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BUDGETARY AND EXTERNAL IMBALANCES RELATIONSHIP: A PANEL DATA DIAGNOSTIC

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Abstract

We assess the cointegration relationship between current account and budget balances, and effective real exchange rates, using recent bootstrap panel cointegration techniques and SUR methods. We investigate the magnitude of the relationship between the two imbalances for each country and for different EU and OECD country groupings. The panel cointegration tests used allow for within and between correlation, between current account balances, budget balances and effective real exchange rates produce significant evidence in favour of the existence of a cointegration relationship. Still, SUR results show both positive and negative effects of budget balances on current account balances for several countries. The magnitude of the effects varies across countries.

Keywords: budget balance, external balance, EU, panel cointegration.

JEL Classification: C23, E62, F32, H62.

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"the so-called twin-deficits hypothesis, that government budget deficits cause current account deficits, does not account for the fact that the U.S. external deficit expanded by about \$300 billion between 1996 and 2000, a period during which the federal budget was in surplus and projected to remain so. Nor, for that matter, does the twin-deficits hypothesis shed any light on why a number of major countries, including Germany and Japan, continue to run large current account surpluses despite government budget deficits that are similar in size (as a share of GDP) to that of the United States." Bernanke (2005).

"A smaller federal budget deficit would mean more national saving, less reliance on foreign capital flows, and a smaller trade deficit. The trade deficit and the budget deficit are not twins, but they are cousins." Mankiw (2006).

1. Introduction

In recent years the resurgence of current account imbalances in the US and the existence of very large double-digit current account deficits, for instance, in the new EU Member States, contributed to rekindle the issue of the linkages between government budget and external deficits. The argument that a government budget deficit leads to a current account deficit, results from the fact that budget deficits tend to increase the domestic interest rate. The higher interest rate attracts foreign capital, inducing an appreciation of the domestic currency, which in turn leads to an increase in the current account deficit. Such an effect can be more relevant the higher the economy's degree of openness. Furthermore, the twin-deficits idea is closely linked to the argument that if saving and investment are not correlated then the budget deficit and the current account deficit would tend to move jointly. In other words, private saving may not increase sufficiently to offset the effects of increased budget deficits. This point recalls the Feldstein and Horioka (1980) puzzle regarding the degree of international capital mobility, with cross-country saving-investment correlations proposed as a measure of international capital mobility.

The existence of a relationship between a country's government budgetary position and its current account balance naturally needs to be assessed empirically. While several studies have analysed the existence of convergence (or divergence) between the current account and budgetary imbalances on a country basis, only a few studies have taken advantage of the panel econometrics framework. Indeed, in the empirical literature, unit root or cointegration tests have in the past been mostly performed for individual countries posing the problem of relatively short time series. However, panel data methods have recently been used, for instance, to assess fiscal sustainability, notably in the EU, taking advantage of the increased power that may be brought to the cointegration hypothesis through the increased number of observations that results from adding the individual time series (see, Afonso and Rault, 2010).

Within the context of our study, and given the growing financial integration and mobility of capital between countries, a panel assessment is also relevant, particularly for a sample of EU and OECD countries. For instance, in the EU, the fiscal framework underpinning the Stability and Growth Pact has renewed attention to the effects of large sustained fiscal deficits on national

savings, investment, interest rates, and the current account.⁴ Therefore, in this paper we assess empirically the existence of a relation between the government budget balance and the current account balance, taking advantage of non-stationary panel data econometric techniques and the Seemingly Unrelated Regression (SUR) methods, which, to the best of our knowledge, was not employed before in this context. We cover the period from 1970 to 2007 and we also define different country groupings for the set of OECD and EU countries. Moreover, a long-term relationship between budgetary and current balances and the real effective exchange rate is also investigated.

It is also important to bear in mind that as in a country by country time series analysis, the performance of the estimation methods implemented in a panel framework depends largely on how well the underlying assumptions of those methods reflect the properties of the data under analysis. More specifically, if data are stationary the conventional panel data techniques such as the well known within or random estimators or GMM estimation method can be carried out to assess the relationship between the budget balance and the current account balance. In contrast to stationary time series, if data are nonstationary as in our study, i. e. do not exhibit any clear-cut tendency to return to a constant value or a given trend, specific panel data cointegrating techniques are required because the conventional estimation methods are then not valid. Therefore, to determine the degree of integration of our series of interest (current account balances, budget balances and real effective exchange rates) we employ the test by Pesaran (2007), as well as the bootstrap tests of Smith et al. (2004), which use a sieve sampling scheme to account for both the time series and cross-sectional dependencies of the data.

In addition, we contribute to the literature by using the bootstrap 2nd generation panel cointegration test proposed by Westerlund and Edgerton (2007), which allows accommodating both within and between the individual cross-sectional units. Such analysis has not been done to study the budgetary and external imbalances linkages.

The rest of the paper is organised as follows. Section two briefly reviews some theoretical underpinnings of the relations between government budget balances and current account balances, and the existing related evidence in the literature. Section three reports the results of the empirical analysis, which includes 2nd generation panel unit root tests, panel cointegration and SUR analysis, while section four concludes.

2. Some Theoretical Underpinnings and Literature

The conventional wisdom that government budget deficits play an important role in the determination of the current account, or that there is a causal link between large budgetary deficits and current account deficits, can be exemplified via looking at national accounts aggregate identities.⁵ The identity for GDP (Y) in an open economy can be written as

$$Y = C + I + G + X - M$$

... (1)

⁴ Note that the fact that cross-country differences may exist does not prevent that cross-country dependencies may indeed exist, and that they play a role in the overall relationship between external en budgetary balances (apart from the gain of having a bigger panel sample).

