TRIPLE DEFICIT OR TWIN DIVERGENCE : A DYNAMIC PANEL ANALYSIS

ÜÇÜZ AÇIK YA DA İKİZ IRAKSAMA : DİNAMİK PANEL ANALİZİ

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ABSTRACT

Triple deficit hypothesis points out coexistence of budget deficit, current account deficit and private-savings deficits. In the literature, in terms of Keynesian and Ricardian approach, existing of budget deficit and current account deficit and the relationship between them are widely examined. The literature on three deficits which develops twin deficit hypothesis by involving private sector saving gaps is limited. Moreover, the problems about political economy of three deficits that occur with fragility of transition economies lay on rather wide area. Our study aims to examine three deficit hypothesis for 24 transition economies over 2002-2013 period by employing dynamic panel data analysis. We find evidence of an interaction between current account deficit and savings-investment deficit.

Keywords: Open economy macroeconomies, Budget deficit, Current account balance, Triple deficit

JEL Classification: F 41, H 60, H 62

ÖZ

Üçüz açık hipotezi, bütçe açığı, cari işlemler açığı ve tasarruf açığının birlikte yaşanması durumunu ifade etmektedir. Bütçe açığı ile cari işlemler açığının varlığı ve bu iki etkinin karşılıklı etkileşimi, literatürde Keynesyen yaklaşım ve Ricardocu yaklaşım açısından oldukça geniş biçimde ele alınmıştır. İkiz açık literatürüne özel sektör tasarruf açığını da dahil ederek ifade edilen "üçüz açık" konusunda yapılan çalışmalar sınırlıdır ve geçiş ekonomilerinde var olan kırılganlık ile birlikte üçüz açık altında ekonomi politikasının yürütülmesine ilişkin sorunlar oldukça geniş bir yer kaplamaktadır. Bu çalışma 24 geçiş ülkesi açısından üçüz açığın varlığını dinamik panel veri analizi ile ortaya koymayı amaçlamaktadır. Sonuç olarak çalışmada cari açık ve tasarruf açığı arasında bir ilişki bulunamamıştır.

Anahtar Sözcükler: *Açık ekonomi makroekonomisi, Bütçe açığı, Cari açık, Üçüz açık*

JEL Sınıflandırması: *F 41, H 60, H 62*

1. Introduction

The studies examining "twin deficit" hypothesis which indicates that a rise in budget deficits leads to current account deficits, conclude with different results. The empirical literature relevant to twin deficit hypothesis may be classified into four separate groups according to the results obtained. According to the results, these four groups can be defined as theories underlying i) the effect of budget balance on the current account balance, ii) the impact of current account balance on the budget balance, iii) bidirectional causality, iv) the non-existence of bi-directional causality according to the Ricardian Equivalence theorem (İyidoğan, 2014:73).The theoretical background of analysis relevant to the twin deficit hypothesis has been investigated in the framework of Keynesian and Ricardian Equivalence approaches.

Triple deficit theory essentially is the extended version of twin deficit theory including savings-investment balance(Szakolczai;2006 :41). Triple deficit theory has also been discussed in context of the same approaches utilized in the twin deficit theory. The fundamental perspective relevant to the triple deficit builds on the relationship of the budget balance and savings balance that may be expressed as internal balance with the current account balance representing external balance. In this context, the principal aim of this study is to examine the nexus between current account balance, budget balance and private savings balance.

Triple deficit theory which is put forward by expanding the twin deficit theory provides to better understand the savings deficit together with the trade deficit and budget deficit and to evaluate the relationship among these. Triple deficit defines the existence of an equlibrium condition within the disequlibrium where internal and external disequlibrium do coexist that puts forward the necessity of producing alternative policies.

Recently, the economic crisis occurred initially in the United States, the European Union countries and other countries resulting in the external deficit has made the impact on the internal stability and sustainability of the relationship established between the internal and external balance more significant (Karaçor et al., 2012:1). In this process, economists associated forming of the current account deficit and the budget deficit to domestic savings and presented the effect of exclusion created by these deficits (McTeer, 2008). The extension of relationship between budget deficit and current account deficit in the form of including total domestic savings which consist of the private sector and public sector savings has increased the role and effectiveness of triple deficit in the context of expression of countries' macroeconomic balances.

