

## Revisiting the Twin Deficit Hypothesis for the Economies of Europe

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### Abstract

*This study presents empirical evidence linking the current account balance to its major determinants such as exchange rate, interest rate and budget balance in 7 of the EU member countries: Bulgaria, Greece, Ireland, Italy, Latvia, Portugal and Spain. Using the panel version of various cointegration tests, we find a long-run relationship between the current account and its determinants. The long-run coefficient of the interest rate is found statistically significant in all estimation techniques. On the other hand, weak evidence is found for the existence of the twin deficit hypothesis.*

*Keywords: Twin deficit, Current account balance, Budget deficit*

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### 1. Introduction

The determinants and the dynamics of the current account constitute an important topic in open economy macroeconomics. Among the analyses of the current account, the relationship between external and internal balances, and deficits specifically, receive significant attention in the literature. Deficits often are cited as being either a cause or a symptom of economic weaknesses. However, deficits are neither causes nor symptoms of weaknesses, but are among the many macroeconomic quantities that are determined jointly by the decisions and interactions of households, firms and governments in both national and international markets (Pakko, 1999). Two types of deficits, internal and external, are the focus of this analysis. Internal (fiscal deficit) and external deficit (current account deficit), together called the twin deficit, are a link between national and international markets. If the twin deficit hypothesis is true, policymakers can control both the balance of payments and money supply via the fiscal position. This would imply virtually total control over the domestic economy. If the twin deficit hypothesis were true, balanced or surplus budgets would guarantee external and internal equilibrium.

The questions regarding the determinants of fiscal balance and the current account attracted attention in the early 1980s and later in the early 2000s, mainly because of the high current account deficit of the US. See, for example, early studies by McKinnon (1980), Laney (1984), Bernheim (1988), Miller and Russek (1989), Enders and Lee (1990), Dewald and Ulan (1990), and Rosenweig and Tallman (1993). Recent studies, such as those by Mann (2002), Obstfeld and Rogoff (2004, 2005), Erceg et al. (2005),

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Bordo (2006), Coughlin et al. (2006), Salvatore (2006), Corsetti and Muller (2006), and Kim and Roubini (2008) have examined whether budget deficits cause trade deficits. There are some studies supporting the twin deficits, such as those by Bernheim (1988), Roubini (1988), Miller and Russel (1989), Normandin (1999), Salvatore (2006), Chinn and Prasad (2003). There are also studies in favor of twin divergence, such as those by Evans (1986), Enders and Lee (1990), Dewald and Ulan (1990), Erceg et al. (2005), Corsetti and Muller (2006), and Kim and Roubini (2008). Additionally, there are some studies providing mixed evidence such as those by Darret (1988), Abell (1990), Rosenweig and Tallman (1993), Kao and Coskey (1999), and Chin and Prasad (2003). A recent study by Kalou and Paleologou (2011) found that current account deficit and budget deficit are positively related and the direction of the causality is running from the current account to the budget deficit.

This study investigates the major determinants of the current account in the selected EU members. To this end, it tries to test the existence of a cointegration relationship between the current account and major variables such as the real exchange rate (RER), the interest rate, and the fiscal balance. This also allows for consideration of the effects of the government spending shock on the external sector and testing of the validity of the twin deficit hypothesis. Understanding the factors behind the current account fluctuations could have important policy implications, yet the recent episodes of macroeconomic turbulence in many emerging markets, and especially in the EU members covered in this study, support the increasing concerns and deserved attention on this topic.

The analysis is structured as follows: Section 2 starts with an overview of the internal and external balances in the EU economies and the selected countries in particular. Section 3 explains the theory and the model used in this analysis. Section 4 shows the methodology, and section 5 discusses the empirical results of the analysis. Finally, section 6 gives concluding remarks.