⁵ For instance, Roubini (1988) argues that the role of fiscal deficits in the determination of the current account and the saving behaviour can hardly be discarded.

where C is private consumption expenditure, I is private investment, G is government expenditure, X is exports of goods and services, M is imports of goods and services. On the other hand, private saving S is given by disposable income net of consumption expenditure, and taxes

$$S = Y - C - T \qquad \dots (2)$$

where T is tax revenue. From (1) and (2) we can relate the current account balance, the net sale of goods to foreign agents, to the difference between national investment and national saving, which in turn is the sum of private and public saving. Thus, the current account balance is usually written as

$$(X - M) = (S - I) + (T - G)$$
 ... (3)

$$CA = (S - I) + BUD \qquad \dots (4)$$

and it is evident to see that the current account (CA=X-M) balance is related to the budget balance (BUD=T-G) through the difference between private saving and investment. In other words, and as it is easily observed, the current account balance of a given country is by definition identical to the difference between national saving and domestic investment. Moreover, one also observes that the two main sources of saving; private domestic saving and foreign capital inflow (due to the current account deficit), finance the two main sources of demand for financial capital; private investment and the government budget deficit.

When the government incurs a budget deficit (T-G<0) this may be financed in various ways. For instance, it may be financed by a private sector surplus (S>I), with the government issuing public debt and borrowing from the private sector. This financing strategy will be sustainable as long as the private sector is willing to buy government debt. Therefore, a government deficit need not imply a current account deficit. On the other hand, if a country runs a budget surplus and a widening current account deficit, this would reflect increases in private investment and/or declining private saving (implying S<I).

Additionally, one could also envisage that under the Ricardian equivalence hypothesis consumers will perceive higher budget deficits today as postponed future higher taxes. Therefore, when the government reduces taxes, consumers just save more, to help pay the higher future taxes, which would leave consumption, investment and the current account balance unaffected.⁶ On the other hand, in the absence of Ricardian equivalence a higher government budget balance rises national saving and increases the current account balance, while the effect of budget balances on the current account balances would also depend on the degree to which the private sector is liquidity constrained.

When both the public and the private sectors are in a deficit position, then this will be reflected in a current account deficit (X-M<0). Such an overall shortfall in domestic saving may then be financed by foreign capital inflows, in the form of investments in either domestic public debt or the domestic private sector. This would imply a surplus position in the capital account (KA>0) and the accumulation of foreign reserves, R.

⁶ Ricardo (1817) first mentioned the equivalence idea, later popularised by Barro (1974), under which deficits might not affect the economy if consumers do not perceive government debt as wealth, and an increase in the budget deficit may then be offset by an increase in private saving.

R = CA + KA

On the other hand, if the capital account surplus is not sufficient to finance the current account deficit, foreign reserves may be directly used by the government to finance a fiscal deficit, or indirectly to finance a private sector deficit.

Therefore, if the difference between private saving and investment remains stable, a budget deficit impinges negatively on the current account balance. Overall, this could imply that shocks to the fiscal position may push the current account balance in the same direction, the main point of the twin-deficits argument. However, investment and saving decisions are bound to change given the fiscal deficit, while the effect of fiscal policy on the current account should also depend on the size and the trade exposure of the country. Still evident from equation (4), is that with a given level of saving an increase in the budget deficit will either crowd out private investment or attract additional inflows of capital.

In the context of a simple Fleming-Mundell open economy framework, one can recall that with international capital movements and flexible exchange rates,⁷ a fiscal expansion could lead to higher interest rates, and in the presence of capital inflows an appreciation of the domestic currency may occur which could increase the current account deficit.⁸ In theory, in the case of perfect capital mobility, with capital flowing among countries to equalise the yield to investors, the current account deficit could increase by exactly the same amount as the budget deficit.⁹ On the other hand, while a fiscal expansion can drive the current account into deficit, the resulting eventual higher interest rates can push the capital account into surplus. Therefore, the final effect on foreign reserves accumulation is less clear, and depends on the relative sensitivity of international capital flows and on the responsiveness of imports to income.¹⁰

Some more practical caveats must, nevertheless, be borne in mind when discussing the twin-deficits hypothesis, since they do not necessarily move in the same direction. Indeed, the fact that exports minus imports is equal to the sum of private and public saving minus investment is simply an accounting identity, and does not mean that one should get such empirical regularities or relationship from the data.¹¹ For instance, if there is an exogenous increase in private investment, this can deteriorate the current account deficit without increasing the budget deficit. On the other hand, an increase in the budget deficit, for instance due to discretionary measures or to the working of automatic stabilizers during a slowdown, can be split between

⁷ According to the IMF (2007), in 2007 most OECD countries were following floating arrangements for their exchange rate regimes, including the euro area and several EU non-euro area countries. Additionally, other EU countries had soft peg arrangements while the Baltic countries had adopted currency board or conventional fixed peg arrangements. Interestingly, Chinn and Wei (2008) argue for the absence of a systematic association between a country's nominal exchange rate regime and the speed of current account adjustment.

