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CEEC VS. PIGS: A COMPARATIVE PANEL ASSESSMENT OF FINANCIAL SUSTAINABILITY AND TWIN DEFICITS

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CEEC vs. PIGS: a comparative panel assessment of financial sustainability and twin deficits

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Abstract

This paper analyses the relation between the external and government deficits in a panel of CEEC economies and, separately, in PIGS economies. We first assess by panel unit root tests whether the fiscal and external intertemporal budget constraints hold, and then examine the role of public and private expenditure in the dynamics of external indebtedness by panel regression. The results show the importance of private capital flows in the current external imbalances of European countries, with different implications for the two groups of countries considered.

J.E.L. Classification: *C53, F32, H62.*
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1. Introduction

The recent financial crisis has brought to the attention of the public at large the problem of financial sustainability in the peripheral countries of the Eurozone. In the ensuing debate a country's financial sustainability has been almost invariably identified with its public debt sustainability: the causes of financial fragility have been ascribed almost exclusively to the profligacy of the public sector, to the lack of control on its unsound behaviour, to the role played by wicked financial companies in fixing the government accounts, and so on. The remedies have been proposed accordingly: tougher control on government expenses, and so on. No matter how plausible these arguments may appear, they still clash against a striking evidence: the vast majority of countries that incurred in severe financial crises since the end of the previous decade (including most Asian economies, Iceland and some Eurozone "periphery" countries) featured a high level of *external* indebtedness, more often than not in presence of sustainable (at least by Maastricht criteria) levels of *public* indebtedness. A glance at Table I illustrates this point.

Table I – Public and external debt before financial crises

	t	d_t	ed_t	d_t-d_{t-5}	ed_t-ed_{t-5}
Indonesia	1996	24	52	-13	4
South Korea	1996	8	8	-3	2
Thailand	1996	4	50	-9	15
Malaysia	1996	35	54	-42	29
Philippines	1996	53	49	3	-9
USA	2007	63	17	5	-3
Iceland	2007	24	113	-18	35
Portugal	2007	72	101	7	33
Ireland	2007	30	18	-5	-2
Greece	2007	102	104	-14	44
Spain	2007	43	85	-18	48
Italy	2007	117	21	-3	7
Japan	2007	170	-50	18	-13

Note: t is the reference year, d_t is the general government gross debt-to-GDP ratio, ed_t is the net foreign liabilities-to-GDP ratio (negative values indicate assets). Sources: ed_t comes from the updated and extended version of the External Wealth of Nations Mark II database developed by Lane and Milesi-Ferretti (2007); d_t comes from World Bank (2008) (for Indonesia, South Korea, Philippines), IMF (2009) (for Thailand and Malaysia), and OECD (2008) (for the remaining countries). For the sake of comparability we use the "General government gross financial liabilities as a percentage of GDP" definition instead of the "Maastricht criterion gross public debt", that provides generally even more reassuring figures on Eurozone member countries.

Consider for instance the 1997 Asian crisis. In 1996 Thailand (the country where the crisis originated) had a public debt equal to 4 GDP points (and falling), and an external debt of 50 GDP points (and rising). With the only exception of the Philippines, where public debt had increased by a scanty 3 GDP points over the previous five years (remaining well within the "European" ceiling of 60 GDP points), in all the Asian countries hurt by the crisis public debt had been *decreasing* in the eve of the crash, often by sizeable amounts (42 GDP points in Malaysia), while external debt had always been increasing (once again, with the only exception of the Philippines). As pointed out for instance by Hussain *et al.* (1999) in the aftermath of the Asian crisis, the coexistence in Asian countries of a small gross public debt with a large net external debt necessarily implied that private debt, financed by foreign

capital inflows, played a major role in the crisis. In fact, the low level of sovereign debt was (mistakenly) read by foreign investors as an implicit guarantee of the solvency of Asian entities at large. The following developments proved that this belief was wrong: Asian *private* debtors were insolvent.

Very similar patterns have emerged in the recent financial crises that hit European "peripheral" countries, such as Iceland, Spain, and even Greece. For instance, in 2007 the public debt of Spain and Iceland was equal to 43 and 24 GDP points, respectively, well below Maastricht reference criterion and on a falling trajectory (in both cases public debt had decreased by 18 GDP points over the previous five years), while their external debt was equal to 85 and 113 GDP points respectively, and rising. As for Greece, even if its public debt was much larger (in terms of GDP points), it had fallen by 14 GDP points over the last five years, while the external debt was larger than the public one, and had risen by 44 GDP points.

This suggests that *external* debt (be it private or public) rather than *public* debt *per se* should be a matter of concern.

Take Italy as a counterexample. As a matter of fact, Italy has withstood so far the global financial crisis, despite having a debt of around 120 GDP points. In 2007 its public debt was 117 GDP points, larger than the Greek one, but its external debt was only 21 GDP points (as compared to 104 GDP points in Greece). Another counterexample is provided by Japan, that has the largest public debt worldwide (over 200 GDP points, some 17% of world GDP). Nobody is worried by a Japanese financial crisis, perhaps because Japan is also the largest net external creditor, with net foreign assets equal to about 50% of its GDP. It appears therefore that whenever a country proves able to finance its debt by domestic, rather than external, savings, the markets become less nervous. To put it in other words, public debt, to the extent that it remains domestic, implies an *intergenerational* transfer of resources, which may prove less traumatic than the *international* transfer of resources implied by external debt (the rows between UK and Iceland, and between Germany and Greece, being a good case in point).

The previous examples suggest that focussing on public debt may prove misleading, and that the current account is (or would have been) a much more useful indicator of a country's overall financial sustainability, especially to the extent that it may implicitly disclose unsustainable flows of (foreign funded) private indebtedness. As a consequence, these examples suggest that public indebtedness should be monitored not only in itself, but also in relation to external indebtedness. In other words, public indebtedness may prove more dangerous in the presence of "twin deficits" behaviour.

These remarks are not a complete novelty. In fact, a "sustainable balance of payments" is expressly mentioned among the "guiding principles" of the member states by Article 3A of Maastricht Treaty, while article 109j states that besides the four convergence criteria, the Commission shall also consider the developments of the current account balance. Interestingly enough, however, no operational "convergence" criterion is defined on external indebtedness: while we have an "excessive (government) deficit" procedure, we do not have an "excessive external deficit" procedure, possibly triggered by some ceiling analogous to the 3% Maastricht parameter. As a consequence, nobody was particularly concerned by the developments of the current account balance in Greece and other European countries, shown in Figure 1. The following crisis has demonstrated the importance of monitoring closely the external indebtedness of the Eurozone peripheral countries.

This paper deals with the issue of external and public debt sustainability, and of "twin deficits" behaviour, in two groups of European peripheral countries: the Central and Eastern European Countries (CEEC),[1] and the so called PIGS, which are usually meant to include Portugal, Italy, Greece and Spain (the Mediterranean Eurozone countries).

