

Financial integration, euro and the twin deficits of southern eurozone countries

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Abstract

The purpose of this study is the investigation of the relationship between budget and Current Account balances for countries of Southern Eurozone. The twin deficit hypothesis is tested within the context of a portfolio model involving variables from the financial sector. Since the beginning of 2010 and as a result of the debt crisis, fiscal imbalances have been at the center of interest. Related to these imbalances are imbalances of the external sector, which are equally important, as they need financing by net inflows from abroad. Financial integration and the euro have been blamed for the sharp deterioration of Current Account imbalances of southern Eurozone countries. The theoretical background of the relationship between the two balances derives from the traditional twin deficit hypothesis. We show that the fiscal budget, as well as variables coming from the financial sector and the real economy, such as interest rate fluctuations, output growth, competitiveness determine Current Account imbalances. Empirical investigation is conducted with panel data from Southern eurozone countries, for the period 1991-2010, during which financial integration of the EU markets has been implemented. Our main conclusion is that the twin deficit hypothesis is verified. Additionally, it is found that not only fiscal policy of eurozone countries of the South affects their Current Account balances, but also fiscal policy of the eurozone surplus countries of the North has a role to play. Interdependence of eurozone countries suggests that fiscal policy can be used for the elimination of external disequilibrium. Therefore, fiscal policy should be coordinated but not uniformly applied. This implies that the improvement in the fiscal situation of southern eurozone countries will have a beneficial influence on their CA deficit, if accompanied by a combination of favorable changes in net private savings, competitiveness, interest rates and also fiscal adjustments in eurozone countries with Current Account surpluses of the North. Fiscal rules are incapable to eliminate Current Account imbalances within the Eurozone.

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Introduction

Analysis of the relationship between the Current Account (CA) and fiscal policy has attracted theoretical as well as empirical attention. There are two major competing theories: the positive association of CA deficit and the government budget deficit, known as the twin deficit hypothesis, derives from the Keynesian tradition. According to this view an expansionary fiscal policy stimulates output and demand which has a deteriorating influence on the CA. At the other extreme, the two deficits have no connection according to the Ricardian Equivalence approach. Any fiscal expansion, or contraction induces intertemporal reallocation of savings, leaving the CA balance unaltered. In line to this approach, an increase in the budget deficit, increases private saving and has no effect on the CA. Whether or not the two deficits are positively related, has important policy implications. If the twin deficit hypothesis is valid, a government can improve the country's CA through a fiscal contraction and vice versa.

Empirical research for individual countries or group of countries has provided unclear results. Evidence in support to the twin deficit hypothesis primarily comes from the US experience in the 1980s and 2000s (Abell 1990a, Abell 1990b, Frankel 2006, Shukur 2002). In Edwards 2005 and Blanchard 2007 it is claimed that CA deficits of the US and other rich countries have their origins in private saving and investment decisions and that fiscal deficits often play a marginal role. For the US there are other empirical studies verifying a negative relation between the two deficits. When fiscal account worsens, the CA improves, as in Roubini 2006, Kim and Roubini 2008. There are numerous other studies that confirm the twin deficit hypothesis for other countries, such as Baharumshah 2007 for the case of Thailand. Daly and Siddiki 2010 test the hypothesis for OECD countries, with cointegration analysis. In 13 out of 23 OECD countries for the period 1960-2000, the twin deficit hypothesis is accepted. Empirical studies dealing with the impact of budget deficits on CA balances for eurozone countries, are inconclusive. Evidence from Vamvoukas 1999 and also from Pantelis et al. 2009 for the period 1960-2007 confirm the twin deficit hypothesis for the case of Greece. On the other hand Papadogonas and Stournaras 2006 provide support to the Ricardian equivalence hypothesis for the EU member states. According to them, CA developments are explained by factors related to financial and economic integration. Kaufmann, Scharler and Winckler 2002 reject the twin deficit hypothesis for Austria. Vasarthani et al. 2010, estimate a model for the determination of the CA for the EU countries with panel data, over the period 1980-2008. Their results provide a weak support to the twin deficit hypothesis.

This study is structured as follows. Section 2 presents the evolution of the variables describing the fiscal situation, the CA balance and the main financial variables for the southern Eurozone countries. Section 3 offers the theoretical background of the relation between the two deficits. In this section a portfolio model is used to explain developments in the CA and budget balances. Factors related to financial and economic integration such as interest rates and growth differentials are essential characteristics of this model. Section 4 provides empirical evidence based on panel data from Southern eurozone countries, over the period 1991-2010. Finally, section 5 concludes with a summary of our results.

1.2 The data

This section starts by comparing the CA and fiscal balance situation among a group of eurozone countries, over the years 1991¹ to 2010. In this group we have included the Southern EU countries, that is, Spain, Portugal, Italy, France, and also Cyprus and Slovenia. A weak and deteriorating external sector is a common feature of these countries, with Greece and Portugal being in the worst position. This can be observed from Figure 1 that shows the course of the CA as a percentage of GDP. Italy's and France's CA surpluses have turned into deficits since 2004 and Cyprus after 2001. We notice a temporary improvement in CA deficits lasting for two or three years after the introduction of Euro and also for the years 2009-2010, as a consequence of the economic crisis. CA deficits have piled up to a rising external debt over the years. With respect to the net external debt position, measured by the Net International Investment Position² as a percentage of GDP, Greece Portugal and Spain are in the worst situation. Figure 3 shows public debt and the Net International Investment Position as percentages of GDP of the countries of our group. By looking at the charts of Figure 3, it is concluded that some countries suffer from a dual problem: high public debt ratios matched with high or even higher external debt ratios. These countries are Greece, Portugal and Spain and to a much lesser extent Italy and Slovenia. Cyprus has positive Net International Investment position while France started having external debt since 2008. The question that can be raised is about the sources of financing the net external debt of Greece, Portugal, Spain and Italy, since mid -1990s. The answer is related to the financial integration of EU and the creation of euro that have eased borrowing conditions for both the public and private sector.

Interest rates were falling rapidly during the convergence period in all countries of our sample. Figure 4 shows the downward path followed by long run interest rates vis a vis the German rate. After euro was introduced and before the bursting of economic crisis, long run interest rates of all countries of our sample almost coincided, with the exception of Slovenia and Cyprus. However, after 2008, the difference between the long run interest rate of each individual country and Germany's increased reflecting default risk that these countries face to a smaller or larger degree. Figure 5 depicts the path followed by real short run and long run interest rates. Real interest rates follow a downward trend. Leaving aside Cyprus and Slovenia, in all other cases real rates have started increasing moderately, since 2004. These short run interest rates have declined since 2008, in accordance to the ECB base rate, while real long interest rates have gone up following the path of nominal interest rates.

The countries of our group share a characteristic of their external sector that is worth noting: their trade balance with respect to other EU countries has been in deficit since 2000. The annual sum of the trade deficits has been increasing since then and is matched by a widening surplus of a different group of eurozone countries (Figure 6). This second group is comprised by surplus³ eurozone countries. These are Germany, Belgium, Ireland, Holland and Slovakia. The widening disequilibrium between the two groups reveals a severe loss in competitiveness for the deficit countries, after the

¹ 1991¹ marks the beginning of the convergence period for the first group of the 11 EU countries that joined the EMU in 1999 and Greece that joined in 2001. The first stage of convergence as determined in the Delors report starts in mid 1990.

² Net International Investment Position as published by the IFS of the IMF.

³ It is reminded that here we are referring to intra - EU trade deficits.

introduction of the euro.⁴ We are going to refer to the group of Southern EU countries as the deficit group, or, countries and to the other group as the surplus group or surplus countries.