⁸ As pointed out by Dornbusch (1976) in his model of exchange rate overshooting, the interest rate will be a key factor between the adjustments of the domestic economy and of the current account. According to Cherneff (1976), while Mundell introduced the device of the foreign balance curve, Fleming (1962) derived the effects of fiscal policy on the external balance, extending the Hicks-Hansen IS-LM model.

⁹ With perfect capital mobility, fiscal policy cannot restore the internal balance (Mundell, 1963).

¹⁰ Since the effect on the balance of payments of exchange rate developments depends on more complicated mechanisms, see Obstfeld and Rogoff (1995), an empirical assessment is necessary.

¹¹ Feldstein (1992) emphasises this point.

decreases in private investment and an increase in the current account deficit, and the resulting weighting of such splitting can be quite diverse.¹²

As already mentioned, empirical analysis does not necessarily provide a positive correlation between the budget balance and the current account balance. Indeed, the existing evidence is rather dissimilar, notably regarding single equation analysis, in the sense that budget balance deteriorations may hardly impinge on the current account position. Overall there is some mixed evidence in favour of a twin-deficits relationship (see Table 1 for a non-exhaustive overview), but this is neither robust nor stable over time, which may imply that fiscal tightening may not diminish the current account deficit.

3. Empirical Analysis

Following some of the empirical strategy existing in the literature, one may recall expression (4) as depicting the basis of the twin-deficits idea. Therefore, assessing such hypothesis would involve testing the cointegration regression between the current account balance and the budget balance,¹³ in a panel framework, as follows,

$$CA_{it} = \alpha_i + \beta_i BUD_{it} + u_{it} \qquad \dots (6)$$

where the index i (i = 1,...,N) denotes the country, the index t (t = 1,...,T) indicates the period. Under such a framework, we can test for the existence of a long-term relationship, implying a positive effect of the budget balance to the current account balance. The possibility of effects from the current account balance to the budget balance (i.e. current account deteriorations lead to higher budget deficits via lower growth) could of course also be assessed, but we are at this stage more interested in the former relationship.

Moreover, a more encompassing specification that takes the effect of the real effective exchange rate (REX) on the current account balance into account can also be assessed:

$$CA_{it} = \alpha_i + \beta_i BUD_{it} + \delta_i REX_{it} + u_{it}. \qquad ... (7)$$

As already mentioned and according to the literature, the real effective exchange rate can either have a positive or a negative effect on the current account, but its presence in a cointegration relationship such as in (7) cannot be discarded with certainty. Of course, additional factors can also be relevant for the developments of the current account balances. For instance, countries with a higher percentage share of older-age people in the population may have lower savings and higher consumption spending, which could translate into a larger current account deficit, while the exchange rate regime will also play a role. However, we are essentially interested in focussing on the long-term relationship between the budgetary and current balances. On the other hand, and instead of estimating a long-term (cointegration) relationship between the current account and budget deficits we could have alternatively considered estimating the short-term relations between the external and budget deficits which may also be

¹² Frankel (2006) discusses the related evidence for the US.

¹³ It is important to have in mind that we are not trying to model the current account, and therefore our paper does not really fall in that category of papers. Indeed, what we are interested in assessing is the existence of possible long-run, cointegration relationship between budget balances and current account balances, using new econometric techniques that may validate such relation or not.

important to assess the comovements between the two deficits. If so, the specifications (6) and (7) could include not only the cointegration relation, but also the short-term dynamics characterizing the adjustments required to return to the long-term relation.¹⁴

3.1. Data

All data for current account balances, general government budget balances and real effective exchange rates are taken from the European Commission AMECO (Annual Macro-Economic Data) database, from the IMF and from the OECD databases.¹⁵ We consider five different country panels: EU15, EU25, Cgroup21, Cgroup26, and Cgroup36. The data cover the periods from 1970 to 2007 respectively for the EU15 countries; from 1996 to 2007 for the EU25 countries (i.e. EU27 without Cyprus and Romania, due to short time span availability); from 1970 to 2007 for the Cgroup21 (i.e. EU15 and Australia, Canada, Iceland, Japan, Norway, USA); from 1987 to 2007 for Cgroup26 (i.e. EU15 and Australia, Canada, Iceland, Japan, Korea, Mexico, New-Zealand, Norway, Switzerland, Turkey, USA), and from 1996 to 2007 for Cgroup36 (i.e. EU25 and Australia, Canada, Iceland, Norway, Switzerland, Turkey, USA).¹⁶ These time spans are used both for the panel unit root tests and for the panel cointegration analysis. On the other hand, and as explained in sub-section 3.4, the unbalanced panels within the period 1970-2007 are used for the SUR analysis.

In Figure 1 we show a visual illustration of the budgetary and external balances for some of the countries included in our sample.

3.2. 2nd Generation Panel Unit Root Analysis

The literature on panel unit root and panel cointegration testing has been increasing considerably in the past years and now distinguishes between the first generation tests (see Maddala, and Wu, 1999; Levin, Lin and Chu, 2002; Im, Pesaran and Shin, 2003) developed on the assumption of the cross-sectional independence among panel units (except for common time effects), the second generation tests (e.g. Bai and Ng, 2004; Smith et al., 2004; Moon and Perron, 2004; Choi, 2006; Pesaran, 2007) allowing for a variety of dependence across the different units, and also panel data unit root tests that enable to accommodate structural breaks (e.g. Im and Lee, 2001). In addition, in recent years it has become more widely recognized that the advantages of panel data methods within the macro-panel setting include the use of data for

¹⁴ Note also that the absence of empirical evidence of a cointegrating vector only means that no-long run relationship exists between the variables, but not necessarily that no relationship exist. In this case, short-run relationships may be investigated either by taking the variables in "level" or in "difference" according to their degree of integration.