As far as CEEC are concerned, their large and persistent external imbalances have raised some concern in the applied literature since the fall of the Soviet Union (Roubini and Wachtel 1999). These countries share a common historical experience as members of the Soviet empire[2] and have nowadays a mixed status as far as their accession to the European Union is concerned: Slovakia and Slovenia belong to the Eurozone already, the three Baltic states (Estonia, Latvia and Lithuania) belong to the European Exchange Rate Mechanism (ERM II) agreement, with Estonia expected to join the euro in 2011, Bulgaria, Czech Republic, Hungary, Poland and Romania belong to the EU but did not yet enter the ERM II agreement, Croatia and the Former Yugoslavian Republic of Macedonia are candidate countries for accession to the EU, and at the other end of this range Albania is not even candidate to EU. Therefore, most of these countries are already, or will become very soon, Eurozone "periphery" countries. In other words, these countries have already, or will acquire very soon, a status similar to that of the PIGS countries whose behaviour has recently put the euro under a severe stress. It is therefore all the more interesting to investigate the issue of their external and fiscal sustainability.

As far as the PIGS economies are concerned, we mentioned before that their current account deficit did not raise any particular concern until the end of 2008, partly because of the lack of an operational "external sustainability" criterion built in Maastricht rules, and partly because before the crisis these countries featured by and large reassuring fiscal indicators. At the time in which this paper is written the crisis has shown itself: we find nevertheless that a *post mortem* analysis of PIGS external and public debt sustainability could prove interesting as a benchmark against which to assess the results of the tests carried out in the CEEC countries. Moreover, assessing the strength of the "twin deficits" relation in these countries is also important as far as the strategies to cope with the crisis are concerned.

The empirical evidence on this issue is rather mixed: while most macroeconomic models imply a causal nexus between the budget and the external deficit, this relation appears in most studies to be weak and subject to structural breaks (Obstfeld and Rogoff 1995, Leachman and Francis 2002). The more thoroughly investigated case is that of the United States, where the studies conclude almost unanimously that public and external deficit are tied by a coefficient of about 0.3 (Bagnai 2006, Bartolini and Lahiri 2006, Salvatore 2006). To the extent that external indebtedness is a problem, these results imply that it cannot be solved only by fiscal consolidation. It is therefore useful to study this issue in relation with the PIGS, especially in the light of the fact that (1) in their case external indebtedness has proved to be a problem, and (2) the solutions to this problem are generally identified with the tightening of the fiscal stance.

[1] CEEC countries include Albania, Bosnia, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Montenegro, Poland, Romania, Serbia, Slovakia and Slovenia. Due to data limitations, we exclude three countries belonging to the former Yugoslavia, namely Bosnia-Herzegovina, Montenegro and Serbia. This leaves us with a panel of 13 countries.

[2] More precisely, since 1961 Yugoslavia took part in the Non-Aligned Movement, therefore the former Yugoslavian countries followed a different path than the other CEEC countries.

Evidence for CEEC economies is even scarcer, due mostly to the limited amount of data. Using quarterly data from 1994 to 2001 and a sample including six transition countries (Bulgaria, Czech Republic, Estonia, Hungary, Poland and Slovakia), Fidrmuc (2003) finds that the current account and the fiscal balance are driven by a unit root process in most countries, and that a significant long-run relation between the two deficits emerges only in Hungary and Poland. According to sustainability tests in the tradition of Trehan and Walsh (1988), a unit root in the government deficit implies unsustainability of the public debt; likewise, a unit root in the current account implies unsustainability of a country external debt (Trehan and Walsh 1991). In the light of these well known results, the findings of Fidrmuc (2003) are rather worrisome, as they imply that the external and public indebtedness of some leading CEEC countries are unsustainable (thus violating the basic principles set out by the Treaty on European Union). In this paper we argue that the results of Fidrmuc (2003) could depend on the lack of power of the unit root tests in small samples, which is especially severe in the presence of slow reversion to the mean. We decide therefore to investigate further the issue by adopting the panel unit root tests developed by Levin *et al*. (2002) (henceforth, LLC) and Im *et al*. (2003) (henceforth, IPS). These tests are known to perform much better than their time series analogues when the number of observation in the time dimension is moderate. Having ascertained the nature of the data generating process (DGP), we go on by estimating the relation between the two deficits using the appropriate panel estimation techniques. This allows us to gauge the role of the public and private sector behaviour in the dynamics of external indebtedness.

The remainder of the paper falls in four sections. Section 2 sets out the twin deficits relation. Section 3 illustrates the panel unit root tests. Section 4 presents the results, first for CEEC and then for PIGS countries. Section 5 draws some conclusions.

2. Twin deficits model

The twin deficits relation derives from the national account identity

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

where Y^N is the gross national product, C private consumption, G government consumption, NX net exports and NFI the net factor income from abroad. The sum of the last two items defines the current account balance $CA = NX + NFI$. Taking it to the left-hand side and remembering the definition of national saving we have

$$CA = S - I \tag{2}$$

Eq. (2) considers two sources of financial capital, an internal one (national saving), and an external one (the current account deficit), but only one use of it, domestic investment. By subtracting the net direct taxes T from both sides of (1) and rearranging we get:

$$S^P - CA = I - S^G \tag{3}$$

where $S^P = Y^N - T - C$ is private saving, and $S^G = T - G$ is government saving (i.e., the budget *surplus*). The left-hand side of (3) displays the two main sources of financial capital, namely private saving and the current account deficit, while the right hand side displays its uses: private investment and public deficit.

Eq. (3) can be rearranged as follows:

$$CA = S^G + S^P - I \tag{4}$$

Eq. (4) shows that if the difference between private saving and investment is stable, then the current account and government balance must move together by arithmetic (i.e., they are "twins"). Starting from the extended relation (4), Fidrmuc (2003) estimates the following equation:

$$ca_t = \beta_0 + \beta_1 \, s_t^G + \beta_2 \, i_t + u_t \tag{5}$$

where small letters indicate the ratios of the relevant variables to GDP and u_t is a disturbance, and we expect $\beta_1>0$ and $\beta_2<0$. Eq. (5) was taken as the starting point of our empirical analysis.

3. Methodology

In order to correctly estimate Eq. (5) we first need to assess the stochastic nature of the variables. In particular, if they are generated by unit root processes, Eq. (5) could be spurious, and cointegration methods would be needed for assessing the statistical significance of its parameters. As a first step, therefore, we perform unit root tests on the three time series ca_t, s_t^G and i_t. According to Trehan and Walsh (1991), the presence of a unit root in the fiscal or the external deficit implies that the public or external debt, respectively, violates the present value borrowing constraint, i.e., is unsustainable. Therefore, the results of the unit root tests are not only of statistical interest: they also allow us to establish whether the pattern of the external or public indebtedness is sustainable, while Eq. (5) allows us to further investigate the reasons of the external indebtedness unsustainability (if any).