The savings-investment imbalances as a result of free movement of capital began to be evaluated as the main reason for the imbalances in the current account. Remaining of domestic savings insufficient while domestic investments are increasing as a result of free movement of capital has accelerated the process of saving-investment balance expression in overall economic balance and made necessary of extending twin deficit and twin deficit's results which has been discussed as the current account balance and the budget balance. After Martin Feldstein (Feldstein, 1992) who emphasized the twin deficits in the 1980s, in the United States, the formation of the twin deficits with the saving deficits in most countries in the 2000s has increased the importance of studies relevant to the potential relationships between these three deficits.

In twin deficit hypothesis, there are two main theories accepted for the existence of relationship between current account deficit and budget deficit. In addition to the theories called as Keynesian model of income and expenses, and the Ricardian Equivalence approach, the

theories called as Mundell Fleming and Feldstein Chain have been used both for the existence of relationship and direction between the deficits.

Keynesian income and expenditure approach points out that budget deficits as a consequence of tax cuts or a rise in government expenditures without a tax revenue increase have expansionary effects on economies via multiplier mechanism. Consequently, the increase in gross national income (GNI) will increase imports which are positive function of GNI and will lead to the current account deficit. This aspect of the Keynesian approach reveals the effect of budget deficits in increase of the current account deficit.

In the Ricardian approach based on the Ricardian Equivalence hypothesis, it was indicated that budget deficits through tax cuts will not be effective on household consumption and the income increase since budget deficits will direct to savings (Barro, 1989:39). This approach rejects the relationship between the budget deficit and current account deficit (Khalid and Da Guan, 1999:390). In the background of this theory, which suggests that there is no relation between budget and current account deficits, lies the assumption of increase in households' current savings to finance such tax increase. More clearly, rational households realize that income increase provided by tax cuts will be transient and the resulting budget deficits will be substituted from tax increases.

Marcus Fleming (Fleming, 1962) and Robert Mundell (Mundell, 1963) expanded the Keynesian macroeconomic policy of open economy by combining the roles of capital flows, independent of each other (Boughton, 2003:1). Mundell (1963) and Fleming (1962) tried to demonstrate the effects of monetary and fiscal policy with the assumption of unrestricted capital mobility considering the currency exchange rate and interest rate fluctuations. In this model, it has been tried to create a situation which the internal and external balances are provided at the same time by including the balance of payments so as to express the external balance into the IS-LM model presented by Hicks-Hansen which expresses that goods and money markets simultaneously balanced. It is presumed in this model that there is a positive relation between the budget deficit and the current account deficit, similar to the Keynesian approach.

In twin deficit hypothesis, the savings-investment balance in economics' overall balance is ignored (Karanfil and Kılıç, 2015:2).Triple deficits theory is based on the mutual interaction between three deficit with the inclusion of domestic savings deficit in addition to the current account and budget deficits called as twin deficits with Feldstein, representing the overall balance (McTeer, 2008:2; Szakolczai, 2006:41).The budget deficits representing public imbalance and savings-investment imbalance representing the source of real growth of the economy are acknowledged as the causes of the current account deficit (Ozdemir et al., 2014:1).The linking of the cause of the current account and the budget deficits in twin deficit hypothesis to the lack of savings in the country has led the studies of the relation between the three deficit progress to this direction. The main objective of studies about triple deficit theory is both the expansion of public budget and the country's domestic savings is not being able to meet the finance demand as a result of increasing imports since the 1980s.In this context, economists have stated that deficit in public balance which forms an aspect of internal balance and not being able to finance of this imbalance with domestic savings will be a trigger on the current account deficits.

The triple deficit which is formed by inclusion of savings deficit into budget and the current account deficits called as twin deficit theory may be presented with the identity of gross national income.