Regarding the government budget balance, we observe from Figure 1 that it has been in deficit for all countries of our group for all years under consideration. Budget deficits as a percentage of GDP have improved during the 1990s, although loosening fiscal policies after attaining the accession to EMU criteria have increased fiscal deficits in all countries of our group, with the exception of Spain. Public debt as a percent of GDP has been under control in all countries until before the economic crisis. Figure 2 shows the stock of public debt as a percentage of GDP. We can observe the performance of the public debt/GDP, for the case of Italy and Spain. In Italy, the public debt as a percentage of GDP fell from a high of 121.84 in 1994 to 103.62 in 2007 and in Spain it fell from a high of 67.45 in 1996 to 36.13 in 2007. In 2010 as a consequence of the economic crisis, public debt climbed to unprecedented levels. It reached 142.75% of GDP in Greece, 119% in Italy, 93% in Portugal, 81.70% in France, 60.11% in Spain, 60.80% in Cyprus and 38.00% in Slovenia.

⁴ Slovenia joined EMU in 2007 and Cyprus in 2007 but for two years before their economics were functioning with fixed exchange rates, under the Exchange Rate Mechanism (ERM II).

Figure 1: Current Account and Government Budget Balances, 1991-2010 (% of GDP)

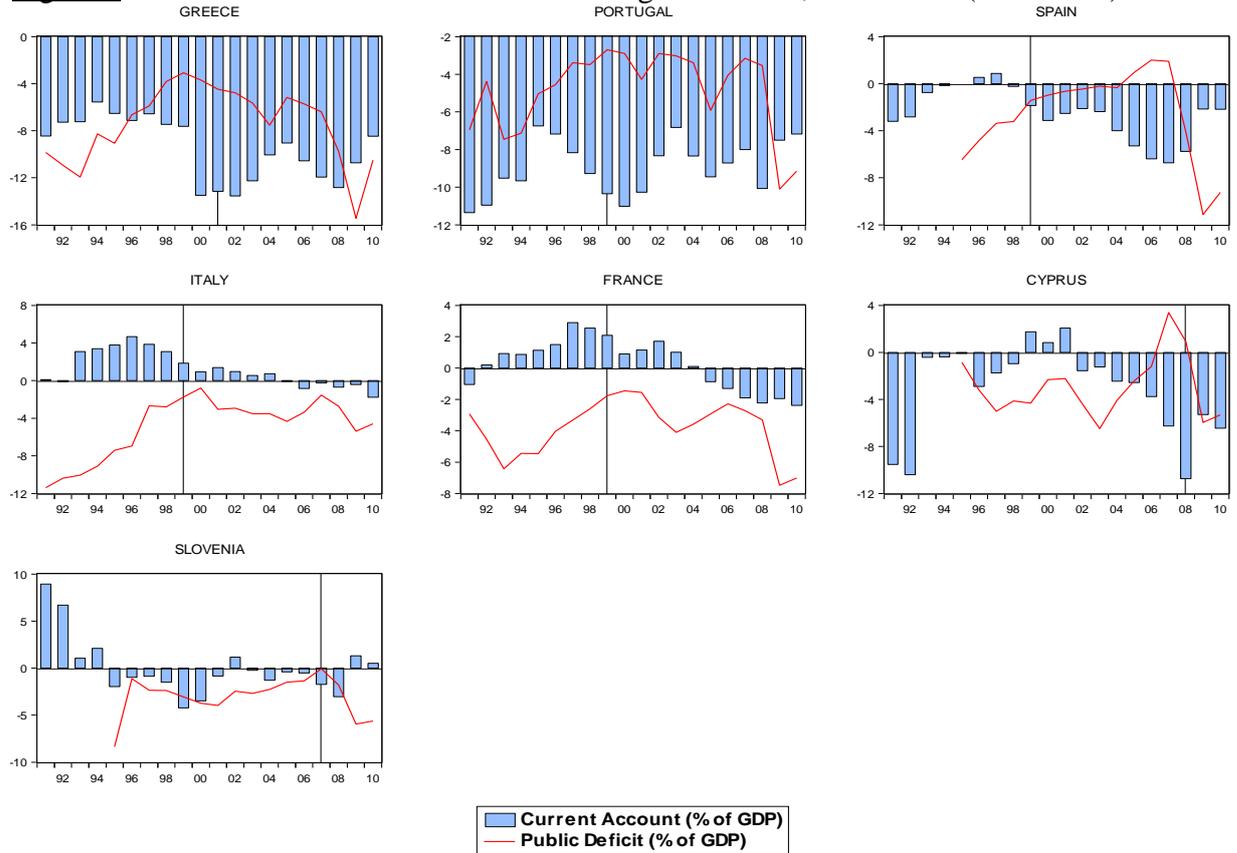
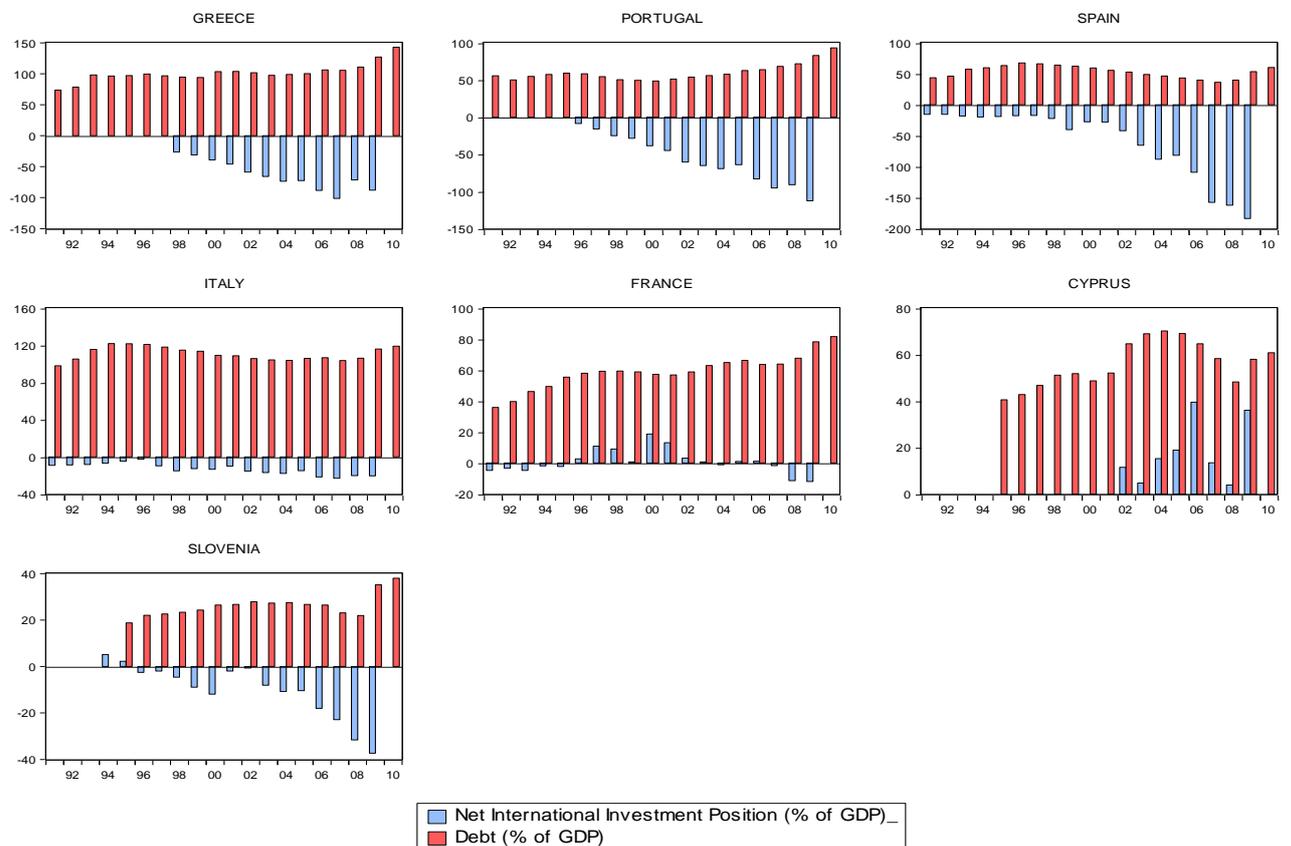


Figure 2: Public Debt, 1991-2010 (% of GDP)



Data Source: European Commission, Economic and Financial Affairs.