The unit root tests were performed in the framework of the following auxiliary regression:

$$\Delta y_{it} = \delta_i y_{i,t-1} + \alpha_{mi} \, d_{mt} + \sum_{L=1}^{p_i} \theta_{iL} \Delta y_{i,t-L} + u_{it} \tag{6}$$

where $i = 1, ..., N$ are the individuals, $t = 1, ..., T$ are the observations in the sample, and d_{mt} is a vector of individual-specific deterministic variables; as in the usual ADF regression, three different specifications are possible: $d_{1t} = \{0\}$, $d_{2t} = \{1\}$, $d_{3t} = \{1, t\}$, each giving rise to a different test. The order p_i of the autoregressive component may differ across individuals. Using Eq. (6) the null hypothesis of unit root:

H_0: $\delta_i = 0$

was tested against two alternative hypotheses:

H_{1A}: $\delta_i = \delta < 0 \quad i = 1, ..., N$

H_{1B}: $\delta_i < 0 \; i = 1, ..., N_1$; $\delta_i = 0 \; i = N_1+1, ..., N$

Under the alternative H_{1A} the individual time series in the sample display the same properties (i.e., they are all generated by stationary processes with the same autoregressive root); this gives rise to the LLC test. The alternative H_{1B} allows for more heterogeneity in the sample: in particular, each individual is allowed to behave following a different (possibly unit) autoregressive root; this specification is considered by the IPS test. The two tests follow a

different approach but give rise to statistics having the same asymptotic $N(0, 1)$ distribution.

The results of the unit root tests may be affected by the wrong choice of either the deterministic component (the d_{mt} in Eq. 6) or the number of lags (p_i in Eq. 6), leading in general to non-rejections of the unit root null (i.e., loss of power; see Campbell and Perron 1991).[3] Several formal strategies have been proposed for tackling this issue: most of them, however, involve repeated testing of the unit root hypothesis, and are therefore plagued by pre-testing problems, resulting in over-rejections of the null. To avoid these undesirable outcomes, we conduct the tests by exploiting prior knowledge on the growth status of the series, according to Elder and Kennedy's (2001) suggestion. Broadly speaking, Eq. 6 must be specified in such a way as to provide a representation of the data consistent with the observed pattern of the data, under both the null and the alternative hypothesis. In practice, this rules out immediately the d_{1t} specification when testing for a unit root in i_t, as gross investment is incompatible with a zero mean process. As for the other time series, an inspection of their graphs is needed in order to verify whether they are growing or not. A growing pattern would call for a d_{3t} deterministic component, otherwise a d_{2t} or d_{1t} specification would be more suited.[4]

The number of lags was automatically selected using Schwarz information criterion starting from a maximum lag length of 2.

If the variables involved in Eq. (5) appears to be $I(0)$ the usual panel estimation techniques apply. If instead they are nonstationary, then a panel cointegration test is needed to verify the null hypothesis that Eq. (5) is spurious. To this end we adopt the test proposed by Pedroni (1999), that is based on a model with individual effects and slopes:

$$ca_{i,t} = \alpha_i + \beta_{1i}\ s^G_{i,t} + \beta_{2i}\ i_{i,t} + e_{i,t}$$

thus allowing for possible heterogeneity across individuals. The individual estimated residuals, $\hat{e}_{it}$, are then used to construct pooled residual based cointegration tests, based on the Dickey and Fuller (1981) or Phillips and Perron (1988) approach. Here again a large number of tests is proposed, the main difference being the method used in order to pool the statistics. As pointed out by Pedroni (1999), the group mean panel statistics, constructed by pooling the statistics along the "between" dimension (i.e., by estimating the panel autoregressive coefficients as simple averages of the individual coefficients), allow for a greater heterogeneity across members of the panel. Referring to Eq. (5), and taking $\hat{e}_{it}$ as the dependent variable, pooling along the "within" dimension implies that the null of unit root is tested against the alternative hypothesis of a common stable autoregressive coefficient, H_1: $\gamma_i=\gamma<0$, whereas the group mean panel statistics allow for different stable roots, H_1: $\gamma_i<0$.

The cointegrating relation was estimated using the group mean panel fully-modified OLS estimator (GFMOLS) of Pedroni (2000), that presents some useful features: it allows for

[3] In case of panel unit root tests, LLC point out that excluding from the Eq. 6 a deterministic component present in the *DGP* leads to an inconsistent test, while including a component that is not present in the data results in a loss of power. IPS stress that the finite sample properties of the test depend on the choice of a large enough order of lag p_i in Eq. 6.

[4] Elder and Kennedy (2001) rule out the d_{1t} specification *a priori*, as being inconsistent with variables like "interest, unemployment and inflation rates". However, we cannot rule *a priori* the hypothesis that the mean of variables like the government or current account balances be not significantly different from zero. An inspection of the time series graphs is needed to settle this issue.

the presence of serial correlation in the errors and for the endogeneity of the regressors, it has better small sample properties, and it allows the researcher to test linear hypotheses on the parameters against heterogeneous alternatives.

4. Results

4.1 Financial sustainability and twin deficits in CEEC countries

Using the *WDI* database (World Bank 2008) we constructed a balanced panel of annual data running from 1995 through 2006 including the following countries: Albania, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Slovakia and Slovenia, resulting in 156 observations.[5] The three variables of the model were defined as follows: ca_t, current account balance, s_t^G, general government balance, i_t, gross fixed investment; all the variables were expressed as a percentage of GDP. Their patterns are reported in Figures 2 to 4. A glance at the ca_t and s_t^G series (Figures 2 and 3 respectively) does not allow us to rule out the presence of a trend, although their pattern could also be consistent with a d_{2t} specification. Gross investment, instead, displays a distinct increasing pattern (Figure 4). No observed behaviour is consistent with a zero mean process. Summing up, we rule out the d_{1t} specification for every series, we adopt the d_{3t} specification for gross investment, and we test for a unit root the other series under both the d_{2t} and d_{3t} specification.[6] Remark that the twin deficits model (Eq. 5) implies that an increasing trend in the investment series determines *ceteris paribus* a decreasing trend in the current account. This implies that in the absence of an offsetting pattern in the government balance, the most likely specification for the ca_t series is d_{3t}.

The results of the panel unit root tests are reported in Table II.

Table II – Results of the unit root tests on the model variables

	LLC		*IPS*	
deterministic component	*trend and drift*	*drift*	*trend and drift*	*drift*
ca_t	-4.47^{**}	-4.29^{**}	-1.65^{*}	-2.70^{**}
s_t^G	-10.05^{**}	-3.65^{**}	-2.73^{**}	-1.72^{*}
i_t	-3.56^{**}		-2.41^{**}	

Note: the test statistics are asymptotically distributed as a N(0,1). One or two asterisks indicate, respectively, 5% or 1% significance (one-sided distribution).

The unit root null is strongly rejected in all cases, the only possible exceptions being the government balance in the IPS test with drift, and the current account balance in the IPS test with trend and drift, where rejection occurs only at the 5% significance level. All in all, we can reject the hypothesis that the DGPs of the series considered possess a unit root. As a consequence, we can estimate the twin deficits relation (5) using standard panel regression techniques.

[5] A few missing data, mostly on government balances, were extracted from the Economist Intelligence Unit online database.

[6] Elder and Kennedy (2001) advocate the use of *F*-type tests (Dickey and Fuller 1981) for assessing the significance of the deterministic component and discriminate between d_{2t} and d_{3t} specifications. We do not know of similar tests in a panel setting.