Disposable personal income (Y_d) may be expressed in two different ways as below:

$$Y_d = C + S \quad (1)$$

$$Y_d = Y + TR - T \quad (2)$$

On the other hand; national income (Y) may be expressed as follows via equation (1) and (2):

$$Y = C + I + G + X - M$$
$$C + S = C + I + G + X - M + TR - T \quad (3)$$

$$S - I = X - M + G + TR - T \quad (4)$$

$$S - I = Saving\ balance \quad (5)$$

$$X - M = Current\ account\ balance \quad (6)$$

$$G + TR - T = Budget\ balance \quad (7)$$

The triple deficit will occur in case of deficits that occur in all balances of equations (5), (6) and (7). The triple deficit may be shown as in equation (8) by rearranging equation (4) in case of considering savings-investment and budget balance as internal balance, and current account balance as external balance.

$$X - M = (S - I) + (G + TR - T) \quad (8)$$

The triple deficits as displayed in equation (8) express exactly "the balance of imbalance" (Eğilmez, 2012). There will be a balance on deficits as a result of negative values in both sides of equation will be even out in case of triple deficits.

2.Literature

Although the regarding literature embodies many studies about twin deficits, there is no sufficient work about triple deficit. Studies regarding the twin deficit hypothesis can be classified into the ones supporting the Ricardian equivalence hypothesis and those that support Keynesian approach. However, there is not a large literature regarding the triple deficits. There exists various results about the existence of the triple deficit obtained through different studies with various methods. These differentiated results could be attributed to the usage of different sample and methods.

On the empirical side of the literature there are studies mostly employing bound test approach, Granger causality analysis and VAR analysis. In this restricted literature, Chowdhury and Saleh (2007) analyze the existence of triple deficit hypothesis by Autoregressive Distributed Lag

(ARDL) approach for Sri Lanka. They present the existence of triple deficit, budget and savings-investment deficits as a cause of the current account deficits in Sri Lanka for 1970-2005 period.

Özdemir et al. (2014) present that there is no relation between budget and current account deficits and asserts the invalidity of triple deficit for 17 transition economies over 2003-2011 period. In this study fixed effects methodology is employed in order to assess the impacts of budget deficit and savings deficit on current account. Their results provide supporting evidence for Ricardian equivalence hypothesis while they show the invalidity of triple deficits hypothesis.

Using the bound test approach Akıncı and Yılmaz (2012), state that current account deficits are determined by savings-investment and budget deficits. They conclude that both deficits have a positive effect on current account deficits for both short and long term and triple deficits are valid for Turkey over the period 1975-2010. Similarly Altun and İnce (2014 use the bound test and cointegration analysis and and find that the triple deficits do not move together in the long term for Turkey over the period 1975-2010. In their analysis for Turkey over the years from 1980 to 2013, Karanfil and Kılıç (2015), accept not only the effect of the current account deficits on savings-investment budget deficits but also the existence of triple deficits. They check the triple deficits by using cointegration and Granger causality analysis and find supporting evidence for the validity of the triple deficits hypothesis for Turkey over the period in question.

Şen and Kaya (2016) examines 6 post-communist countries from 1994-2012 using bootstrap panel Granger causality analysis and they find no twin or triple deficit in their models. Akbaş et al.(2014) investigated the existence of triple deficits in Turkey from 1960 to 2012. In conclusion they added triple deficits is valid inTurkey. Sürekçi (2011) reaches the conclusion of invalidity of triple deficits in Turkey by employing VAR analysis for Turkey over the period 1987:1 - 2007:3. Tang (2014), states in his study about existence of triple deficits in US with the use of data from quarter period 1960:1-2013:1 that three deficit act mutually in US and triple deficit hypothesis is supported from perspective of causality consequences. In addition, they show that there is a positive relationship among budget deficit, trade deficit and savings deficit and, they move together in the long run.

Employing Granger causality tests Bolat et al. (2014), indicate that triple deficit hypothesis is valid for Poland, Portugal, Spain and Sweden in their study for European Union countries for 2002:1-2013:3 period. Kim and Roubini (2008) reveal in their study which implements VAR analysis for 1973- 2004 period that there is a negative relationship between budget deficits and current account for G7 Nations. They described this case as the twin divergence concept as negative effect of twin deficits. Van Bon(2014), investigates ten developing economies of Asia between 1985 and 2012 using GMM analyses and as a result, they also find twin divergence between fiscal deficits and current deficits.