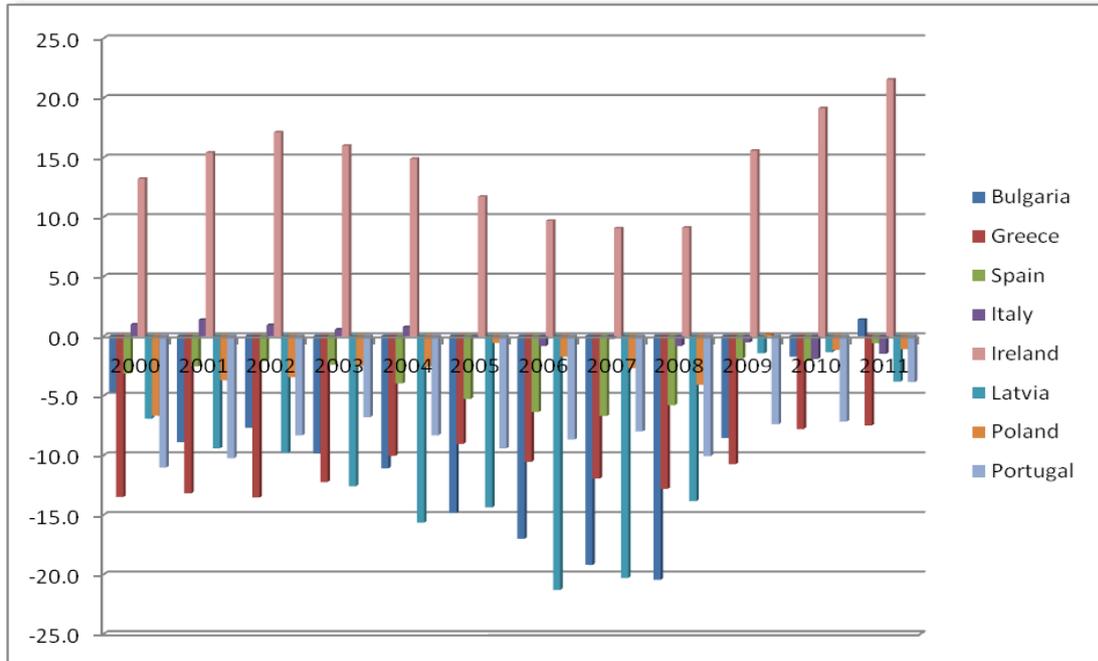
## **2. Overview to Internal and External Balances in the EU Economies**

Since the establishment of the single currency, the euro, in the European Union (EU), there have been many arguments regarding the performance of the EU countries and the Economic and Monetary Union (EMU). The EU experienced an economic boom during 2003-2007 and an economic bust during 2009-2011. This was the last financial crisis that proved right the concerns of skeptics in matters such as the difference among EU members in terms of economic and social policies and the behavior of EU institutions in dealing with asymmetric shocks. Recent developments in the EU have shown that the judgments of the European financial markets once again have to be questioned. De Graw (2010) explains this with a movement from excessive optimism before the crisis to

deepest pessimism after the crisis. There are two major problems in solving this problem:

- Moral hazard. Bailout will signal to the EU members that irresponsible behavior will not be punished.
- Contagious effect. The Greece sovereign default and its consequences on other EU members