The results are shown in Table III. We started from a general specification, including both individual and time effects:

$$ca_{i,t} = \beta_{0i} + \beta_1 \; s^{G}_{i,t} + \beta_2 \, i_{i,t} + \lambda_t + u_{i,t} \qquad (7)$$

The time effects λ_t were introduced to take into account the possible presence of common shocks across the sample countries. They are not significant at the *F* test and were therefore dropped from the regression. The preferred specification has strongly significant coefficients and individual effects, with an adjusted R^2 equal to 0.91.

Table III – Panel estimates of the coefficient of the twin deficits relations

	parameter estimates(1)			*F-test*(2)	
	β_1	β_2	R^2	*time effect*	*individual effect*
time and individual fixed effect	0.19	–0.60	0.92	1.15	12.80
	(2.3)	(10.9)		[0.32]	[0.00]
individual fixed effect	0.21	–0.64	0.91		13.85
	(2.8)	(11.5)			[0.00]

Notes: (1) *t-stats in parentheses;* (2) *p-values in square brackets.*

4.2 Sustainability and twin deficits in PIGS countries

There has been some debate in the media about the meaning of the capital "I" in the PIGS acronym. We belong to those that believe that the "I" country is Ireland, rather than Italy. This conclusion does not rest on nationalism (an attitude that economic crises usually foster, but that should not shape economic reasoning), but on the analysis of some key macroeconomic indicators. First, according to the last release of the World Economic Outlook database (IMF 2010), unlike Portugal, Ireland, Greece and Spain, Italy did not feature a two digit government deficit in 2009, while being at the same time the only country in this group with positive growth prospects for 2010;[7] this means that Italy was able to withstand the impact of the global financial crisis thanks to its structural features (in particular, to its high rate of private saving) rather than by loosening the public purse strings. Second, unlike Portugal, Ireland, Greece and Spain, in the decade since the inception of euro Italy featured a below unity inflation differential with Germany;[8] this means that the Italian economy did not experience as dramatic a loss of competitiveness as PIGS did. This casual evidence is reinforced by more formal econometric testing. As shown by Busetti *et al*. (2006), as far as its inflation performance is concerned, Italy belongs to a distinct group, separate from both the low inflation countries (Germany, France, Belgium, Austria, Finland) and the high inflation ones (The Netherlands, Greece, Spain, Portugal and Ireland). These two facts (namely, the relatively high private saving and relatively low inflation of Italy, as compared to the other Eurozone peripheral countries) are indeed the two sides of the same

[7] The government balance-to-GDP ratios for 2009 are -12.8 (GRC), -11.4 (IRL), -9.3 (PRT), -11.4 (ESP), and -5.3 (ITA). The expected growth rate for 2010 are -2 (GRC), -1.5 (IRL), 0.2 (PRT), -0.4 (ESP), and 0.8. (ITA).

[8] The average inflation differential with Germany from 1999 to 2008 has been equal to 1.6 (GRC), 1.7 (IRL), 1.5 (ESP), 1.2 (PRT), and 0.7 (ITA).

coin, namely, of the relative minor size of external debt in the Italian economy, mentioned in the introduction.

Table IV – Results of the unit root tests on the model variables

	LLC		*IPS*	
deterministic component	*trend and drift*	*drift*	*trend and drift*	*drift*
ca_t	–0.69	0.07	0.63	1.24
s_t^G	–1.88**	–2.42**	–0.37	–1.54
i_t	–1.11		–0.28	

Note: the test statistics are asymptotically distributed as a N(0,1). One or two asterisks indicate, respectively, 5% or 1% significance (one-sided distribution).

For these reasons, we defined the PIGS group as Portugal, Ireland, Greece and Spain and we set up our panel accordingly, exactly in the same way as for the CEEC countries. The balanced panel, therefore, runs from 1995 through 2006, the only difference being that owing to data availability the figures on government and current account balances were extracted from IMF (2010) rather than World Bank (2008). The patterns of the data are represented in Figures 5 through 7. There is an evident downward trend in the current account balance, an upward trend in investment, and a relatively more stable (or slightly increasing) pattern in the government balance. The results of the panel unit root tests are reported in Table IV. With the only exception of the LLC test on government balance, the tests consistently fail to reject the unit root null. This implies that in these countries the test carried out with the data available in 2007 had pointed out an external unsustainability problem (and perhaps, with mixed evidence, also a fiscal unsustainability one). In the light of what has now become apparent, our *post mortem* analysis suggests that in the PIGS case the unit root sustainability tests had issued the correct warning.

Table V – Group mean panel FMOLS estimates of Eq. (5) for PIGS without time effects

	$s_{i,t}^G$	$i_{i,t}$
GRC	-0.36	-0.91
	(1.71)	(5.89)
PRT	-0.09	-0.14
	(0.10)	(0.32)
ESP	-0.25	-0.79
	(0.42)	(1.94)
IRL	0.50	-1.16
	(4.85)	(16.02)
Panel estimates	-0.05	-0.75
	(1.31)	(12.09)
Group PP cointegration test	-0.62	
Group ADF cointegration test	-1.73	

Note: t-statistics in parentheses. The cointegration test statistics are distributed as *N*(0,1) and the test is one-sided.

Coming now to the twin deficits issue, Table V reports the cointegration estimates of Eq. 5 with PIGS data. The evidence of cointegration is rather mixed. The group Phillips-Perron cointegration test fails to reject the non cointegration null, while the group ADF rejects at the 5% level. Interestingly enough, the panel estimates, while stressing the relevance of investment for the current balance dynamics, show no significant relation between the government and the external balance. This outcome results from the average of very different individual country results. While on the one hand Ireland displays a significant twin deficits coefficient of 0.5, in the Mediterranean countries the same coefficient is consistently negative and not statistically significant (with the only exception of Greece, where it is significant at the 10% level). Taken at their face value, these results imply that in Mediterranean countries a worsening of the government balance determines an improvement of the external accounts. Several features could account for such a nonsensical result, among which structural change and government accounts "creativity". Some hints come from Table VI, that displays the variation of the external balance, the government balance, private investment and private consumption expenditure in the CEEC and in the PIGS. In order to interpret these data consider that owing to Eq. (4) it should always be true that

$$CA - S^G + I - S^P = 0$$

which, after taking variation and expressing variables as ratios to GDP, becomes:

$$\Delta ca - \Delta s^G + \Delta i - \Delta s^P = 0$$

Table VI – Sectoral deficits consistency in the PIGS and the CEEC

	2006-1995	Greece	Portugal	Spain	Ireland	PIGS	CEEC
(1)	Δca	-8.88	-9.91	-8.67	-6.36	-8.45	-6.06
(2)	Δs^G	4.16	1.23	8.90	5.00	4.83	0.65
(3)	Δi	7.40	-1.30	8.80	8.63	4.97	6.37
(4)	Δc	-5.90	0.00	-2.30	-7.65	-2.73	0.49
	(1)-(2)+(3)+(4)	-11.54	-12.45	-11.07	-10.38	-11.04	0.15