¹⁵ The AMECO codes are the following ones: .1.0.319.0.ublge, Net lending (+) or net borrowing (-): general government, % of GDP at market prices - excessive deficit procedure). .1.0.310.0.UBCA, Balance on current transactions with the rest of the world (National accounts), % of gross domestic product at market prices.

¹⁶ Note that regarding the selection of the country groups, we use all OECD countries, just the EU15 countries (the "old"15 EU members, for which a longer time span is available), and additional country groups where the EU New Member States are also included. Apart from this selection criteria we also need to adjust the country groupings according to whether all the relevant variables, for each country, have a unit root or not, in order to proceed with the cointegration analysis (see supra).

which the spans of individual time series data are insufficient for the study of many hypotheses of interest.

Reference	Data frequency	Country sample	Approach/tests	Main results
			performed	
Bernheim	Annual,	US, Canada,	Regression of the CA on	Budget deficit increases CA
(1988)	1960-1984	Japan, Mexico	the budget deficit (% of	deficit, except for Japan.
		Germany, UK	GDP)	
Miller and	Quarterly,	US	Cointegration and	Budget deficit causes trade
Russek (1989)	1946:I-1987:III		Granger causality tests	deficit, but no cointegration.
Dewald and	Annual,	US	Relationship between CA	No significant link between
Ulan (1990)	1954-1987		and the budget deficit	fiscal and current-account
Endoro and Loo	Quartarly			Dalances.
		03	VAR allalysis	remporary increases in
(1990)	1947.111-1907.1			worsen current account
Andersen	Δηριμαί	OFCD countries	Regression of CA on	The twin-deficits does not
(1990)	1960-1989	OLOD countries	hudget deficit	fully hold but budget deficits
(1000)	1000 1000		sugger denot	explain the CA.
Rosenswieg	Quarterly.	US	VAR analysis	Some evidence on the
and Tallman	1961:I-1989:IV			government deficit trade
(1993)				deficit link.
Normandin	Quarterly,	US, Canada	VAR, causality tests	Statistical and positive link
(1999)	1950:I-1992:III			between CA and budget
				deficit in Canada.
McCoskey and	Annual,	OECD countries	Panel data cointegration	No rejection of either
Kao (1999)	1975-1994			cointegration or no
		0.505		cointegration hypothesis.
Piersanti (2000)	Annual,	OECD countries	Causality tests;	Current account deficits are
	1970-1997		regression of CA on	associated with large budget
Loophmon and	Quartarly	110	Cointogration and	delicits. Week evidence of
Erancis (2002)	107/1-1002·11	03	multicointegration	cointegration causality from
1 101013 (2002)	1974.1-1992.11		maniconnegration	fiscal to trade deficit
Chinn and	Annual	18 industrial	Pooled OLS panel	Government budget
Prasad (2003)	1971-1995	and 71		balances positively affect
		developing		current account balances.
		countries		
Bussière,	Annual,	21 OECD	Panel	Little evidence for the twin-
Fratzscher and	1960-2003	countries		deficits hypothesis.
Müller (2005)				
Funke and	Annual,	G7 countries	Panel	Increase in government
Nickel (2006)	1970-2002			spending deteriorates the
• • • •	A A A			trade account.
Corsetti and	Quarterly,	Australia, US,	/ variable SVAR	I rade deficit effects of
Wideller (2006)	1979:1-2005:111 Ouerterlui	Canada, UK,		spending shocks are mall.
NIIII and Roubini (2007)		05	VAR	increase in budget deficit
Roubilli (2007)	19/3.1-2004.1			
				account.

Table 1. S	Some existing	empirical	evidence	regarding	the tw	vin-deficits	hypothesis



Note: BUD - budget balance, CA - current account balance

Figure 1. Budgetary and external balances (% of GDP)

To determine the degree of integration of our series of interest (current account balances, budget balances and real effective exchange rates) in our five panel sets, we employ two second-generation panel unit root tests in order to investigate the robustness of our results.

The first 2nd generation unit root test that we use is the test by Pesaran (2007) who suggests a simple way of getting rid of cross-sectional dependence that does not require the estimation of factor loading. His method is based on augmenting the usual ADF regression with the lagged cross-sectional mean and its first difference to capture the cross-sectional dependence that arises through a single-factor model. The resulting individual ADF test statistics (CADF) or the rejection probabilities can then be used to develop modified versions of the t-bar test proposed by Im *et al.* (2003), such as the Cross-sectionally augmented IPS (CIPS = $N^{-1}\sum_{i=1}^{N} CADF_i$), or a truncated version of the CIPS statistic (CIPS^{*}) where the individual CADF statistics are suitably truncated to avoid undue influences of extreme outcomes that could arise when T is small (between 10 and 20), or the inverse normal test (or the Z test) suggested by Choi (2006) that combine the p-values of the individual tests (CZ). Critical values reported in Pesaran (2007) are provided through Monte Carlo simulations for a specific specification of the deterministic component and depend both on the cross-sectional and time series dimensions.