Figure 3: Public Debt and the International Investment Position (% of GDP)

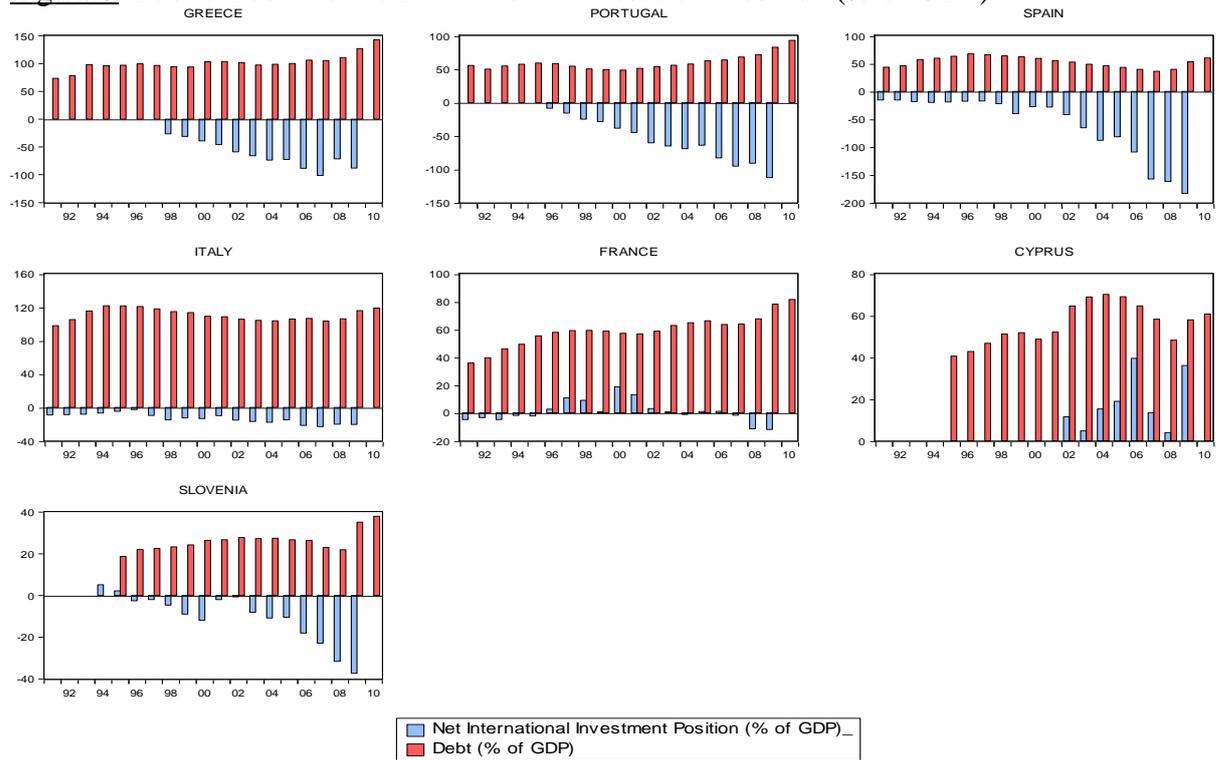


Figure 4: Long Run Interest Rates (interest rate on 10 year bonds)

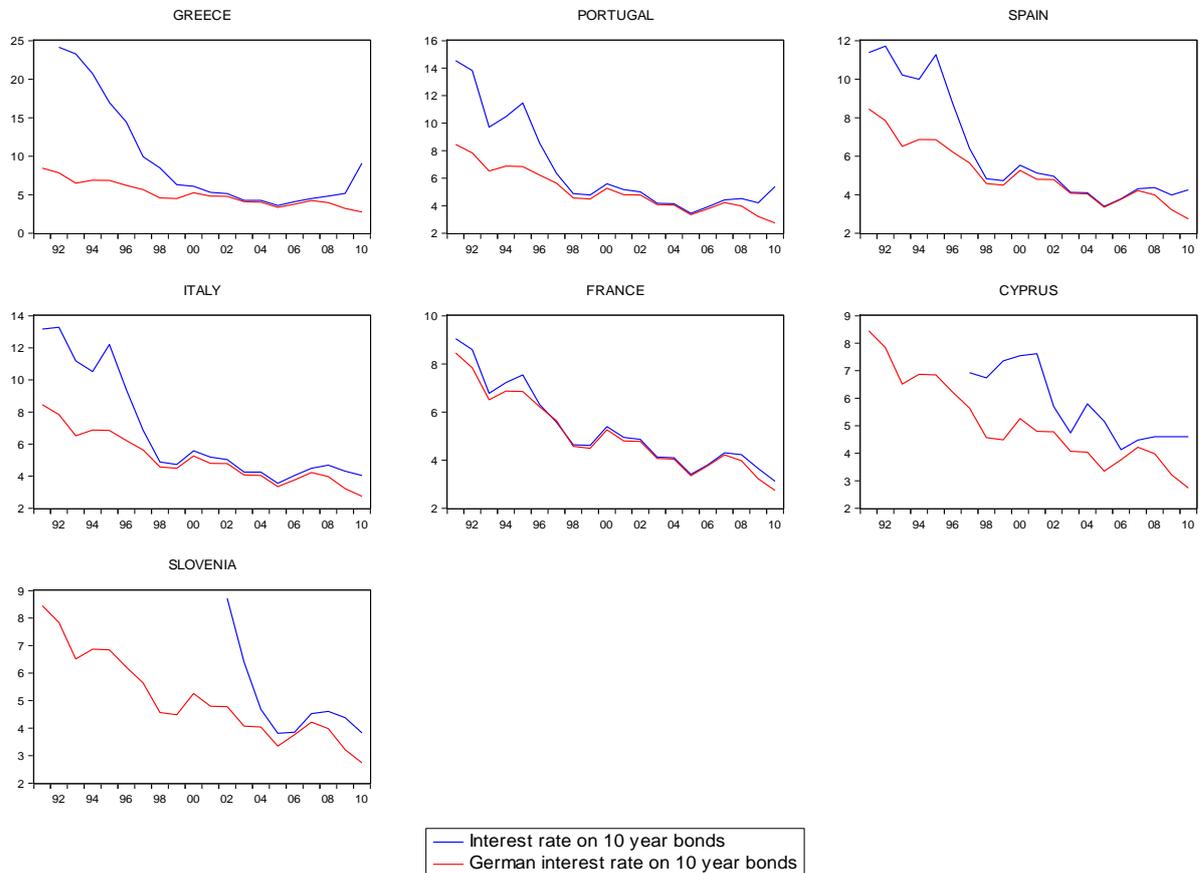


Figure 5: Real Short Run and Long Run Interest Rate (1991-2010)

