficients in Equation (2) are in a stationary structure, in order to satisfy $\varepsilon \sim I(0)$, $\Pi z_{t-k,}$ which contains the $\beta' z_t$ long term coefficient matrix, should also be in stationary structure. The Johansen method is built on an unrestricted VAR model. In establishing econometric models, all the variables in vector β are assumed to be endogeneous.Therefore, in order to be able to interpret the β long-term coefficients matrix in the context of econometrics, one of the variables constituting the matrix should be divided by unit value, and other variables should be divided by the variable selected for this purpose, and normalized.

In order to analyze the long term relationships between endogenous variables, the Johansen co-integration method benefits from two likelihood rate statistics that are called trace and maximum eigenvalue. The null hypothesis of a maximum r co-integrated vector and (n-r) unit root can be shown as follows :

$$H_0 : \lambda_i = 0, i = r+1, ..., n \tag{5}$$

The first non-zero r, which is found as a result of the rank test above, shows that the eigenvalue co-integrated vectors and the remaining (n-r) column expresses the unit root combinations in the multivariate space. This restriction is applied for a different r co-integrated vector value. The restricted model is compared with the likelihood of the model, the likelihood of which is not restricted. As a result of this, standard likelihood rate statistics are obtained. Using trace statistics, the null hypothesis can be tested as follows:

$$\lambda_{trace} = -2\log(Q) = -T\sum_{i=r+1}^{n}\log(1-\lambda_i) \text{ ve } r = 0,1,2,...,n-2,n-1 \tag{6}$$

In Equation (6) Q = (restricted model likelihood value / unrestricted model likelihood value) and T is the sample period. For a maximum λ_i value, another likelihood rate statistic is the maximum eigenvalue statistic.

$$\lambda_{\max} = -T\log(1-\lambda_{r+1}) \text{ ve } r = 0,1,2,...,n-2,n-1 \quad (7)$$

In the space of the long term variables, the $\lambda_{\max}$ statistics tests the existence of r co-integrated vectors against the existence of r+1 co-integrated vectors.

VECM Model

Granger (1986), and Engle and Granger (1987) show that time series can have a non-stationary structure when the level values of economic time series are taken into account. On the other hand, they also show that linear combinations that can be established between variables can converge to a long term stationary equilibrium relationship. In this case, at least one of the variables will have the power to explain the changes in the path of other variable.

Therefore, regarding the direction of the relationship between variables, there will be at least a one-way Granger causal relationship. If the level values of the economic time series have a difference-stationary structure but a linear combination of these series can generate a stationary relationship, the time series in question are co-integrated. Therefore, theoretically, they will not be able to move independently of each other and in a manner that can produce an economic relationship oriented towards a long term stationary position (Dickey et al., 1991). In line with this, the error correction model that contains stationary information found by the co-integration analysis allows researchers to analyze long term equilibrium and short term dynamic relations in the long term variables space. In regards to deviations from the equilibrium position, this shows the stability of the long-term relationship through the error correction term, which indicates the process of adapting to equilibrium. On the other hand, if only the differences of time series are taken into account in an econometric analysis, then information containing probable relationships between the level values of variables will be lost (Hendry, 1988). Contemprary co-integration estimation methods and the error correction models that are obtained using these methods allow for the preservation of the long-term information that the economic time series contain within an econometric analysis. In addition, they allow for the analysis of variables within a unit root structure but in a way that can find a stationary relationship as a result of mutual interaction.

In this study, we used unit root tests to determine if variables are stationary at the same level and continued with a co-integration analysis. In the presence of co-integration, it is

possible to talk about the existence of a long-term relationship between variables. In order to determine whether there was a co-integrated relationship and to identify long-term relationships, the Johansen Cointegration Analysis (Horvath and Watson, 1995; Johansen, 1988) has been applied. In order to determine the level of deviation from the equilibrium between the two variables in the long term when there is a co-integrated relationship between the variables, the VECM (Vector Error Correction Model) has been applied. In addition, for the analysis of series, Eviews 8.0 econometrics software has been used.

V. EMPRICAL RESULTS

Table 2. ADF and PP Unit Root Test Results

Variables	Level	First Difference
Generalized Dickey-Fuller (ADF) unit root test		
DTA	2.575 [C,2]	-6.1677 [C,1]*
BA	-2.466 [C,0]	-5.7279 [C,3]*
Phillips-Perron (PP) unit root test		
DTA	0.4444 [C,1]	-7.2463[C,0]*
BA	-2.4881 [C,1]	-9.4701 [C,15]*

[.] shows the constant and lag length, respectively in the equation. Optimum lag lengths have been determined by SC for ADF test, and by Newey-West method for PP test.

*Shows that the null hypothesis is rejected at a 1% significance level, according to MacKinnon's (1996) critical value.

After the stationarity of the series is established, we switch to the co-integration test. Having observed that the series were stationary at first difference I(1), the Johansen Co-integration Test will be applied. Lag lengths are determined before the test application. The VAR model is used to estimate lag lengths. For optimum lag, we benefitted from LR, AIC, SC, FPE and HQ information criteria. The lag lengths obtained from the model are presented in the table 3.

Table 3. Lag Length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-890.6666	NA	1.68e+25	63.76190	63.85705	63.79099
1	-824.1240	118.8259	1.94e+23	59.29457	59.58005	59.38185
2	-823.7484	0.617206	2.52e+23	59.55345	60.02924	59.69891
3	-812.7667	16.47241	1.55e+23	59.05477	59.72087	59.25840
4	-798.0565	19.96397	7.42e+22	58.28975	59.14616	58.55156
5	-786.3093	14.26445*	4.45e+22*	57.73638*	58.78311*	58.05637*
6	-784.2902	2.163254	5.47e+22	57.87787	59.11492	58.25605

*shows appropriate number of lags with respect to relevant criteria.