The second set of unit root tests of the 2nd generation are the bootstrap tests of Smith et al. (2004), which use a "Sieve" bootstrap method, taking into account both the sample size and the possible dependence between countries in the panel, generating appropriate empirical critical values.¹⁷ The specific tests that we consider are denoted \bar{t} , \bar{LM} , \bar{max} , and \bar{min} , where \bar{t} is the bootstrap version of the well-known panel unit root test of Im *et al.* (2003), $\bar{LM} = N \sum_{i=1}^{-1} LM_i$ is a mean of the individual Lagrange Multiplier (LM_i) test statistics, originally introduced by Solo (1984), \bar{max} is the test of Leybourne (1995), and $\bar{min} = N \sum_{i=1}^{-1} min_i$ is a (more powerful) variant of the individual Lagrange Multiplier (LM_i), with min_i = min(LM_{fi},LM_{fi}), where LM_{fi} andLM_{fi} are based on forward and backward regressions (see Smith et al., 2004 for further details). We used bootstrap blocks of m=20-¹⁸ All four tests are constructed with a unit root under the null hypothesis and heterogeneous autoregressive roots under the alternative, which indicates that a rejection should be taken as evidence in favour of stationarity for at least one country.

The null hypothesis of all tests is the unit root.

¹⁷ Before carrying out the 2nd generation panel unit-root tests that allow for cross-section dependence, we implemented the simple test of Pesaran (2004) and have computed the CD statistic to test for the presence of such cross-section dependence in the data. This test is based on the average of pair-wise correlation coefficients of the OLS residuals obtained from standard augmented Dickey-Fuller regressions for each individual unit. Its null hypothesis is cross-sectional independence and it follows asymptotically a two-tailed standard normal distribution. The null hypothesis is always rejected for all series in our five panel sets, regardless of the number of lags (up to five lags) at the five and ten percent level of significance. Therefore, the members of our panel are cross-sectionally correlated and any 1st generation panel unit root test (assuming cross-country independence), would be flawed and cannot be used in this case.

¹⁸ The results are not very sensitive to the size of the bootstrap blocks.

Another crucial issue is the selection of the order of the deterministic component. In particular, since the cross-sectional dimension is rather large here it may seem restrictive not to allow at least some of the units to be trending, suggesting that the model should be fitted with both a constant and trend. However, in order to investigate the robustness our results we consider two alternative specifications of the deterministic part of the model (either a constant term, or both a constant and a linear time trend).

The results of the second generation panel unit root tests proposed by Pesaran (2007) are reported in Tables 2a and 2b and provide support of the existence of a unit root in all series under consideration, for the conventional levels of significance (1, 5, or 10%), in our five panel sets. This conclusion, which is robust to the number of lags (p) introduced in the ADF regressions (from p=1 to 4),¹⁹ should be considered as safe given that it does not depend on whether the model includes only a constant, or both a constant and a linear time trend.

Similar results in Tables 2c and 2d, suggest that for all the series the unit root null cannot be rejected at any conventional significance level by the four bootstrap tests of Smith et al (2004).²⁰ This result holds whether the model includes a constant term, or both a constant and a linear time trend. Therefore, we conclude that current account balances, budget balances and real effective exchange rates are non-stationary and integrated of order one in our five country panels.²¹

3.3. Panel Cointegration

We now proceed by testing for the existence of cointegration between current account balances and budget balances and also between current account balances, budget balances and effective real exchange rates (in conjecture with equations 6 and 7), using the bootstrap panel cointegration test proposed by Westerlund and Edgerton (2007). Unlike the panel data cointegration tests of Pedroni (1999, 2004), generalized by Banerjee and Carrion-i-Silvestre (2006), this test has the appealing advantage that the joint null hypothesis is cointegration for all countries in the panel. Therefore, in case of non rejection of the null, we can assume that a cointegration relationship for the whole set of countries of the panel exists, which is crucial to assess the twin-deficits hypothesis. On the contrary, performing the Banerjee and Carrion-i-Silvestre (2006) methodology raises the problem that a single series from the panel might be responsible for rejecting the joint null of non-stationary or non-cointegration, hence not necessarily implying that a cointegration relationship holds for the whole set of countries. This could be less helpful to investigate the two imbalances relationship since no information is provided on which panel members are responsible for this rejection, that is, for which country the cointegration relationship does not hold.

¹⁹ The same conclusion is reached if p is selected for each series by a model selection criteria such as AIC (see Tables 2a and 2b in the appendix).

²⁰ The order of the sieve is allowed to increase with the number of time series observations at the rate T^{1/3} while the lag length of the individual unit root test regressions are determined using the Campbell and Perron (1991) procedure.

²¹ We have of course also checked using the tests by Pesaran (2007) and the bootstrap tests of Smith *et al.* (2004) that the first difference of the series are stationary, hence confirming that the series expressed in level are integrated of order one.