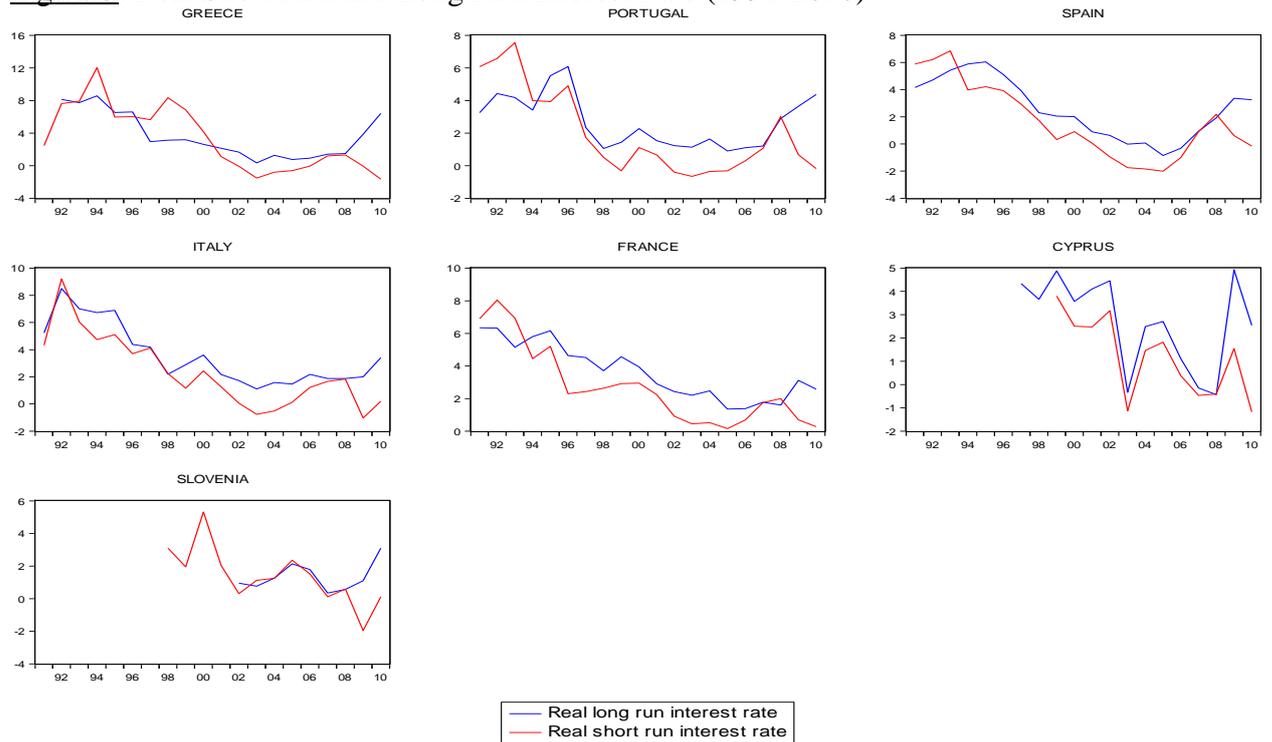
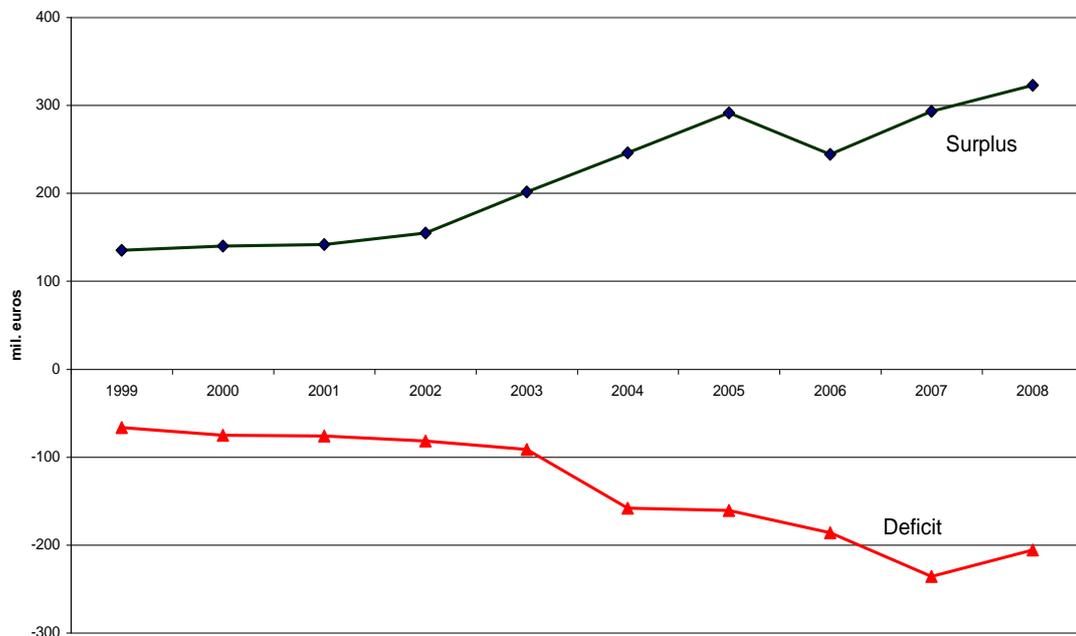


Figure 6: Intra-eurozone trade balances



Note: *Deficit* includes: trade deficits of Austria, France, Italy, Spain, Portugal, Greece, Luxemburg, Cyprus, Malta and Slovenia with other eurozone countries..

Surplus includes: Trade surpluses of Germany, Belgium, Ireland, Holland and Slovakia, with other eurozone countries.

Data Source: European Commission, Economic and Financial Affairs.

2. Theoretical background

The relationship between the two balances derives from the basic macroeconomic identity according to which the CA is equal to the difference between national savings, S and investment, I:

$$CA = S - I \quad (1)$$

Breaking down S and I into its public and private sector components, (1) becomes:

$$CA = (S_p - I_p) + (S_g - I_g) \quad (2)$$

where subscript p denotes private sector and subscript g denotes and public sector.

From (2), the CA is related to the excess public saving ($S_g - I_g$), which corresponds to the budget balance. Hence equation (2) is used as a basis for discussing the twin deficit hypothesis. A positive relation between CA and excess government savings holds only under the condition that the difference between S_p and I_p remains constant. The evolution of $(S_p - I_p)$ is very important for the twin deficit hypothesis.

3.1 Channels through which the budget balance influences the Current Account and vice versa

The two balances influence each other through various channels. Theoretical support to the twin deficit hypothesis and causality running from the public deficit to the external deficit derives mainly from the conventional Keynesian and Mundell - Fleming approach.

First, according to the Keynesian tradition, an expansionary fiscal policy stimulates income and spending through the multiplier mechanism. Part of increased spending falls on imports, hence the CA deteriorates and the twin deficit hypothesis is verified. This is true irrespective of exchange rate regime, capital mobility situation or phase of the business cycle of the economy.

Second, in a Mundell-Fleming framework (Mundell 1968, Fleming 1967), with perfect capital mobility and negligible transaction costs, fiscal expansion increases real interest rates that in turn trigger capital inflows. As a result real exchange rate appreciates, deteriorating the CA. Whatever the exchange rate regime is, even in a common currency area, such as the eurozone, this mechanism is effective. However, uncoordinated fiscal policy in a currency union may lead to divergent inflation, real interest rates, real exchange rates, finally to widening external imbalances.

Causality running from the CA balance to the budget balance is supported by other views. Financial integration and easier access to borrowing for member countries causes deterioration of their CA balances, raising questions of sustainability by financial markets. Gourinchas 2002, among others, argue that governments should protect their economies from such a potential by lowering public deficits. If such a policy is implemented, the two deficits are inversely related and the twin deficit hypothesis does not exist.

An inverse relation between the two deficits is found for the US, for the period 1973-2004, by Kim and Roubini 2008. The observed "twin divergence" as they call it is in effect when the main driver of the two balances is an output shock. They claim that because during economic recessions unemployment is high and output falls, fiscal policy is expansionary to stimulate economic activity and the budget balance worsens. At the same time, as spending falls, the CA improves. On the contrary during the booms, when the economic activity is high, the fiscal balance improves implying co-existence deteriorating CA balances and improving budget balances. So, according to

their explanation, there is no causal effect between the two deficits but there exists an inverse association.

Stiglitz 2010 supports the twin deficit hypothesis, with causality running from the CA to the budget balance. He argues that countries with persistent or expanding CA deficits are often obliged to run fiscal deficits to maintain aggregate demand. “Without the fiscal deficit, they will have high unemployment.”⁵

The synchronized variation in private sector’s saving and investment, known as the Feldstein-Horioka 1980 puzzle, supports the twin deficit hypothesis, as can be inferred from equation (2). (Marinheiro 2008, Blanchard-Giavazzi 2002). More recent empirical work has proved that the Feldstein-Horioka puzzle is not more valid neither is the twin deficit hypothesis.

An alternative approach known as the Ricardian Equivalence Hypothesis suggests no relation between the two deficits (Barro 1974, 1988). The Ricardian Equivalence predicts that a fiscal expansion has a positive effect of the same size on private savings, while real interest rates, investment and CA balance remain unaffected. Rational individuals know that if public expenses increase this year, next year or sometime in the near future, taxes will be raised. Therefore, they save today to pay increased taxes in the future. Papadogonas - Stouraras 2007 findings support this view.