**Figure 1. Current account balance (percentage of GDP)**

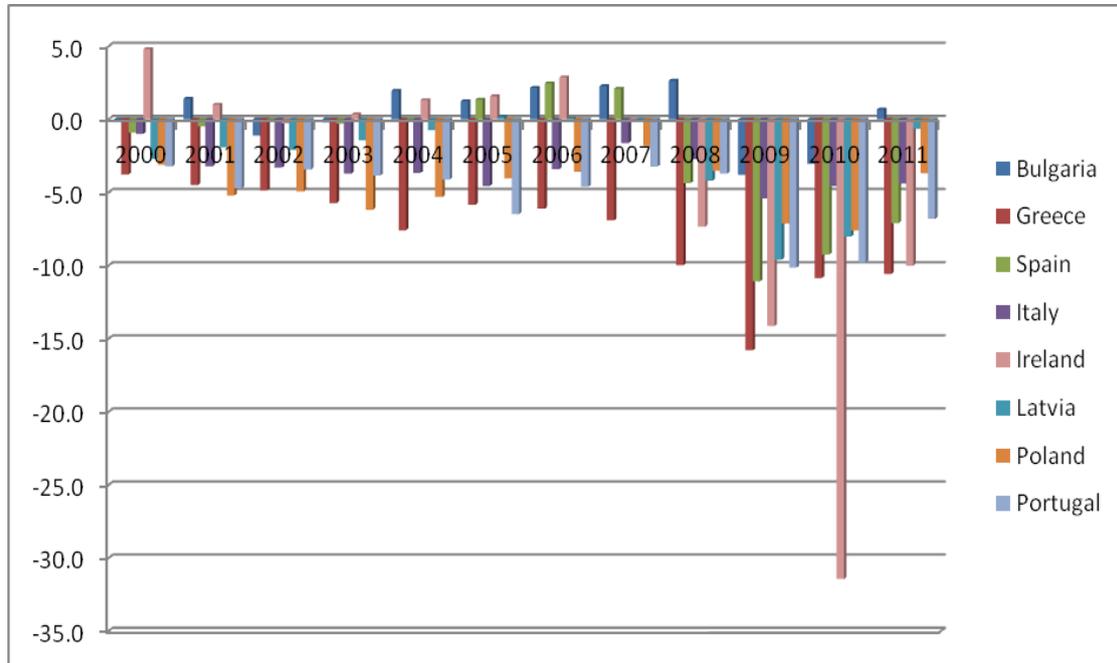


Source: Eurostat

The selected countries in this study are Bulgaria, Greece, Italy, Ireland, Latvia, Portugal, and Spain. Figure 1 and 2 show the current account and fiscal balances for these countries, respectively. All of the countries but Ireland are suffering from prolonged current account deficits. Fiscal deficit, on the other hand, is a problem for all of the selected countries, especially after the 2009 crisis. In Greece and Portugal, the problem is insolvency. The economy suffers from low national savings and depends on high capital inflows. In Spain and Ireland, the problem is illiquidity. In these countries, the economies have high rates of national savings and the crisis is due to the expansion of financial activity. In Italy, the problem is different. The economies deal with high savings rates, small foreign imbalances, and the conservative financial sector. In Latvia, the problem is high labor taxes pushing unemployment rates to stay in the two-digit numbers. Latvia has experienced the worst loss of output in the world, losing about 24% of its GDP between late 2007 and late 2009. Official unemployment rose from 5.3% in late 2007 to 20.5% in early 2010. In spite of significant fiscal surpluses generated in recent years, the current account deficit in Bulgaria expanded continuously, exceeding

20% of GDP in 2008. Only under the impact of the global financial crisis in 2009 did the current account deficit narrow in parallel with the fiscal surplus.

**Figure 2. Fiscal balance (percentage of GDP)**



Source: Eurostat

### 3. Theory and Model

The framework of the national accounts defines a clear relationship between external and internal balances within an economy.

$$Y_t = C_t + I_t + G_t + (X_t - M_t) + NFIA \quad (1)$$

By rearranging the variables,

$$(X_t - M_t) + NFIA = Y_t - C_t - G_t - I_t = S_t - I_t \quad (2)$$

where  $C_t - G_t - I_t$  is equal to the sum of private and public consumption, this means that the external account has to equal the difference of national savings and investment. This relation implies that the current account is related directly to savings and investments in the economy. Therefore, the policies supporting investment have a negative impact on the current account, while policy measures reducing private or public consumption have a positive impact on the current account, because they increase national savings.

Further insights into policy implications are given by dividing the national savings into public and private savings.

$$(X_t - M_t) + NFIA = (Y_t - T_t - C_t) + (T_t - G_t) - I_t = S_t^p + S_t^g - I_t \quad (3)$$

After introducing the real variables to the model, it becomes as follows:

$$\frac{CA_t}{P_t} = \left( Y_t - \frac{NT_t}{P_t} - \frac{P_{Ct}}{P_t} C_t \right) + \left( \frac{NT_t}{P_t} - G_t \right) - \frac{P_{It}}{P_t} I_t \quad (4)$$

where  $CA_t$  is the current account balance,  $P_t$  is the GDP deflator,  $NT_t$  is the taxes net of transfers,  $P_{Ct}$  is the price of final consumption goods that are purchased, and  $P_{It}$  is the price of final investment goods. So, the real current account balance is the sum of real private and public savings minus real investment. If the private savings are roughly equal to the investment, then the external account and public budget are interrelated directly, or twinned. According to the Mundell-Flemming approach, the external balance and fiscal balance have to move in the same direction. In other words, an increase in budget deficit causes an increase in interest rates that in turn causes an increase in capital inflows and the appreciation of the domestic currency, thereby causing a current account deficit. Fiscal deficit causes a current account deficit, or what is known as twin deficits.