	Curre	ent acco	unt bala	ances	E	Budget k	alance	s	Effective real exchange rates			
Test												
Statistics	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4
				E	U15 (19	970-200	7)					
CIPS	-1.92	-188	-1.84	-1.96	-2.10	-1.96	-1.72	-1.68	-1.94	-1.75	-1.71	-1.68
CIPS	-1.58	-1.52	-1.46	-1.62	-2.09	-1.95	-1.71	-1.68	-1.66	-1.56	-1.44	-1.38
Test	p=1	p=2	p=3	P=4	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4
Statistics												
				E	U25 (19	96-200	7)					
CIPS	-2.09	-2.07	-1.98	-1.91	-2.17*	-1.90	-1.43	-1.28	-1.75	-1.94	-1.72	-1.68
CIPS	-2.08	-2.06	-1.98	-1.91	-2.16*	-1.89	-1.43	-1.28	-1.48	-1.37	-1.21	-1.19
Test	p=1	p=2	p=3	P=4	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4
Statistics												
				Cgr	oup21 (1970-20	007)					
CIPS	-1.95	-1.92	-1.90	-2.01	-2.03	-1.99	-1.97	-1.94	-1.55	-1.42	-1.38	-1.27
CIPS [*]	-1.93	-1.9 1	-1.89	-2.01	-2.02	-1.98	-1.97	-1.94	-2.01	-2.04	-1.92	-1.85
Test	p=1	p=2	p=3	P=4	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4
Statistics												
				Cgr	oup26 (1987-20	007)					
CIPS	-1.75	-1.68	-1.82	-1.78	-1.36	-1.28	-1.23	-1.19	-1.55	-1.48	-1.43	-1.39
CIPS [*]	-1.74	-1.65	-1.82	-1.77	-1.65	-1.58	-1.52	-1.45	-1.32	-1.23	-1.18	-1.14
Test	p=1	p=2	p=3	P=4	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4
Statistics												
				Cgr	oup36 (1996-20	007)					
CIPS	-1.93	-1.78	-1.69	-1.61	-2.02	-1.99	-1.95	-1.88	-1.55	-1.49	-1.44	-1.39
CIPS [*]	-1.87	-1.76	-1.64	-1.58	-1.99	-1.94	-1.87	-1.83	-1.48	-1.41	-1.38	-1.26

Table 2a. Panel unit root test of Pesaran	(2007) for	current account	balances,	budget
balances and effective real exchange rate	es (with a	model including	a constan	t term)

1) Rejection of the null hypothesis indicates stationarity at least in one country.

2) Critical values are respectively of -2.40 at 1%, -2.22 at 5%, and -2.14 at 10%.

3) Numbers in bold are the values of the CPIS and CPIS* tests statistics when the number of lags (p) introduced in the ADF regressions is selected using the AIC criterion. Values of the two statistics for other number of lags are also reported for comparison purposes in order to assess the robustness of the conclusion regarding non-stationarity of the data.

* denotes rejection of the null at the 10 % significance level.

CIPS – Cross-section augmented Im-Pesaran-Shin test. CIPS* – truncated CIPS test.

Table 2b. Panel unit root test of Pesaran (2007) for current account balances, budget
balances and effective real exchange rates (with a model including both a constant and a
linear time trend)

	Current account balances			Budget balances			s	Effective real exchange				
									rates			
Test Statistics	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4
				E	J15 (19	970-200)7)					
CIPS	-2.45	-2.25	-2.18	-2.17	-2.38	-2.45	-2.48	-1.98	-2.57	-2.48	-2.53	-2.54
CIPS [*]	-2.32	-2.31	-2.18	-2.11	-2.61	-2.52	-2.58	-2.25	-2.33	-2.41	-2.32	-2.28
Test	p=1	p=2	p=3	P=4	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4
Statistics												
				El	J25 (19	96-200)7)					
CIPS	-2.35	-2.44	-2.68	-2.38	-2.14	-2.12	-1.96	-1.85	-1.99	-1.85	-1.97	-1.68
CIPS	-2.26	-2.14	-2.56	-2.41	-2.45	-2.32	-1.92	-1.82	-2.03	-1.98	-1.82	-1.57
Test	p=1	p=2	p=3	P=4	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4
Statistics												
				Cgro	oup21 (1970-2	2007)					
CIPS	-1.82	-1.79	-1.68	-1.82	-2.47	-1.99	-2.32	-2.17	-2.02	-2.13	-2.23	-
CIPS	-2.08	-2.18	-1.96	-1.78	-1.92	-2.17	-2.23	-2.47	-2.57	-2.32	-2.38	2.69*
												-
												2.67*
Test	p=1	p=2	p=3	P=4	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4
Statistics												
				Cgro	oup26 (1987-2	2007)					
CIPS	-2.45	-2.25	-2.61	-2.48	-1.97	-1.92	-1.87	-1.82	-2.38	-1.96	-2.12	-2.09
CIPS	-1.68	-1.76	-1.97	-2.02	-2.18	-1.99	-1.47	-1.67	-1.45	-1.74	-1.68	-1.62
Test	p=1	p=2	p=3	P=4	p=1	p=2	p=3	p=4	p=1	p=2	p=3	p=4
Statistics												
				Cgro	oup36 (1996-2	.007)					
CIPS	-1.22	-1.34	-1.26	-1.58	-2.02	-2.14	-2.25	-2.34	-1.23	-1.25	-1.37	-1.18
CIPS [*]	-2.36	-1.92	-1.87	-1.78	-2.38	-2.18	-2.32	-2.38	-1.64	-1.55	-1.59	-1.36
Notes:												

1) Rejection of the null hypothesis indicates stationarity at least in one country.

2) Critical values are respectively of -2.93 at 1%, -2.76 at 5%, and -2.66 at 10%.

3) Numbers in bold are the values of the CPIS and CPIS* tests statistics when the number of lags (p) introduced in the ADF regressions is selected using the AIC criterion. Values of the two statistics for other number of lags are also reported for comparison purposes in order to assess the robustness of the conclusion regarding non-stationarity of the data.

* denotes rejection of the null at the 10 % significance level.