3.2 A portfolio model

Whatever the underlying forces behind the two deficits are, widening imbalances in the euro area countries cannot be explained without considering the effect of financial and economic integration and the common currency. In what follows we construct a portfolio model in the context of which the relation between CA and budget balances can be discussed. Under the condition of financial integration and a single currency, it is assumed that short run interest rates are common for all countries, while long run interest rates may differ. Therefore, financial assets bearing different rates of return are not perfect substitutes, in the portfolios of investors. Assume for simplicity that prices are constant and that the Union we are referring to is comprised of two countries representing two groups with distinct characteristics. The first is the surplus countries group comprised by countries of the core of the currency union. Deficit countries are included in the second group. The difference between the two groups is that all indicators of real variables, such as income per capita, distribution of income, adjustment productivity of labour, competitiveness of the economy, as well as the structure of production and institutional framework are superior the surplus relative to the deficit group. Also, the financial sector of the surplus group is more developed and efficient. Deficit countries benefit from the formation of the currency union with the surplus group, in terms of lower nominal and real interest rates and easier access to borrowing in general. This situation induces widening deficits in both public and CA balances.

It is also assumed that the external sector of the union as a whole is in balance. So CA surplus of the first group equals the deficit of the second. At this stage, for simplicity of analysis, the two country groups will be referred to as countries: the deficit countries group will be the “home” country while the surplus group “foreign” country. The CA balance is equal to the change in the net holdings of foreign assets held by domestic residents. If it is positive it corresponds to the country’s net lending abroad, if negative, to net borrowing from abroad:

⁵ Stiglitz (2010), p 326.

$$CA = \Delta(F-B) \quad (3)$$

Where, Δ , denotes first difference. F is the holdings of foreign assets by domestic residents and B is the holdings of domestic assets by foreign residents. It is assumed that foreign assets, F , are comprised by bonds issued by the government or the private sector of the foreign country, with an average rate of return R_f , whereas, B , domestic assets are bonds issued by the government or the private sector of the home country, with an average rate of return R_b . Residents of the union can hold their financial wealth in the form of money, M , or bonds F , or B . Money, M , has also a rate of return equal to R_m . The rate of return of each form of asset is its interest rate. Hence demand for each asset⁶ depends positively on its own interest rate, negatively on the other assets' interest rates and it also depends on income, Y . Subsequently, demand for foreign assets F_d , by domestic residents, is a function of R_f , R_b , R_m and Y , home country's income:

$$F_d = f_d(R_f^{(+)}, R_b^{(-)}, R_m^{(-)}, Y^{(+)}) \quad (4)$$

Signs of (+) or (-) denote the sign of partial derivative of the demand for F with respect to corresponding variables in (4). Similarly, demand for domestic bonds B_d , is described in equation (5):

$$B_d = b_d(R_f^{(-)}, R_b^{(+)}, R_m^{(-)}, Y^*) \quad (5)$$

The star (*) refers to foreign country variables.

To determine the factors affecting the assets supply side we argue that B and F are issued by the corresponding country's government or private sector, to finance their borrowing requirements. The higher is the stock of public debt, $PDebt$, the higher is the stock of bonds that have been issued, or the higher. Also, the lower is the interest rate the higher is the supply of bonds. Therefore, supply of foreign bonds,⁷ F_s , depends positively on the foreign country' stock of public debt, $PDebt^*$ and negatively on R_f . Supply of domestic bonds, depends on positively on $PDebt$ and negatively on R_b .

$$F_s = f_s(PDebt^*^{(+)}, R_f^{(-)}) \quad (6)$$

$$B_s = b_s(PDebt^{(+)}, R_b^{(-)}) \quad (7)$$

Consequently, when demand of each asset is equal to its supply, the actual stock of F and B depends on all forces included in corresponding demand and supply functions:

$$F = f(R_f^{(?)}, R_b^{(-)}, R_m^{(-)}, Y^{(+)}, PDebt^*) \quad (8)$$

$$B = b(R_f^{(-)}, R_b^{(?)}, R_m^{(-)}, Y^*, PDebt^*) \quad (9)$$

In (8) the direction of influence of R_f on F depends on whether the effect originates from the demand for foreign bonds, F (supply of lending) or the effect originating from the supply of F (demand for borrowing). The same holds for the ambiguous effect of R_b on the stock of bonds, B , in (9). By substituting the equilibrium equations (8) and (9) in (3) we end up with the CA balance as a function of variables coming from the asset market:

⁶ Demand for F corresponds to the (supply of) lending by domestic residents to foreigners. Similarly, demand for B corresponds to the (supply of) lending to domestic residents by foreigners.

⁷ Supply of F corresponds to the demand for borrowing by foreigners, while supply of B corresponds to the demand for borrowing by domestic residents.

$$F - B = \phi(R_f, R_b, R_m, Y, Y^*, PDebt, PDebt^*) \quad \text{and}$$

$$CA = \Delta(F - B) = \Delta(\phi(R_f, R_b, R_m, Y, Y^*, PDebt, PDebt^*)) \quad (10)$$

If additionally we assume that a change in the stock of public debt corresponds to that year's budget balance, BB, with the opposite sign, we can rewrite (10) as

$$CA = \zeta(\Delta R_f, \Delta R_b, \Delta R_m, \Delta Y, \Delta Y^*, BB, BB^*) \quad (11)$$

Again, the effect of a change in Rf or Rb on the CA balance is subject to the dominance of the effect from the demand or the supply side of the relevant bonds market. It is noted that the CA is influenced by the change in interest rates and not by their levels.

Next we shall discuss the effect of financial integration on the CA balance and its relation with the budget balance. Within our framework of analysis financial integration causes stronger adjustments in the home country⁸ than in the foreign country. The government of the home country takes the opportunity to increase its borrowing to finance its requirements, by increasing the supply of government bonds, B. In turn, this inflates public debt, as well as the budget deficit by the same amount, ceteris paribus. The increase in the supply of B, given the fact that there exists sufficient demand for domestic bonds, increases the stock of bonds, B, in the home country. From (3) (CA=Δ(F-B)), it is implied that the CA balance deteriorates. Besides, unless other adjustments take place, the worsening of the CA, is matched by a worsening of the budget balance. Therefore, the twin deficit hypothesis holds under the hypothesis of the Government and private sector unlimited capacity to borrow from financial markets. In fact, what we will estimate is a linear specification of (11) that has the following form:

$$CA_{it} = a_0 + a_1 \Delta R_{f_{it}} + a_2 \Delta R_{b_{it}} + a_3 \Delta R_{m_{it}} + a_4 \Delta Y_{it} + a_5 \Delta Y_{it}^* + a_6 BB_{it} + a_7 BB_{it}^* + u_{it} \quad (12)$$

Coefficients $\alpha_1, \alpha_2, \alpha_3$ can be either positive or negative:

$\alpha_1 > 0$, if the effect coming from the demand side prevails over the effect coming from the supply side of the market for F. It implies that as ΔR_f increases, CA improves. In words, the higher is the increase in foreign interest rates, the greater is the demand for foreign bonds, by domestic residents. As F increases, our country's CA improves.

$\alpha_1 < 0$, if the effect coming from the supply side of the F market prevails. Similarly,

$\alpha_2 > 0$, if effect coming from the supply side of the market for B prevails.

$\alpha_2 < 0$, if effect coming from the demand side of the B market prevails.

$\alpha_4 > 0, \alpha_5 < 0, \alpha_6 > 0, \alpha_7 < 0$. u_{it} is the disturbance term.

In any case it is the variation in interest rate that matters for the determination of the CA balance, not their level.

⁸ representing the weaker economies.

4. Results of the Empirical Research

Our intention has been to test empirically the twin deficit hypothesis for southern Eurozone countries, over the period 1991-2010 that covers the convergence process, the introduction of euro as well as the economic crisis. For this reason we have used panel data from Greece, Portugal, Spain, Italy, France, Cyprus and Slovenia.