In Table VI we verify this relation with our sample data. Owing to data limitations we approximate the variation in private saving, Δs^P, with the variation in private consumption, Δc (by changing its sign).[9] The results are rather telling. In the case of the CEEC, we see that the worsening of the external balance is almost completely explained on average by an increase in domestic investment. At the same time, a relatively minor increase in public saving is only partially offset by an increase in private consumption, so that the accounts balance. In the PIGS average instead the worsening of the current account balance does not square with the relatively limited increase in domestic investment, especially because both public and (to a limited extent) private saving are seen to increase over the same period. A possible explanation for this result is, of course, that the government accounts may have been

[9] Since private saving is define as $S^P = Y-T-C$, its ratio to GDP is equal to $s^P = 1-t-c$ (where t is the ratio of net direct taxes to GDP), whose variation therefore is $\Delta s^P = -\Delta t-\Delta c$. An error of approximation could therefore arise in presence of changes in the average tax rate.

fixed somehow. Just to make an example (admittedly, not a randomly selected one), in the case of Greece the amount needed to balance the accounts is equal to about 11.5 GDP points. Unsurprisingly enough, this amount is matched quite closely by the spread between the IMF (2008) forecasts on 2009 government budget balance (equal to -2.2), and the current (IMF 2010) estimate of the same balance (equal to -12.8). This suggests that creativity could have been at work in "ins", while the "outs", being more closely monitored, did not dare to fix their accounts.

In order to take into account "creativity", as well as other factors that may have determined a shift in Eq. (5) parameters, we estimated it again by taking into account the time effects (by way of comparison. recall that they prove statistically insignificant in CEEC countries). The results are reported in Table VII and provide a much more sensible picture. There is now a strong evidence of cointegration, and the coefficient make sense and are more or less in line with what is usually found in developed countries. The impact of the government balance on the external one is rather small (0.2), which implies that the external imbalance is driven mostly by private debt.

Table VII – Group mean panel FMOLS estimates of Eq. (5) for PIGS with time effects

	$s^{G}_{i,t}$	$i_{i,t}$
GRC	-0.37	-0.51
	(1.40)	(1.96)
PRT	0.52	-0.47
	(3.11)	(6.70)
ESP	0.50	-0.88
	(2.73)	(5.49)
IRL	0.17	-0.01
	(1.15)	(0.07)
Panel estimates	0.20	-0.47
	(2.79)	(7.11)
Group PP cointegration test	-3.10	
Group ADF cointegration test	-2.76	

Note: t-statistics in parentheses. The cointegration test statistics are distributed as $N(0,1)$ and the test is one-sided.

5. Conclusions

Using the more powerful panel approach to unit root tests we are able to reject the null hypothesis of non stationarity for both the external and the government deficit of the CEEC. Interpreted in the framework of the sustainability definitions grounded on the intertemporal borrowing constraint this result implies that the external and the public debt of these economies are sustainable. On the contrary, in the PIGS countries the external and (with mixed evidence) the government balance appear to be unsustainable even using the panel unit root tests.

In the CEEC the two deficits appear to be tied by a statistically significant relation, although strictly speaking they are not twins: the β_1 coefficient is less than unity, as envisaged in some recent open-economy macroeconomic models (Makin 2004). This result

confirms also for CEEC economies what has been found in previous studies like Chinn and Prasad (2003) or Bagnai (2006), that do not take into account transition economies. While in the CEEC economies the relation appears to be stable, in PIGS countries a similar relation emerges only when a time effect is included in the equation, a possible reason being structural shifts determined by "creative accounting" in the public sector of some country. The estimated coefficient is rather on the low side, around 0.2, which implies that fiscal tightening cannot affect significantly external sustainability.

In the CEEC private investment appears to be a much stronger determinant of external imbalances than public deficits: its coefficient is both larger and more significant. This reinforces the conclusion that the negative external balances of the transition economies are determined mostly by medium-term intertemporal dynamics related to the catching-up process and should therefore be considered as sustainable. In PIGS countries the investment coefficient is lower, and back-of-the-envelope accounting shows that a large share of the increase in the external deficit cannot be explained by an increase in investment, which in turn reinforces the conclusion that the external imbalances of these economies are *not* sustainable.

We end these remarks with a cautionary note. While reassuring, the results on CEEC economies do obviously not imply that these countries are forever immune from sustainability problems. Two further remarks are in order.

First, as stressed above, our conclusions on CEEC financial sustainability are drawn in the framework of the intertemporal budget constraint (or solvency constraint). However, it is known since McCallum (1984) that sustainability definitions grounded on the intertemporal constraint are very loose, because they may consider as sustainable even ever increasing patterns of public (or external) debt. In other words, respect of the solvency constraint is a necessary, but by no means sufficient, condition for actual financial sustainability. While the results for PIGS show that they did not respect the necessary condition (which explains what happened), the results for CEEC should not be read as a warranty that these countries meet any "sufficient" condition for sustainability. In fact, sufficient conditions for financial sustainability proved hard to define in theory, and the practical assessment of sustainability relies on a wide range of indicators and rule-of-thumb criteria (Chalk and Hemming, 2000). As a consequence, we do not claim our tests to be an ultimate assessment of CEEC financial sustainability, as this would require more thorough and possibly country-specific analyses, which will be made possible over time by the increasing availability of data.

Second, structural changes may quickly alter the sustainability prospects of a country: the PIGS story is rather telling in this respect, and requires a somewhat lengthier discussion. A glance at Figure 5 shows that in at least three cases (Greece, Portugal and Ireland) the worsening of the current account balance coincided with the structural change determined by the inception of the euro. Several factors may explain this pattern, the most important being perhaps the inadequateness of Maastricht rules. As is well known, Maastricht treaty focuses almost exclusively on the monitoring of fiscal convergence of member countries, meant to be the convergence of their fiscal balances to a "close to balance" position. The economic literature has warned many times that this approach is unwarranted for a number of reasons. In fact, the optimum currency area (OCA) theory since at least Kenen (1969) stresses the need for fiscal *integration*, rather than *convergence*. Integration is a very different concept from convergence, as it refers to the ability to smooth out asymmetric shocks through a redistribution of resources from high- to low-employment regions, carried out through a

(possibly) supranational fiscal authority. In other words, fiscal integration is what the public at large demands when asking for "more Europe" as a way out of the current crisis. This does not contradict the need for some degree of fiscal discipline in order to ensure the viability of a monetary union (as recalled for instance by Tavlas, 1993). However, the way Maastricht treaty strives to enforce fiscal discipline has proven completely ineffective, as largely anticipated for instance by Buiter *at al*. (1993).

The only convergence explicitly mentioned by OCA theory is that of inflation rates, since Fleming (1971), for the simple and completely objective reason that the persistence of inflation differentials leads to shift in price competitiveness and ever growing external imbalances among member countries. In its dull fight against the size of the public sector and the accession of Mediterranean countries to the Eurozone (Buiter, 2006), Maastricht treaty very inappropriately forgets the need to monitor inflation convergence. Oddly enough, this convergence is monitored during the accession process, but forgotten thereafter. No "excessive inflation" procedure is envisaged for "ins" by the Treaty, despite the obvious relevance of the issue. It comes therefore as no surprise that while during the accession period the Exchange Rate Mechanism (ERM) has favoured inflation convergence, after 1998 the European inflation rates have diverged again towards two separate "inflation clubs", the low-inflation one (Germany, France, Belgium, Austria and Finland) and the high-inflation one (Portugal, Ireland, Greece, Spain and the Netherlands), with Italy somewhere in between, as shown by Busetti *et al*. (2006). This has led to competitiveness shifts and disrupting external imbalances.