CIPS – Cross-section augmented Im-Pesaran-Shin test. CIPS* – truncated CIPS test.

	Current acco	ount balances	Budget l	balances	Effective real	Effective real exchange rates	
Test	Statistic	Bootstrap	Statistic	Bootstrap	Statistic	Bootstrap	
		P-value	 =1115 (1970-200	7)		P-value	
-	-1 442	0.570	_2 526	0.084	_1 837	0.126	
	-1.442	0.015	-2.020	0.004	-1.007	0.120	
	3.757	0.215	4.729	0.048	4.552	0.146	
max	-1.343	0.112	-2.068	0.140	-1.414	0.069	
min	3.359	0.015	5.027	0.098	3.588	0.048	
	1	ŀ	EU25 (1996-200)7)	r		
t	-1.893	0.099	-2.738	0.058	-1.835	0.274	
LM	3.375	0.201	5.738	0.055	3.664	0.397	
max	-1.280	0.140	-1.909	0.234	1.174	0.977	
min	2.590	0.068	3.871	0.260	2.485	0.374	
		Cg	roup21 (1970-2	007)			
Ī	-1.569	0.419	-2.327	0.284	-2.352	0.125	
LM	3.340	0.291	5.643	0.262	6.386	0.054	
max	-1.343	0.098	-1.979	0.277	-1.957	0.108	
min	2.635	0.066	4.480	0.232	5.231	0.029	
		Cg	roup26 (1987-2	007)	1		
Ī	-1.493	0.507	-2.474	0.138	2.032	0.642	
LM	3.190	0.315	5.844	0.120	4.240	0.684	
max	-0.965	0.541	-2.077	0.118	-1.909	0.331	
min	1.870	0.399	4.554	0.127	3.856	0.395	
		Cg	roup36 (1996-2	007)	1		
Ī	-2.647	0.155	-2.702	0.118	-2.336	0.285	
LM	5.524	0.060	5.900	0.027	4.967	0.319	
max	-1.977	0.208	-2.055	0.122	-1.141	0.865	
min	3.768	0.282	4.231	0.130	2.438	0.840	

Table 2c. Panel unit root test of Smith et al. (2004) for current account balances, budge	et
balances and effective real exchange rates (with a model including a constant term)	

a) Null hypothesis: unit root (heterogeneous roots under the alternative). Rejection of the null hypothesis indicates stationarity at least in one country. All tests are based on 5000 bootstrap replications to compute the *p*-values.

b) EU25 countries includes EU27 without Cyprus and Romania; group21 includes EU15 and Australia, Canada, Iceland, Japan, Norway, USA; Cgroup26 includes EU15 and Australia, Canada, Iceland, Japan, Korea, Mexico, New-Zealand, Norway, Switzerland, Turkey, USA; and Cgroup36 includes EU25 and Australia, Canada, Iceland, Japan, Korea, Mexico, New-Zealand, Norway, Switzerland, Turkey, USA;

Table 2d. Panel unit root test of Smith et al. (2004) for current account balances, budget
balances and effective real exchange rates (with a model including both a constant and a
linear time trend)

	Current acco	unt balances	Budget l	balances	Effective real exchange rate	
Test	Statistic	Bootstrap	Statistic	Bootstrap	Statistic	Bootstrap
		P-value*		P-value		P-value*
		E	EU15 (1970-200)7)		
ī	-2.241	0.303	-2.601	0.079	-1.987	0.167
LM	5.737	0.295	3.678	0.081	4.884	0.172
max	-1.957	0.180	-2.335	0.110	-1.257	0.135
min	4.617	0.200	4.332	0.127	4.645	0.124
		E	U25 (1996-200)7)		
ī	-2.258	0.124	-2.258	0.068	-1.945	0.321
LM	3.785	0.254	6.025	0.087	3.557	0.402
max	-1.005	0.137	-2.258	0.287	1.058	0.105
min	2.125	0.087	3.258	0.247	2.687	0.347
		Cg	roup21 (1970-2	007)	•	
ī	-1.687	0.395	-2.258	0.274	-2.226	0.174
LM	3.289	0.305	5.875	0.259	5.258	0.084
max	-1.275	0.114	-2.325	0.254	-1.658	0.128
min	2.357	0.0875	4.878	0.215	5.125	0.045

Cgroup26 (1987-2007)											
ī	-1.325	0.557	-2.358	0.149	2.325	0.625					
LM	3.345	0.296	5.258	0.144	4.658	0.641					
max	-0.758	0.625	-1.978	0.135	-2.365	0.298					
min	1.954	0.378	4.358	0.148	4.258	0.348					
	Cgroup36 (1996-2007)										
ī	-2.325	0.187	-2.325	0.121	-2.665	0.274					
LM	5.126	0.095	5.352	0.051	5.025	0.284					
max	-1.642	0.212	-2.236	0.112	-1.235	0.791					
min	3.368	0.301	4.478	0.110	2.698	0.815					

a) Null hypothesis: unit root (heterogeneous roots under the alternative). Rejection of the null hypothesis indicates stationarity at least in one country. All tests are based on 5000 bootstrap replications to compute the *p*-values.

b) EU25 countries includes EU27 without Cyprus and Romania; group21 includes EU15 and Australia, Canada, Iceland, Japan, Norway, USA; Cgroup26 includes EU15 and Australia, Canada, Iceland, Japan, Korea, Mexico, New-Zealand, Norway, Switzerland, Turkey, USA; and Cgroup36 includes EU25 and Australia, Canada, Iceland, Japan, Korea, Mexico, New-Zealand, Norway, Switzerland, Turkey, USA;