4.1 Savings – Investment

Before proceeding with the empirical investigation of the two deficits it is important to examine the savings-investment behavior. The reason is that financial integration that lead to the reduction in nominal and real interest rates as well as the optimism about the future of the EMU, influenced savings as well as investment interfering in the relation of the two deficits. The identity $CA=(Sg-Ig) +(Sp-Ip)$ suggests that our preliminary investigation should involve the following relations:

- 1) private savings Sp and private investment Ip . If these two variables are positively correlated with correlation coefficient equal to one then the Feldstein-Horioka puzzle is verified, as well as the twin deficit hypothesis. For any other value of the correlation coefficient, the twin deficit hypothesis should be further investigated. So, we should test

$$Sp=\beta_0 + \beta_1 Ip \quad (13)$$

$$\text{If } \beta_0=0 \text{ and } \beta_1=1 \quad (13)'$$

then the Horioka Puzzle is valid and the twin deficit hypothesis is accepted.

- 2) If the Feldstein Horioka puzzle doesn't hold, the relation between net public savings, $(Sg-Ig)$, and net private savings, $(Sp-Ip)$, should be investigated. In case net public and private savings are positively correlated, the twin deficit hypothesis is verified. In case of negative correlation, or, of no correlation at all, twin deficit hypothesis should be further examined. We should test

$$(Sg-Ig)= \gamma_0+\gamma_1(Sp-Ig) \quad (14)$$

$$\text{If } \gamma_0>0 \text{ and } \gamma_1>0 \quad (14)'$$

then, the twin deficit hypothesis holds, otherwise it should be further checked.

$$\text{In the special case where } \gamma_0= 0 \text{ and } \gamma_1= -1 \quad (14)''$$

the Ricardian Equivalence hypothesis is valid and the twin deficit hypothesis is rejected.

Testing the above relations involves the following steps:

First, we check for unit roots, with the standard tests. Second, if all or some of these variables are not stationary, we test for cointegration and finally we examine whether the long run coefficients satisfy conditions (13)' or (14)'. Tables 1, 2 and 3 summarize the estimated results. From Table 1 it is inferred that whereas the variable Sp can be considered as stationary, Ip , $(Sg-Ig)$ and $(Sp-Ip)$ cannot. Therefore we proceed by testing for cointegration. Most of the tests⁹ for the existence of cointegrating vector suggest that private investment and private savings are cointegrated. (Table 2). The same is true for net government savings $(Sg-Ig)$ and net private savings, $(Sp-Ip)$. Table 3 demonstrates the estimated coefficients for the long run relationships. As can be

⁹ There exist other tests, not reported here, available from the econometric package Eviews 7. If all these tests are taken into account, our conclusions will not be altered.

observed, conditions (13)' and (14)' are not satisfied. Their rejection does not imply the rejection of the twin deficit hypothesis, which should be further investigated.

Table 1: Unit root tests (panel data for deficit eurozone countries, 1991-2010)				
Variables	Hadri z statistic	Levin, Lin and Chu t*	Im, Pesaran and shin W-statistic	ADF-Fisher Chi-square
Sp	5.66*	-2.26*	-1.57**	22.89***
Ip	2.62*	-0.76	-1.21	18.18
(Sg-Ig)		0.91*	1.35	9.72
(Sp-Ip)		2.31	-0.67	18.65
Note: the asterisks *, **, *** correspond to statistics according to which, the Ho hypothesis of a unit root, cannot be rejected at the 1%, 5% and 10% level of significance.				
Table 2: Cointegration tests (panel data for deficit eurozone countries, 1991-2010)				
Variables	Kao test	Panel pp statistic	Panel ADF statistic	Group ADPstatistic
Ip, Sp	4.55	-3.56 *	-3.39*	-1.68**
(Sg-Ig), (Sp-Ip)	-1.61**	-1.14	-2.06**	-1.23***
Note: the asterisks *, **, *** correspond to statistics according to which, the Ho hypothesis of no cointegration cannot be rejected at the 1%, 5% and 10% level of significance.				
Table 3: Estimated coefficients of cointegration equations (panel data for deficit eurozone countries, 1991-2010)				
equation	β_0	β_1	γ_0	γ_1
$Sp = \beta_0 + \beta_1 Ip$	27.72*	-0.49*		
$(Sg-Ig) = \gamma_0 + \gamma_1(Sp-Ig)$			-3.72*	-0.40*
Note: The asterisk, *, denotes statistical significance of relevant coefficients at the 1% level of significance.				

It is interesting to comment that Ip and Sp are inversely related, as expected from the visual inspection of the individual country figures of these time series (Figure 7) Also, the excess government savings, (Sg-Ig) and the excess private savings, (Sp-Ip) are inversely related. This could support a weak Ricardian Equivalence Hypothesis. The inverse association between the two deficits suggests that the expansion of the government excess savings in the eurozone deficit countries leads to the crowding out of the private sector excess savings. And of course, the opposite holds. Figure 8 shows the path of net private and public savings for the countries of our sample. Their inverse relation is indeed noticeable.

Figure 7: Private Saving and Investment (% GDP)