Raju-Mukherjee (2010) investigate the relation among the crowding out of budget deficit, capital accumulation and net exports over two periods i.e. 1980-81 and 2008-09 for India. The results of the analyses employing cointegration methodology indicate that an evidence of a crowding out effect between public expenditures and private sector expenditures cannot be found. Instead their results support The Ricardian equivalence hypothesis that financing the government expenditures by taxes or borrowing have similar effects on the economy. Roubini (1988) uses data from 18 OECD countries for 1960-1985 period and finds that budget deficits are very important in explaining the current account and savings deficits.

3. Data and Methodology

In this study, we test the validity of triple deficits hypothesis by implementing both static and dynamic panel data analysis in 24[1] transition economies for 2002-2013 period. Theoretically, the horizontal and vertical sections of data co-exist in panel data analysis. Panel data analysis is used in this analysis due to the involvement of size of the country and time. For this purpose, the panel model which includes simultaneous analysis of the horizontal and vertical cross-section units is estimated as its framework given broadly below.

$$Y_{it} = \alpha_{it} + \theta X_{it} + \varepsilon_{it} \qquad (9)$$

Here, i represents horizontal cross-section units (i=1,…,N), t represents vertical cross-section units which is time (t=1,.., T).

Table 1. Data Definition

Variable	Description	Reference
curdef	Current Account Deficit/GDP	IMF World Economic Outlook
buddef	Budget Deficit/GDP	IMF World Economic Outlook
psidef	Private Savings-Investment Deficit/GDP	IMF World Economic Outlook

Before estimating the structural model in question, we proceed with panel unit root tests. We employ two different panel-based unit root tests, the Levin–Lin–Chu ADF (Levin, Lin and Chu, 2002) and the IPS ADF (Im, Pesaran and Shin, 2003), to examine the null of a unit root of all of the variables chosen in the models. Resuls of the panel unit root tests are presented in Table 2. We find that all the variables have stationary characteristics since the nulls of the unit root are rejected.

Table 2. Panel Unit Root Test Results

	Levin Lin ADF		IPS ADF	
Variable	**statistics**	**p value**	**statistics**	**p value**
curdef	-6.0357***	0.0000	-2.1249**	0,0168
buddef	-7.7472***	0.0000	-3.3892***	0.0004
psidef	-7.3587***	0.0000	-3.4818***	0.0002

Note: ****, **, * respectively 1%, 5% and10% statistical significance levels.*

Ensuring that variables of interest are stationary, panel analysis is carried out depending on the assumptions regarding to the constant coefficient and the slope of coefficient in three different ways. The first one is "least squares" model. This model assumes all parameters are the same for each country. Second one is "Fixed Effects Model" which coefficients of constant terms are different while the slope coefficients are the same in. In this model, it is assumed that omitted variables which have an effect on estimate stay constant over time. Finally, the constant coefficients are distributed randomly regardless of the effect of the horizontal section

1 Armenia,Azerbijan, Belarus, Georgia, Kazakhistan, Krgyz Republic, Moldova, Russia, Tajikistan, Ukraine, Bulgaria, China, Crotia, Czech Republic, Estonia, Georgia, Hungary, Lithuania, FYR Macedonia, Poland, Romania,Slovak Republic, Slovenia, Uzbekistan.

representing effect of country in the "Random Effects Model". The random effect model, unlike the fixed effects model is based on the assumption that the explanatory variables are unrelated to individual error terms. In order to make a choice between Random effects and fixed effects model Hausman test including the null hypothesis that there is no correlation between the explanatory variables and constant coefficients is employed. The estimates made through three models are as follows[2].

Table 3. The Results of Least Squares Method

	curdef(Dependent Variable)
buddef	.7621816*** (6.96)
psidef	.0571766*** (4.05)
Intercept term	-1.794148 *** (-3.82)
F Test (orWald χ^2) p value	0.0000
N	288
Number of countries	24

Note: ****, **, * respectively 1%, 5% and10% statistical significance levels; intercept term, N the number of observations*

The test result in Table 3 shows that budget deficits and private savings-investment deficits define the results of current account deficits. All variables are statistically significant in the model. Note that fixed effects model is preferred to random effects model according to the Hausman test in Table 4.