The disastrous oversight of the inflation convergence criterion may have been motivated by theoretical arguments. For instance, Giavazzi and Pagano (1988) stress that belonging to a monetary union reinforces inflation convergence because it brings large credibility gains to policy makers in inflation-prone countries, thus solving time-inconsistency problems. Inflation convergence thus becomes an outcome, rather than a prerequisite, of the accession to a monetary union, which obviously implies that the "ins" do not need to monitor it. This is a central argument in the so-called "endogenous OCA" literature, that puts forth the argument that monetary union will endogenously generate the conditions for their viability (in terms of inflation convergence, of macroeconomic cycle synchronization, and so on). As far as inflation is concerned, Busetti *et al*. (2006) results show that such an endogenous validation of the political decision to join the Eurozone did not occur in Europe. In our view, what has been naively overlooked by the "endogenous convergence" hypothesis is that credibility is no free lunch. What the data say is that credibility, rather than strengthen the commitment of policy makers to anti-inflation policies, has loosened market discipline, by increasing the perceived creditworthiness of PIGS countries. Once the Eurozone imbalances triggered by inflation differentials have manifested themselves, foreign investors, instead to put a stop on them, have proved willing to finance them much in the same way and for the same reasons for which they had lent money to Thailand before the Asian crisis.[10]

This discussion has two implications, one for CEEC, and the other for the Eurozone.

As far as the financial sustainability of CEEC is concerned, the recent developments in the PIGS stress the need of closely monitoring inflation after the accession to the Eurozone,

[10] There is however a difference: in the case of Thailand, credibility was fostered by the tight fiscal stance, while in the case of PIGS countries it was fostered by the accession to the eurozone.

in order to avoid that the imported “euro-credibility” translates into unsustainable imports of foreign capitals.

As far as the Eurozone is concerned, this discussion suggests that rather than converge from the bottom to a zero budget balance, a more sensible rule for the Eurozone members would be that of converging *from both sides* to a suitably defined Eurozone average inflation rate. This would imply a *symmetric* commitment for high inflation countries to deflate, and for low inflation countries to inflate, thereby leading to the currently much demanded sharing of the burden of the adjustment, which in the present institutional framework is borne exclusively (and very irrationally indeed) by the high-inflation ones.

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7. Figures

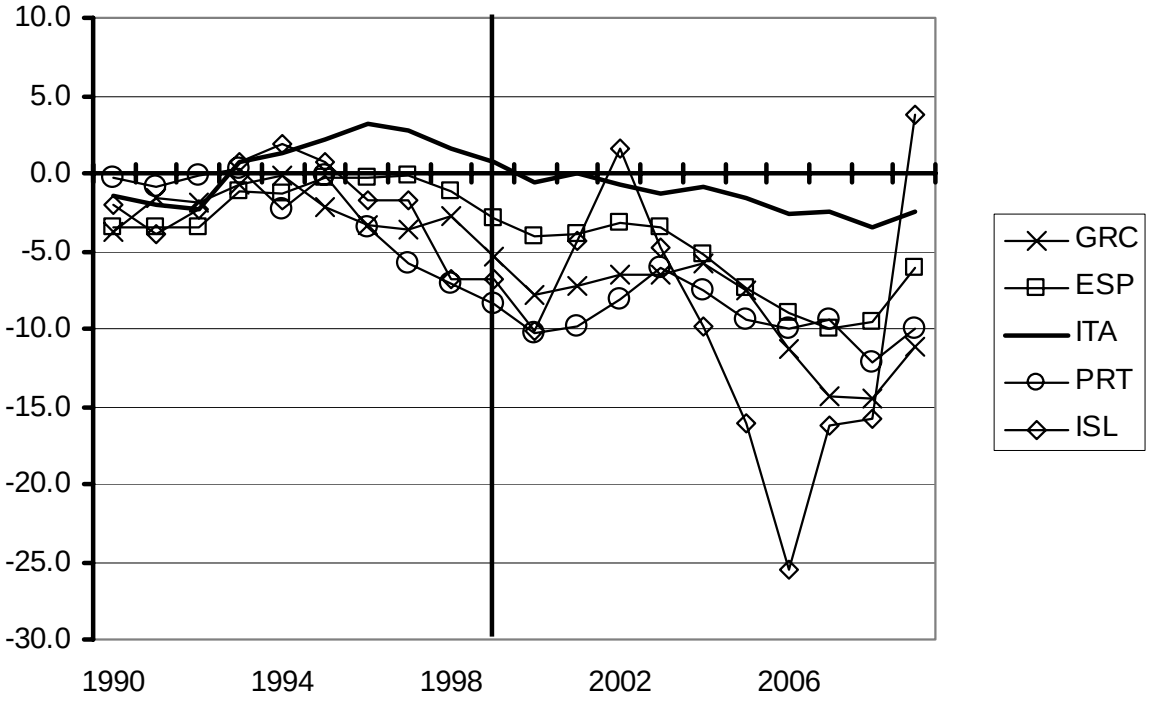

Figure 1 – The current account balance-to-GDP ratio in Iceland and the eurozone Mediterranean countries.

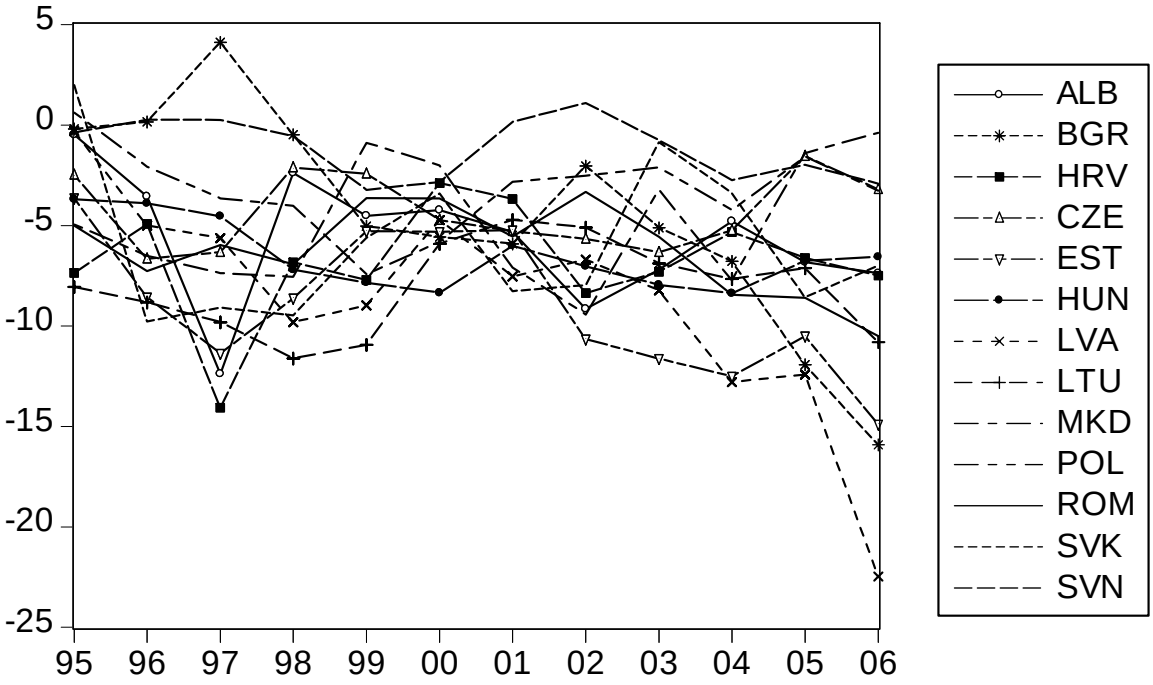

Figure 2 – The current account balance to GDP ratio in CEEC countries.