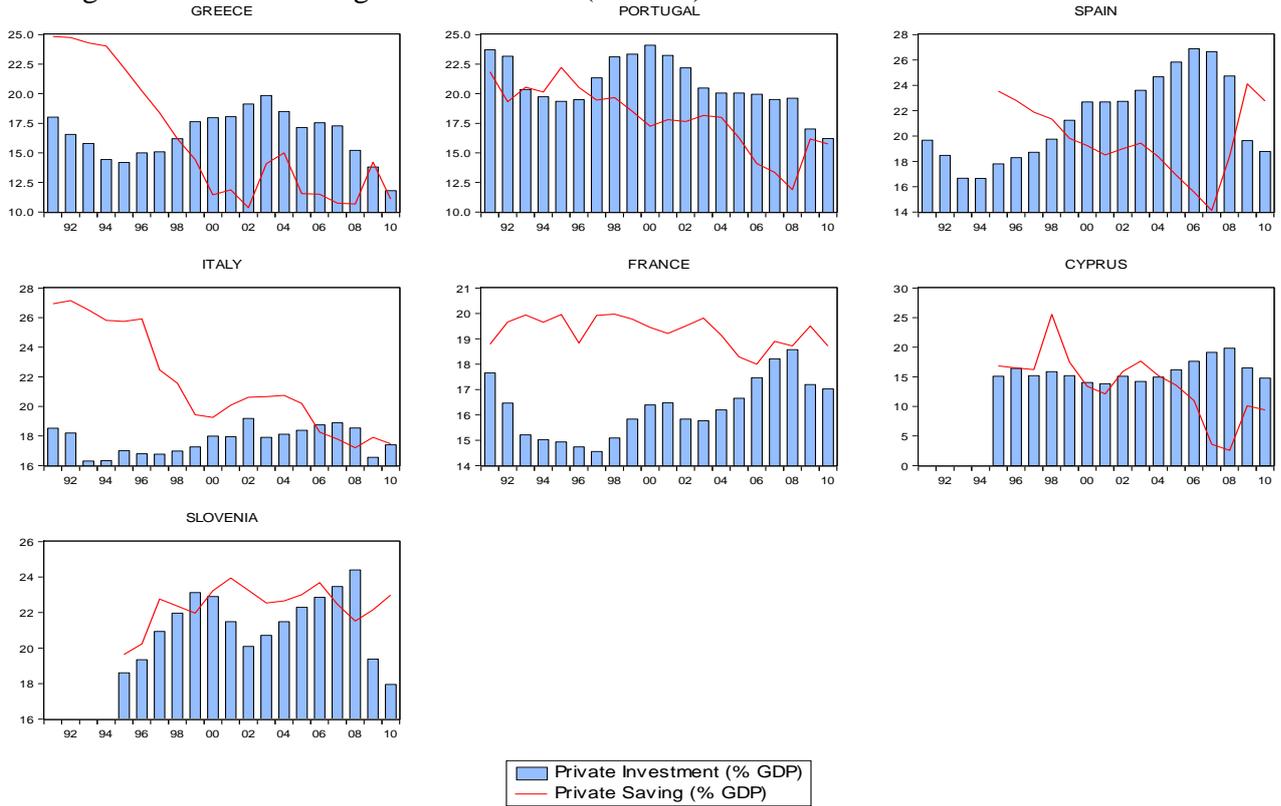
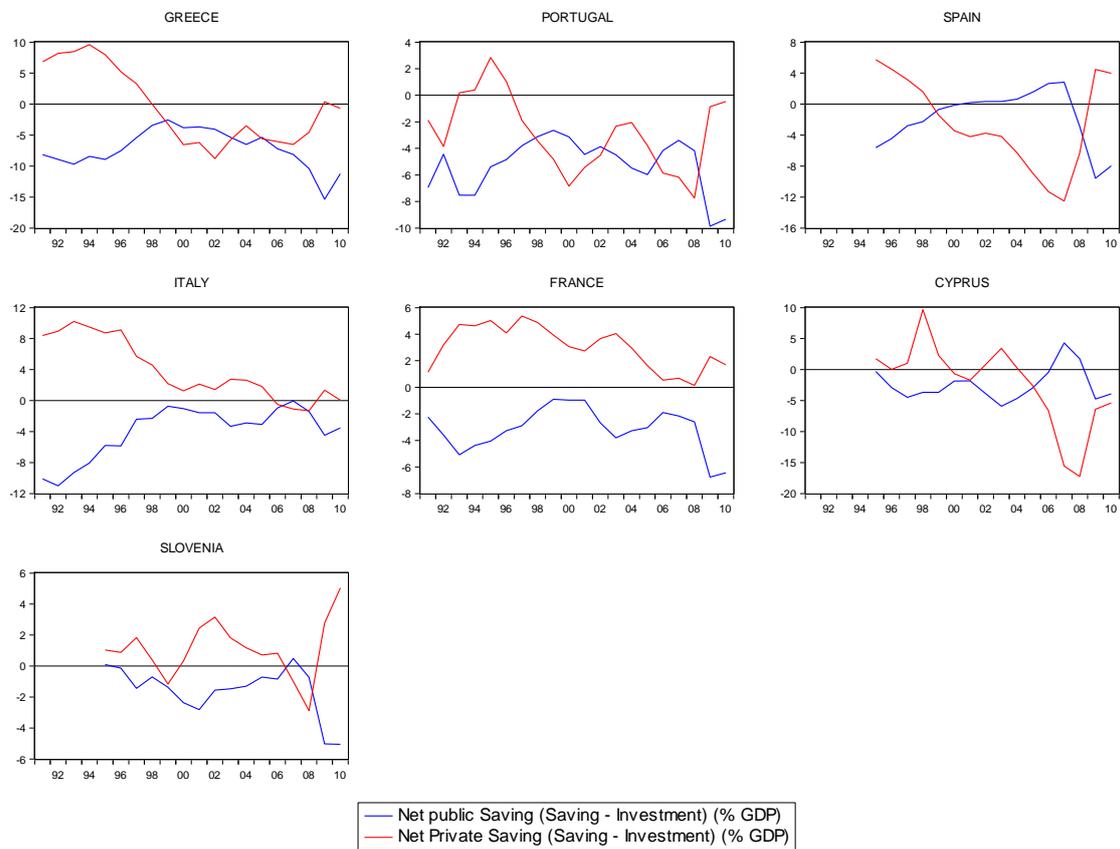


Figure 8: Net Private and Public Saving (% GDP)



Data Source: European Commission, Economic and Financial Affairs.

Therefore, as there is no certainty about whether the twin deficit hypothesis is rejected, we proceed by estimating the portfolio model, in order to draw further information about the two deficits.

4.2 Estimation of the portfolio model

The purpose of this section is to estimate equation (12) with panel data from the deficit eurozone countries and from Germany, representing the “foreign” surplus country of our theoretical framework. With the intention to make data from different countries more comparable and also correct for inflation, data on the CA and budget balances are expressed as percentages of GDP. In place of ΔY we have tried GDP growth, y , for deficit eurozone countries and in place of ΔY^* , Germany’s GDP growth y^* . Initially, we have tested for stationarity of our variables for. Table 7 reports unit root tests. According to the majority of those tests, stationarity of the variables cannot be rejected at the 1% or 5% level of significance. So, we proceed with the estimation of (12).

Table 4 : Unit root tests
(Panel data for deficit eurozone countries, 1991-2010)

Variable (level)	Test statistics			
	Hadri z statistic	Levin, Lin and Chu t*	Im, Pesaran and shin W- statistic	ADF-Fisher Chi-square
CA/Y (CA balance/GDP)	2.35*	-0.96	-1.80**	27.13*
ΔLR (long run interest rate)	5.54*	-.98*	-2.07*	26.06*
ΔGLR (Germany' long run interest rates)	7.79*	-3.04*	-0.12	10.13
ΔSR (short run interest rate)	5.52*	-3.36*	0.82	16.53
BB/Y (budget ba- lance/GDP)	0.97	-.59**	21.73***	23.11**
GBB/GY (Germany's Budget bal- ance/GDP)	7.47*	-3.21*	-2.85*	29.88*
y (output growth)	1.70**	-2.21*	-2.39*	28.17*
gy (Germany's output growth)	3.39*	-5.73*	-4.49*	45.35*
ULC Unit labour cost	7.02*	-2.39*	0.04	14.95
GULC (Germany's unit labour cost)	7.39*	-4.04*	-1.17	16.55
RULC (Relative unit la- bour cost ULC/GULC)	4.95*	-0.20	0.81	8.19

Note:
the asterisks *, **, *** correspond to statistics according to which, the
Ho hypothesis of a unit root cannot be rejected at the 1%, 5% and 10% level of sig-
nificance.

Table 5: Estimation of the portfolio model for the southern eurozone Countries with current account deficits, 1991-2010				
Dependent Variable: CA/GDP(%)				
Independent variables	(1)	(2)	(3)	(4)
ΔR_b (change in the long run interest rate)	-0.56*	-0.56*		
ΔR_f (change in Germany's long run interest rates)	0.55*	0.43*		
$\Delta(R_b - R_f)$			-0.54*	-0.54*
ΔR_m (short run interest rate)	-0.14*	-0.17*	-0.18*	-0.18*
BB/GDP (Public balance as a % of GDP)	0.14*	0.15*	0.12*	0.15*
BB*/GDP* (Germany's Public balance/as a % of Germany's GDP)	-0.16*	-0.15*	-0.16*	-0.15*
y (output growth)	-1.83			
y* (Germany's output growth)	-4.03			
(y-y*)			0.52	
RULC (Relative unit labour cost: Deficit countries unit labour cost with respect to Germany's)		0.17*		0.17**
(CA/GDP)(-1)	0.75*	0.71*	0.74*	0.71*
Constant	-0.65	1.34	-0.97*	1.28*
Adjusted R-squared	0.957	0.957	0.956	0.957
Total panel observations(unbalanced)	103	103	103	103
Note: the asterisks *, **, denote statistical significance of relevant coefficients at the 1% and 5% level of significance, respectively.				

In columns (3) and (4) coefficients of ΔR_b and ΔR_f are constrained to be equal, but with opposite signs. So, the change in the interest rate spread $\Delta(R_b - R_f)$ appears as an independent variable. The difference between column (3) and (4) is that (3) in-

cludes relative output growth, $(y-y^*)$ whereas (4) includes relative unit labor cost, RULC. Our preferred estimations are those of columns (2), (3) and (4), on the basis of Empirical results for equation (12) estimated with cross section fixed effects panel data are reported in Table 8, column (1). Because estimated coefficients of GDP growth, for the deficit countries as well as for Germany, are insignificant at the 10% level, we proceed with a new estimation in column (2), where output growth has been substituted with unit labor cost of the deficit countries with respect to Germany's, RULC, under the assumption that $\alpha_4=\alpha_5$.

significance of the estimated coefficients. Estimated values of coefficients of interest rates and budget deficits are very similar for all 4 equations of Table 5. Finally, before proceeding with the evaluation of our results, we should note that the lagged dependent variable has been also included in all estimations as it improves their general performance and also reduces autocorrelation. Subsequently, from Table 5, we observe the following:

First, concerning the effect of fiscal policies:

the budget balance and the CA as percentages of GDP are positively related as implied by the positive and significant, at the 1% level, coefficients on BB/GDP in columns (1)-(4). This is consistent with the prediction of our model, as α_6 coefficient is expected to be positive, verifying the twin deficit hypothesis. It is reminded that according to our approach, the channel of influence is through the bonds market: an expansionary fiscal policy is financed through the issue of government bonds. If increased supply of bonds is met by higher demand, then the change in B, ΔB is positive and exerts a deteriorating effect on the CA balance, through equation (3), which is $CA=\Delta(F-B)$. If $\Delta B>0$ and $\Delta F=0$, then the CA is negative.