Alternatively, higher real interest rates induce an appreciation of the real exchange rate; the relative price of imported goods falls, while the relative price of exported goods rises in the foreign market. This may increase the terms of trade, however, boosting real import demand and reducing export demand. The increase in real import demand is offset partly by a decline in private consumption and investment spending. Furthermore, a rise in the budget deficit leads to a fall in national savings unless there is an equal offsetting rise in private savings. Therefore, an increase in the budget deficit has to reduce either private investment or net export. "Twin deficit" is a way of saying that almost all of that adjustment was in net exports. The division of the response to lower savings between investment and current account deficit depends on certain key parameters and on changes in the external environment. The factors on which the magnitude of the responses of real trade demand depends are (Erceg et al., 2005):

- The magnitude of the real exchange rate appreciation and the sensitivity of the exchange rate to the level of interest rate;
- The price elasticity of export and import demand, and
- Factors that determine the response of private consumption and investment spending, i.e. the sensitivity of the investment to the interest rate.

Furthermore, all things being equal, a decline in investment is a smaller fraction of the fall in national savings when investment has low sensitivity to the interest rate, or/and the exchange rate is sensitive to the level of interest rate or/and trade is sensitive to the exchange rate. This mixture of changes in investment and net exports need not have been the response to a decline in the rate of national savings, let alone to an increase in the budget deficit. More fundamentally, the response to a budget deficit

or, more generally, to a fall in savings is not likely to be the same in the long run as in the short run. Changes in domestic savings are generally balanced in the short run by changes in international flows. Changes in domestic savings that persist, however, lead to a parallel change in domestic investment. Feldstein and Horioka (1980) find a substantial degree of correlation between the country's domestic savings and domestic investment rates over the medium term. This shows that capital is not very mobile across national borders.

The aim of this study is to assess the major determinants of the current account and to study whether there is a twin deficit in the selected members of the EU by using recent econometric techniques. In addition to the public savings variable, the real effective exchange rate (RER) variable is introduced as one of the exogenous variables of the model as a measure of a relationship between current account balance and the price elasticity of trade demand. An increase in RER is associated with an appreciation of the currency, where it reduces both the competitiveness of the country and current account. On the other hand, any increase in the interest rate increases the amount of savings and reduces investment, so we expect that interest rates will have a positive effect on the current account indirectly. Under these circumstances, the model becomes:

$$CA_t = a_0 + a_1 RER_t + a_2 i_t + a_3 S_t^g + \varepsilon_t \quad (5)$$

where  $CA$  is current account,  $RER$  is the real effective exchange rate,  $i$  is the interest rate,  $S^g$  is the government saving, and  $\varepsilon$  is the error term.

#### 4. Methodology

##### 4.1. Panel Unit Root Tests

This paper used three different tests for the panel unit root. The first one was the Levin, Lin, and Chu (LLC) test (Levin et al., 2002), which is based on orthogonalized residuals and the correction by the ratio of the long-run to the short-run variance of each variable. Although the LLC test has become a widely accepted panel unit root test, it has a homogeneity restriction, allowing for heterogeneity only in the constant term of the ADF regression. The second applied test was the Im, Pesaran, and Shin (IPS) test, which is a heterogeneous panel unit root test based on individual ADF tests. It was proposed by Im et al. (2003) as a solution to the homogeneity issue. This test allows for heterogeneity in both the constant and slope terms of the ADF regression. Finally, the third test used in our paper was again the heterogeneous panel unit root test, the PKPSS. This test was presented by Hadri (2000) as an extension of the test of Kwiatkowski et al. (1992), and the KPSS (Kwiatkowski-Phillips-Schmidt-Shin) to a panel with individual and time effects and deterministic trends, which has as its null the stationarity of the series.