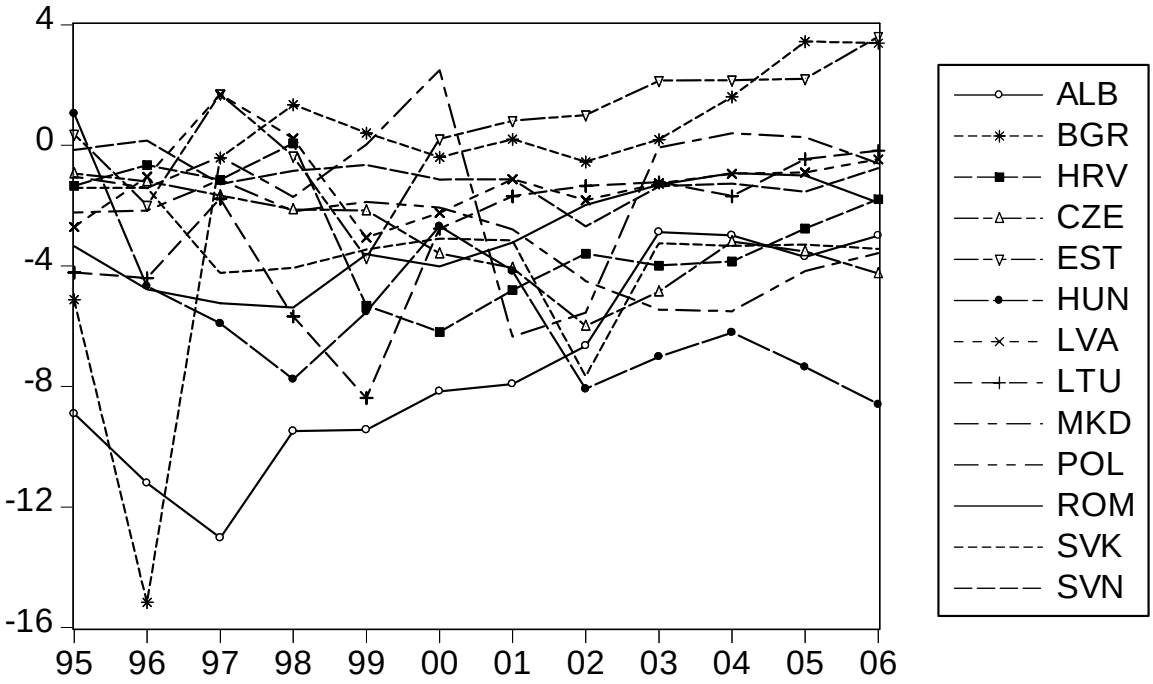

Figure 3 – The government balance to GDP ratio in CEEC countries.

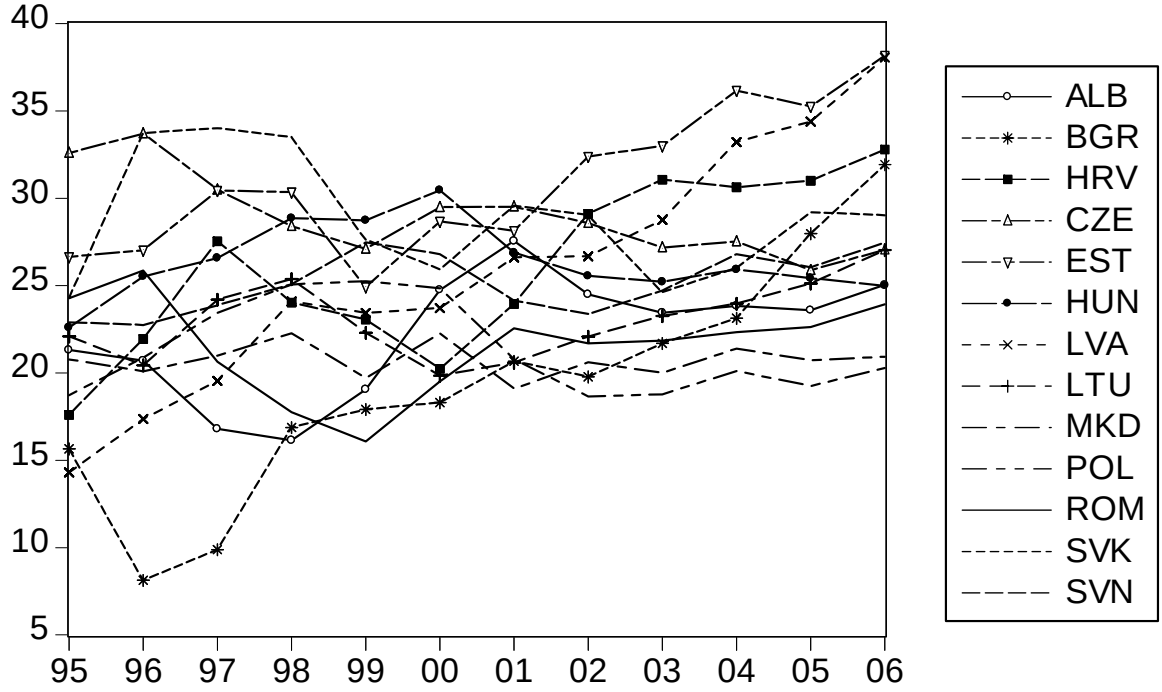

Figure 4 – The gross investment to GDP ratio in CEEC countries.