It is interesting that Germany's budget balance as a percentage of its GDP is inversely related to the CA balance of the deficit countries, as percentage of GDP. This is expected from our model which predicts α_6 , the coefficient on BB^* , to be negative. Moreover it must be noted that the budget balance effect of the Southern countries and of Germany (as percentages of their GDP) on the CA/GDP ratio, is of almost equal but opposite value. In terms of equation (12) this implies that α_6 coefficient is equal to α_7 . This suggests that domestic as well as foreign fiscal policies are equally important in affecting external imbalances in the eurozone. So, an expansionary fiscal policy in Germany reduces the CA deficits of Southern eurozone countries. And of course the opposite is true, that is a tightening fiscal policy in Germany, widens the deficits of the Southern eurozone countries. If this is true, an underlying hypothesis about twin deficits for Germany must hold. But this must be empirically investigated.

Second, about the effect of interest rates:

in columns (1) and (2) of Table 5, specific coefficients are estimated for the variation in the long run interest rates, ΔR_b and ΔR_f .

The negative sign on ΔR_b can be explained as follows. Increasing reductions in R_b causes the deterioration in the CA balance (as a percentage of GDP). According to our theoretical approach, the worsening of the CA is the outcome of a positive effect on the supply of B, which deteriorates the CA. Hence, for periods of declining interest rates, increasing negative changes in the long run interest rate is matched with wider CA deficits. This happens because governments as well as the private sector can benefit by increasing their borrowing (issuing bonds) under the condition of fast falling interest rates. Therefore, widening CA deficits of the Southern eurozone countries over 1991-2000 have been, to a certain extent, the result of sharp reductions in long run interest rates (Figure 4). We could therefore claim that deteriorating CA balances of the deficit eurozone countries has been, to a certain degree the result of financial

integration and deregulation of the capital markets. The opposite effect is true, that is decreasing variations in the interest rates –as in the period after 2000- are related with improving CA balances as a percentage of GDP. Converge of interest rates among the EMU countries should, in part, explain an improvement in CA balances after the introduction of the Euro. The same interpretation can be given to the negative sign of the estimated coefficient of the variation in short run interest rate, ΔR_m . It should be noted that the estimated effect of ΔR_m is much smaller (less than half) than the effect of ΔR_b , indicating the importance of long term borrowing in relation to the CA/GDP ratio.

Similarly, we can explain the positive sign on ΔR_f . Decreasing (increasing) variations in R_f , Germany's long run interest rate, result in widening (narrowing) CA deficits of the eurozone peripheral countries. The channel of influence is again the bonds market, but this time Germany's bonds market: as ΔR_f falls, demand for F, bonds issued by the German Government, decreases. As supply of F adjusts, ΔF becomes negative and the CA balance worsens, from $CA = \Delta(F - B)$.

Third, about the GDP growth: The coefficient of relative GDP growth ($y - y^*$) in Column (3), is positive implying that higher GDP growth in deficit eurozone countries relative to Germany GDP growth, contributes to the improvement in the CA Balances, as a % of GDP, of Southern eurozone countries. The coefficient on relative unit labour cost, in column (2) and (4) also indicate positive effect on the CA, as a % of GDP. This is in accordance to the predictions of our model, if $\alpha_4 = \alpha_5$ in (12) and if relative unit labour cost takes the place of relative growth rates. Furthermore, relative unit labour cost is an indicator of a country's competitiveness. So, the positive effect implied by our estimation indicates that a loss in competitiveness (increase in relative unit labour cost) for the deficit eurozone countries worsens further their CA deficits. It could be claimed that the effect of relative unit labour cost, or competitiveness, originates from the traditional CA approach, according to which CA is determined by competitiveness, relative income and other variables related to the demand side of the economy.

4.3 Implications for the Greek economy

The results of our empirical investigation for the deficit eurozone countries hold for Greece as well. Hence, the deterioration of the Greek CA during the last two decades can be attributed to some extent to the financial integration and the introduction of Euro. Sharp decline of the interest rates in the 1990s, made borrowing easier for the public as well as for the private sector. Also, we found that fiscal policies matter and most surprisingly, German fiscal policy, representing the policies of the EU core euro countries, matters for the Greek Current Account. The twin deficit hypothesis therefore holds for the case of Greece. The Greek CA can improve through policies promoting the improvement of the country's competitiveness, that is, the Greek relative unit cost must decline. This can be achieved not just by introducing horizontal cuts in incomes of public and private sector wage earners¹⁰. There are alternative policies that can be realized, such as promoting investment, technologies and innovations in exporting sectors, cutting taxes on selected products or industries. Unfortunately, the economic and political developments that have brought the country to the brink of

¹⁰ as the 2010 and 2011 adjustment programs of the EU and IMF dictate.

default have created insecurity about the future and adverse expectations. These together with severe and repeated wage cuts have led domestic spending and investment to a nadir level. Given the economic environment of insecurity and instability, the country's competitiveness has declined, despite the decrease in the relative unit labour cost. The importance of the German Budget Balance in affecting the Greek CA indicates the crucial role that policy factors in the core countries of the EU can play. Unlimited lending to the Greek government to pay its debts will not help the country to recover from recession. On the contrary, a better synchronization of fiscal and monetary policy program for the eurozone as a whole, but not applied with uniformity could be more successful. It must be noted that the criteria of the Stability Growth Pact were repeatedly violated in the past by many countries for various reasons.

5. Conclusion

In this study we have examined the effect of the government deficit on the CA balance. First, we studied statistical information about the fiscal developments, the financial situation and the CA of the southern Eurozone countries. During recent years the CAs of these countries have been in deficit. This contrasts with Northern or core eurozone countries that have CA surpluses. Then we constructed a portfolio model incorporating the effect from financial integration and the creation of the euro. According to this the channel of influence from fiscal policy to the CA balance is the bond market, from where governments and the private sector can borrow. Finally we have tested our portfolio model with panel data coming from the countries of Southern euro area and Germany, representing the surplus countries of Northern eurozone for the period 1991-2010. The conclusions we have drawn can be summarized as follows:

First, the twin deficit hypothesis is confirmed. An expansionary fiscal policy worsens the CA and the opposite of course, holds. This is true for the eurozone countries with CA deficits. The sample of deficit countries includes Greece, Portugal, Spain, Italy, France, Cyprus and Slovenia.

Second, fiscal policy of the surplus eurozone countries represented in our empirical investigation with Germany, influences CA balances of countries of Southern eurozone. We found that expansionary (contractionary) fiscal policy of the German government improves (deteriorates) the CA deficits of countries of the South.

Third, fluctuations in the long run as well in short run interest rates affect the CA. A sharp decline in long run and short run interest rates, as during the 1991-1999 period has a deteriorating effect on the CA. Variations in the German long run interest rates also influence CA deficits of the South with an opposite sign.

Forth, competitiveness, measured as the relative unit labour cost is important. An improvement in competitiveness reduces the CA deficit.

As a final remark, the interdependence between South eurozone and core eurozone countries is crucial in determining CA imbalances within the EMU. For the elimination of these imbalances fiscal coordination, but not uniformity is important. Unilateral decisions such as reductions in the government budget balance are inadequate for the elimination of external distortions. Additionally, fiscal rules followed by all Eurozone countries uniformly would be incapable to eliminate CA imbalances in the euroarea.

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