#### 4.2. *Panel Cointegration Tests*

In case of the panel cointegration tests, the tests of Pedroni (1999) and Kao (1999) have been estimated. Kao (1999) assumes that cointegrating vectors are homogeneous and tests the null hypothesis of non cointegration through Dickey-Fuller (DF) and augmented DF (ADF) tests. On the other hand, Pedroni (1999) tests the null hypothesis of non cointegration through seven statistics, four for panel cointegration tests representing the within-dimension approach (non-parametric variance ratio statistic, Phillips and Perron rho-statistic, the Phillips and Perron t-statistic, and ADF t-statistic) and three for group cointegration tests representing the between-dimension approach (the Phillips and Perron rho-statistic, the Phillips and Perron t-statistic, and the ADF t-statistic), all to test co-integration in a panel where there exist multiple regressors. As Pedroni (2004) notes, the panel-ADF and the group-ADF tests of these seven tests have better small sample properties than the other statistics, and the estimation results will depend on these tests.

Other methods for estimating a long-run (cointegrating) relationship between the variables in a panel framework are the panel ordinary least squares (OLS), the multi-country panel version of multivariate maximum likelihood procedure of Johansen (1991), the VEC framework (JOH-ML), and the dynamic OLS (DOLS) estimator by Mark and Sul (2001) and Kao and Chiang (2000). Each method has different advantages and disadvantages. Kao and Chen (1995) demonstrated in their work that the OLS estimator is asymptotically normal, but at the same time it is asymptotically biased. They proposed to correct the bias in OLS; however, the results showed that this correction did not perform well in small samples. DOLS is derived from the studies of Saikkonen (1991) and Stock and Watson (1993) and proposed by Kao and Chiang (2000). Kao and Chiang (2000) estimated Monte Carlo simulations in order to compare the sample properties of OLS, fully modified OLS (FMOLS), and DOLS, and concluded that the DOLS outperformed both the OLS and FMOLS estimators in estimating the cointegrated panel regressions. Baltagi and Kao (2000) also stated that the DOLS estimator could be more promising than the OLS estimator in the case of a cointegrated panel structure. Panel DOLS estimation includes leads and lags of the differentiated independent variables as additional regressors to the model. Through this, it takes into account two important issues related to the estimation: the potential endogeneity of the regressors and the serial correlation among error terms. The final method that includes a standard cointegration test is the Johansen (1991) Vector Error Correction (VEC) framework that may suffer from a ‘time span problem’. According to Otero and Smith (2000), the shorter the span of data, the lower the power of cointegration tests to reject the null of non-cointegration as a result of low adjustment speeds.

## 5. Empirical Results

Table 1 shows the results of the unit root tests employed in the study. In these tests, appropriate lag lengths are determined with the automatic selection of the Akaike Information Criteria (AIC).

**Table 1. Panel unit root tests**

|     | LLC   | IPS   | Hadri |
|-----|-------|-------|-------|
| CA  | -0.43 | -1,26 | 3.59  |
| BB  | 0.47  | -1.67 | 6.64  |
| RER | -1.45 | 0.11  | 9.89  |
| I   | 4.03  | 1.15  | 2.65  |

As the calculated values for the IPS and LLC tests are greater than the 5 per cent critical value of -1.645 (1 per cent critical value of -2.326) from the standard t-table, the null of non-stationarity (unit root) cannot be rejected for all of the selected variables. On the other hand, the Hadri test rejects the null hypothesis of stationarity and confirms again the non-stationarity of the variables. As the series CA, BB, RER and I are found to be non-stationary, it is possible to employ the panel cointegration tests.

The next step is to report the cointegration test results for the selected countries in order to determine whether the residuals of the tested variables are stationary. Table 2 presents the cointegration test results by using the Pedroni residual cointegration test, the Kao residual cointegration test, the panel ordinary least squares (OLS), and the DOLS and multi-country panel version of the Johansen (1991) VEC framework (JOH), as discussed earlier. The alternative tests are used to find cointegrating relationships in order to control the results of each method.