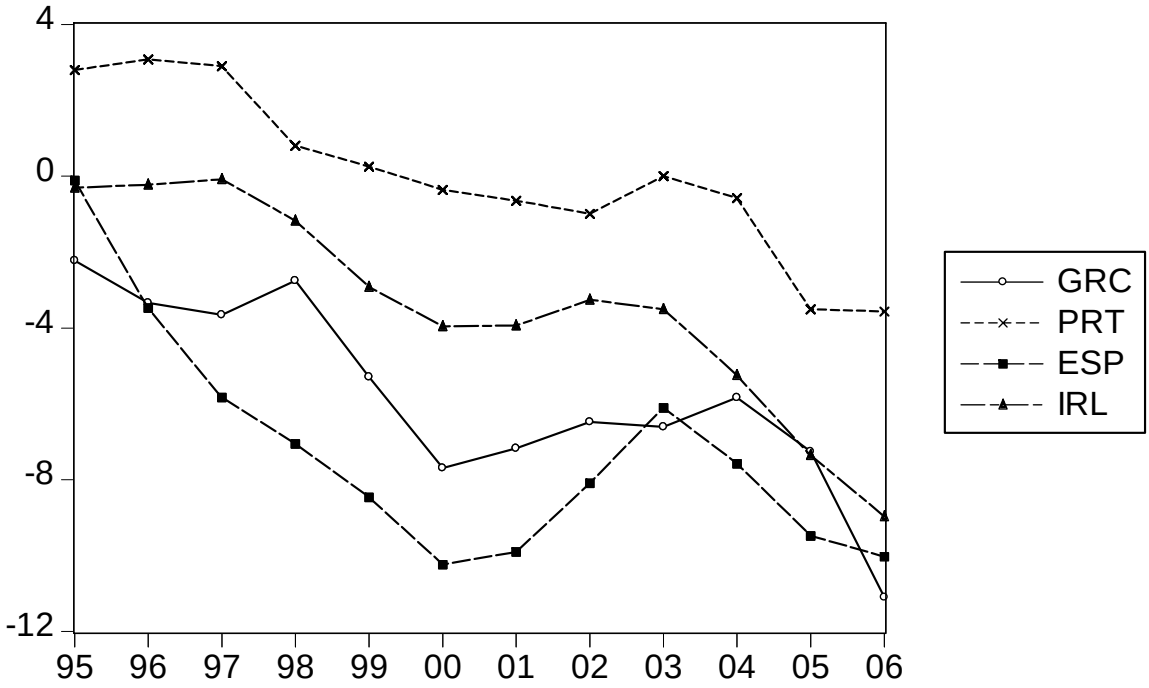

Figure 5 – The current account balance to GDP ratio in the PIGS.

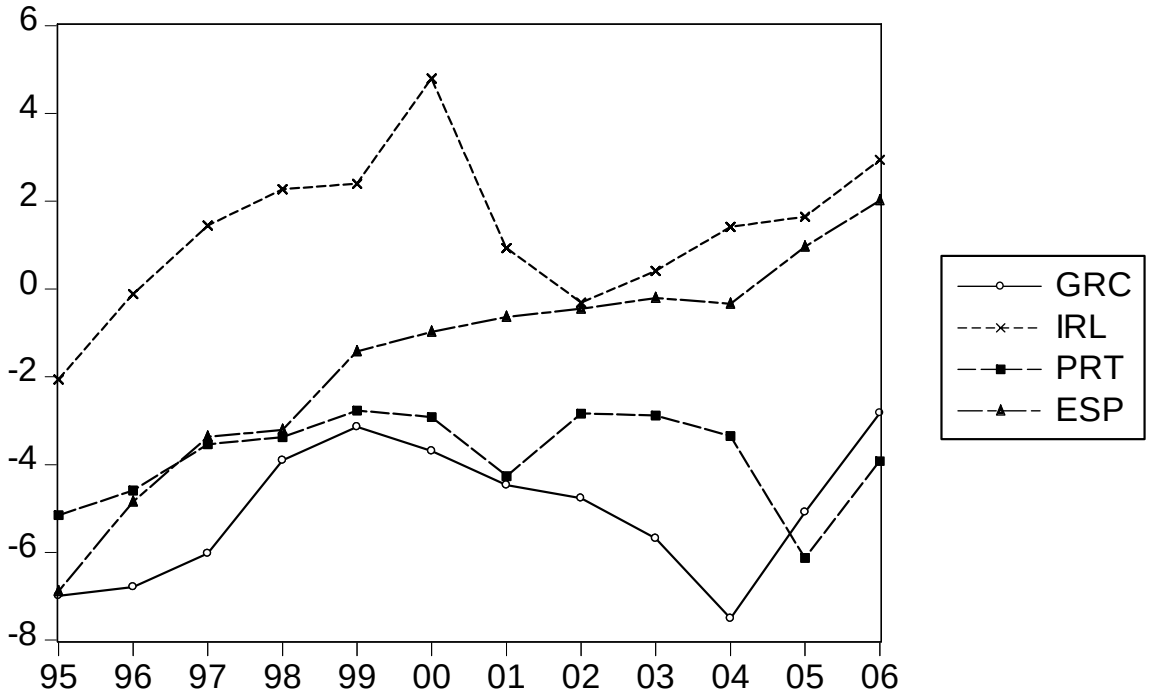

Figure 6 – The government balance to GDP ratio in the PIGS.

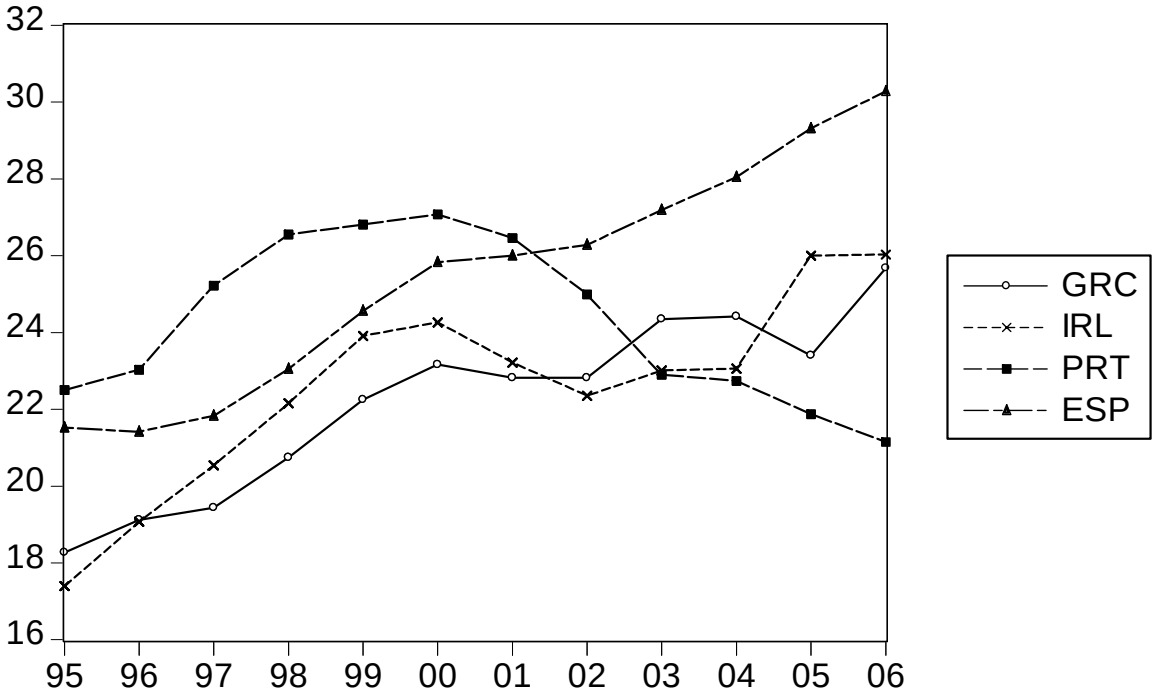

Figure 7 – The investment to GDP ratio in the PIGS.