Table 4. The Results of Fixed and Random Effects

	curdef(Dependent Variable)	
	Fixed E.	**Random E.**
buddef	.4708862*** (3.54)	.5882936*** (4.87)
psidef	.0290738** (2.28)	.0368641*** (2.87)
Intercept Term	-2.312586 (-5.45)	-2.11245*** (-2.74)
F Test (p value)	0.0000	
Breusch-Pagan LM Test (p value)	0.0000	
Hausman Test (p value)	0.0006	
N	288	288
Number of countries	24	24

Note: ****, **, * respectively 1%, 5% and 10% statistical significance levels; intercept term, N the number of observations, The t and z statistics are placed in parentheses***.**

2 Therefore, before using dynamic panel analysis, we proceed with checking whether there exists structural break in the relationship that we are trying to put forward. We employ Chow test to examine the structural break for the period of 2002-2013 and as a result F test is 1.60, P value is 0.1768 so cannot find an evidence for the existence of a structural break.

The use of lagged dependent variable leads to estimates of biased and inconsistent parameters in the static panel data models. In this context, at the second stage of the study, followed by static analysis, triple deficits relationship is examined by dynamic panel data analysis method. The Arellano-Bond GMM estimator is the first difference transformation. This is designed to 'sweep-out' the fixed effect. The dynamic panel proposed by Arellano and Bond (1991) which included lagged values of the dependent variable model "Generalized Method of Moments (GMM) is listed below:

$$Y_{it} = \alpha Y_{it-1} + \beta X_{it} + \theta_i + u_{it} \qquad (10)$$

Y represents dependent variable; X represents the vector of explanatory variables, θ and represents unit effects. The estimated results of the model by the GMM method are shown in Table 4.

Tablo 5. Arellano-Bond Dynamic Panel Estimations

	curdef(Dependent Variable)
curdef(-1)	.7401042 (59.22)
buddef	-.0333567 (-1.92)
psidef	-.0031539 (-0.78)
N	288
Sargan Test	22.343
AR(2)	0.2098
Number of countries	24

Note: ****, **, * respectively 1%, 5% and 10% shows statistical significance levels; N the number of observations. The z statistics are placed in parentheses***.**

In this study one step GMM estimator has an autocorrelation problem so we use two step GMM estimator. The Sargan and autocorrelation test statistics in the last two columns of the table shows the suitability of used tools, respectively, and no rejection of the null hypothesis of "no 2. degree autocorrelation". It is seen that the budget deficit among coefficients is significant at the level of 1%, but negative. Private saving deficit is seen as insignificant. In this respect, it is revealed that the current account deficit affects the budget deficit inversely. As a result of this model, it is shown that there is twin divergence advocating an inverse relation between the budget and current account deficits instead of triple deficit problem in the transition economies as in the study of Kim and Roubini (2008).

4. Conclusion

According to triple deficit theory, there is a positive relationship among current account deficits, budget deficit and savings-investment deficit. We find no evidence of relationship between current account deficit and savings-investment deficit. In this case, the hypothesis of savings-investment deficit as the reason of current account deficit is not accepted in our study. The cause of current account deficit for our sample countries depends on various factors apart from savings-investment deficit.

In our study, we analyze the existence of triple deficit relationship for 24 transition countries in the period 2002-2013 by means of static and dynamic panel data analysis. We find that there is an inverse relationship between the budget and the current account deficits which implies that transition economies face with the budget deficit problems or vice versa in case of reducing the current account deficit.

The inverse relationship between budget deficit and the current account deficit is thought to be caused by the high share of indirect taxes from imports among tax revenues in these countries. In this case, the decrease of imports made in order to reduce the current account deficit, causing a reduction of indirect taxes on the imports will lead to the decline in tax revenues and an increase in the budget deficit. In this regard; reduction of the value added tax from import with reduction of the current account deficit will create an increasing impact on the budget deficit.

In parallel of the results of our study, we can conclude that the reduction of the current account deficit via increase of exports instead of reducing imports significantly in transition economies will eliminate the negative effects that may occur on the current account deficit.

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