Based on the results represented in Table 2, we found strong evidence of a cointegration relationship between the current account and its determinants, such as the real exchange rate, interest rate, and the budget deficit. In all of the methods used, the results support a cointegration relationship at different levels of significance.

**Table 2. Panel cointegration tests**

| Study              | Statistics               | Null hypothesis     | Test result |
|--------------------|--------------------------|---------------------|-------------|
| Pedroni<br>(1999)  | Panel ADF-<br>statistics | No<br>cointegration | -1.57*      |
|                    | Group ADF-<br>statistics | No<br>cointegration | -3.56***    |
| Kao<br>(1999)      | ADF statistics           | No<br>cointegration | 1.53*       |
| OLS <sub>a</sub>   | ADF statistics           | No<br>cointegration | 0.14**      |
| DOLS <sub>a</sub>  | ADF statistics           | No<br>cointegration | -0.47***    |
| Johanson<br>(1991) | Eigenvalue               | No<br>cointegration | 0.10**      |

\*, \*\*, \*\*\* indicate significance at 10, 5, and 1% levels, respectively.

Critical values of cointegration tests based on MacKinnon (1991).

DOLS method includes 2 lags and 2 leads.

Table 3 shows long-run coefficients of the current account model in equation 5 and  $a_1$ ,  $a_2$  and  $a_3$  refers to real exchange rate, interest rate, and budget balance, respectively. The results show that the real exchange rate is found to be statistically significant only in the OLS estimate with a negative sign. The interest rate is found to be statistically significant in all estimates. It has a positive sign as it is supported by the theory, meaning that any increase in interest rates would expect a reduction in the amount of investments and an increase in the amount of savings. Budget balance is found to be statistically significant only in the JOH estimate. It has the correct sign that supports the twin deficit hypothesis.

**Table 3. Panel estimates of the cointegration coefficients**

| Coefficient | OLS      | DOLS     | JOH      |
|-------------|----------|----------|----------|
| $a_1$       | -0.083** | 0.063    | 0.094    |
| $a_2$       | 0.874*** | 2.109*** | 2.681**  |
| $a_3$       | 0.021    | -0.119   | 1.511*** |

\*, \*\*, \*\*\* indicate significance at 10%, 5% and 1% levels, respectively.

## 6. Conclusion

This study tries to underline the major causes of current account deficit from the simple Mundel-Flemming approach for seven members of the EU in the short-run and long-run. Furthermore, it investigates cointegration relationship between the current account and major variables such as the real exchange rate, interest rate, and the fiscal balance of new EU members. According to the Mundell-Flemming approach, budget deficit leads to an increase in domestic interest rate. This in turn is followed by the appreciation of the domestic currency due to the increase in capital inflow. Appreciated domestic currency reduces the price competitiveness of exports, leading to the current account deficit. In another words, budget deficit leads to the twin deficit.

In this study, there is enough evidence to assume a long-run relationship between the current account and its determinants such as real exchange rate, interest rate, and budget balance. The long-run coefficient of the interest rate is statistically significant in all estimation techniques. Only one out of three estimate techniques confirm the twin deficit. Therefore, there is weak evidence to support the twin deficit hypothesis for the selected member countries.

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## **Appendix: Data**

This study includes quarterly data for the period of 2000Q1-2011Q3 for 7 EU members, which are Bulgaria, Greece, Ireland, Italy, Latvia, Portugal and Spain. Definitions for the selected data are as follows:

CA        Current Account Balance.

RER       Real Effective Exchange Rates (deflator: consumer price indices, including 27 trading partners, index as 1999=100), where increases denote real appreciation of domestic currency.

i         Interest rates on government securities.

S<sup>g</sup>       Public Savings are represented as the Net Landing/Borrowing of the consolidated budget balances.

All data, except the real exchange rate and interest rate, are taken as a share of GDP. Data other than interest rates are all obtained from the official site of the EU, Eurostat. Interest rates are obtained from the IMF.