As a result of the test, LR, FPE, AIC, SC and HQ values give the minimum value for the 5 lags. Therefore lag length for the analysis has been determined as 5. After determining the lag length, we repeated the Johansen Co-integration Analysis for a lag length of 5. Table 4 presents the Johansen Co-integration Test results. The null hypothesis (H_0) of no co-integration between the analyzed variables is rejected for maximum eigenvalue (λ_{maks}) test statistics at a 5% significance level and is rejected for the trace statistics (λ_{iz}) at a 10% significance level. It is observed that there exists at least one co-integration vector between the variables. Existence of co-integration between the variables indicates that there is a long term relationship between the series.

Table 4. Johansen Co-integration Test Results

λ_{iz} Statistics			
Hypotheses	**Trace Statistics**	**0.1 Critical Value**	**Prob.****
H_0:r=0, H_1:r≥1	11.87903	10.474557	0.0592
H_0:r≤1, H_1:r≥2	0.251125	2.976163	0.6755
λ_{maks} Statistics			
Hypotheses	**Max-Eigen Statistics**	**0.05 Critical Value**	**Prob.****
H_0:r=0, H_1:r≥1	11.62790	11.22480	0.0424
H_0:r≤1, H_1:r≥2	0.251125	4.129906	0.6755

**MacKinnon-Haug-Michelis (1999) p-values

When we look at the results in Table 4 we see that there is a long term relationship between budget deficit and trade deficit for the period in question. At a 10% significance level, λ_{iz}=11.87>10.47 and at a 5% significance level, λ_{maks}=11.62>11.22. In this circumstance, H_0 is rejected. There is at least one co-integrated vector between the variables. The variables reach equilibrium together in the long term. When the co-integration relationship is normalized with respect to the trade deficit, the relationship between the variables is as follows:

DTA=4.1308819BA
(0.00022)

In the long term, the budget deficits affect the trade deficit in a positive direction. A 1% increase in the budget deficit in the period in question increases the trade deficit by

4.13%. The results of the VECM, which was applied to determine the level of divergence from long term equilibrium, are presented in Table 5.

Table 5. VECM- Vector Error Correction Model Estimation Results

$D(DTA)=-0.144VEC_{t-1}-0.233D(DTA_{t-1})-0.024D(DTA_{t-2})-0.077D(DTA_{t-3})$ (-2.86) (1.23) (-0.23) (-1.18)
$+0.258D(DTA_{t-4})-0.082D(DTA_{t-5})-7.19D(BA_{t-1})-5.57D(BA_{t-2})-$ (4.46) (-1.32) (-1.76) (-1.29)
$4.07D(BA_{t-3})-2.59D(BA_{t-4})-1.43D(BA_{t-5})-12495$ (-0.95) (-0.64) (-0.42) (-2.70)

(.) figures are t-statistics values

According to the figures in the table, the high R^2 (0.99) value shows that the budget deficit is a powerful means of explaining the trade deficit. As a result of the VECM, the coefficient of vector error correction term is seen as -0.14. The 0.14 has a negative sign and is between 0 and 1. This coefficient is statistically significant. In one year, 14% of imbalances in the trade deficit that stem from the budget deficit are eliminated. In addition, when we analyze whether there is a relationship between budget deficit and trade deficit in the short term, we obtain the results in Table 6.

Table 6.Granger VECM- Vector Error Correction Model Results

Short Term Equilibrium	Hypothesis	F-St.	df	$VECM_{-5}$	R^2	DW	P
DTA=F(BA)	H_0=BA is not the cause of DTA .	0.64	(5,16)	-0.14	0.99	2.00	0.66
BA=F(DTA)	H_0= DTA is not the cause of BA.	0.08	(5,16)	146.83	0.50	2.09	0.99

F-Statistics is insignificant. Budget deficit is not the cause of trade deficit in the short term. Therefore, H_0 cannot be rejected.

CONCLUSION

The Twin Deficits Hypothesis was proposed as a response to problems experienced by countries that had increased public expenditure in the 1980s. In that period, research studies reached the conclusion that budget deficits stemming from increased public expenditure reflected onto trade deficits and caused current account deficits. The twin deficits case, which means having the two deficits simultaneously, is an inequilibrium case that leads countries

into crises. Therefore, in order to steer policy-making and to take necessary preventive action, it has become important to monitor the progress of budget deficits and current account deficits as well as to determine the relationship between these two deficits.

Turkey, which is an emerging market country and where the state historically plays a determining role in the economy, has experienced a gradual and constant increase of the current account deficit, which it is necessary to explain the reasons for. Within this context, in order to determine the relationship between the budget deficit and the current account deficit, the Twin Deficits Hypothesis has been analyzed using Turkey as an example and using annual data for the period 1980-2013. The Johansen Co-integration and VECM error correction models were applied to this data.

According to our empirical results, there is no short-term relationship but there is a long-term positive relationship between budget deficits and trade deficits. These results reject the Ricardian Equivalence Approach whereas they support the Traditional Keynesian Approach. In response to a one unit change in budget deficits in Turkey, the balance of trade changes by 4.13%. In addition, it is observed that 14% of the imbalance in the level of foreign trade caused by a budget deficit is eliminated within a year.

The fact that findings about Turkey are supportive of the Twin Deficits Hypothesis clearly shows that if authorities want to control a current account deficit, they should first put the budget deficit, hence public expenditure, under control.

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