The test developed by Westerlund and Edgerton (2007) relies on the popular Lagrange multiplier test of McCoskey and Kao (1998), and permits correlation to be accommodated both

within and between the individual cross-sectional units. In addition, this bootstrap test is based on the sieve-sampling scheme, and has the advantage of significantly reducing the distortions of the asymptotic test.²² In order to assess the robustness of our results we consider two alternative specifications of the deterministic part of the model (either a constant term, or both a constant and a linear time trend). The panel cointegration results reported in Table 3 clearly indicate the absence of a cointegrating relationship between current account balances and budget balances for three panels sets out of five (EU15, Cgroup21, Cgroup26). This result is valid for the two specification of the deterministic component considered, and is robust to the critical value used (asymptotic or bootstrap) for the conventional levels of significance. On the contrary, cointegration is detected for a model including a constant term in the EU25 and Cgroup36 panel sets set, and for a model including either a constant term, or both a constant and a linear time trend in the Cgroup36 panel set using bootstrap critical values (which are valid if the members of our panel are cross-sectionally correlated as it is the case here).

Interestingly, performing the panel data cointegration tests between current account balances, budget balances and effective real exchange rates (see Table 2) produces significant evidence in favour of the existence of a cointegration relationship for three panels sets out of five (EU15, Cgroup21, Cgroup26) for the two specifications of the deterministic component considered if one relies on asymptotic p-values. Results are even stronger when using bootstrap p-values since the null hypothesis of cointegration cannot be rejected for the five panel sets considered for a model including either a constant term, or both a constant and a linear time trend. These results underline the crucial importance of considering the effect of the effective real exchange rate in assessing the twin cointegration between budgetary and current account balances.

3.4. SUR Cointegration Relationships

If a cointegrating relationship exists for all countries of a given panel set, we estimate the systems (6) and (7) by the Zellner (1962) approach to handle cross-sectional dependence among countries using the SUR estimator. It is now well known that the presence of cross-section dependence renders the ordinary least squares estimator inefficient and biased, which makes it a poor candidate for inference. A common approach to alleviate this problem is to use Seemingly Unrelated Regressions techniques. However, as noted by Westerlund (2007), this approach is not feasible when the cross-sectional dimension N is of the same order of magnitude as the time series dimension, since the covariance matrix of the regression errors then becomes rank deficient. In fact, for the SUR approach to work properly, one usually requires the time series dimension being substantially larger than N, a condition that is only fulfilled for the EU15 and Cgroup21 panels over the 1970-2007 period, but not for the EU25, Cgroup26, and Cgroup36 panels over the 1996-2007, 1987-2007 and 1996-2007 periods. As a consequence, for the last three panels the SUR estimation technique is actually performed on the (unbalanced) 1970-2007 period, according to data availability. This way of proceeding enables us to estimate the individual coefficients β_i in a panel framework and hence to investigate the relationship between budget and current account balances for each country taken individually.

²² We are grateful to Joakim Westerlund for sending us his Gauss codes.

Table 3. Panel cointegration between current account balances, budget balances, and real effective exchange rates *

3a – Current account and budget balances									
EU15 (1970-2007)	LM-stat	Asymptotic p-value	Bootstrap p-value						
Model with a constant term	8.580	0.000	0.004						
Model with both a constant and a linear	9.477	0.000	0.000						
time trend									
EU25 (1996-2007)									
Model with a constant term	0.452	0.326	0.606						
Model with both a constant and a linear	3.685	0.000	0.227						
time trend									
Cgroup21 (1970-2007)									
Model with a constant term	9.183	0.000	0.016						
Model with both a constant and a linear	11.548	0.000	0.000						
time trend									
Cgroup26 (1987-2007)									
Model with a constant term	3.871	0.000	0.019						
Model with both a constant and a linear	6.310	0.000	0.000						
time trend									
Cgroup36 (1996-2007)									
Model with a constant term	0.608	0.272	0.847						
Model with both a constant and a linear	5.078	0.000	0.540						
time trend									
3b – Current account and b	udget balances, a	ind real effective excha	ange rates						
EU15 (1970-2007)	LM-stat	Asymptotic p-value	Bootstrap p-value						
Model with a constant term	-2.646	0.848	0.996						
Model with both a constant and a linear	-2.800	0.901	0.999						
time trend									
EU25 (1996-2007)									
Model with a constant term	7.076	0.000	0.833						
Model with both a constant and a linear	21.569	0.000	0.629						
time trend									
Cgroup21 (1970-2007)									
Model with a constant term	-1.075	0.859	0.999						
Model with both a constant and a linear	-3.366	0.892	0.998						
time trend									
Cgroup26 (1987-2007)									
Model with a constant term	0.059	0.477	0.996						
Model with both a constant and a linear	0.592	0.277	0.999						
time trend									
Cgroup36 (1996-2007)									
Model with a constant term	12.847	0.000	0.672						
Model with both a constant and a linear	43.729	0.000	0.438						
time trend									

Notes: the bootstrap is based on 2000 replications. a - The null hypothesis of the tests is cointegration.

a - The null hypothesis of the tests is cointegration.
b) EU25 countries includes EU27 without Cyprus and Romania; Cgroup21includes EU15 and Australia, Canada, Iceland, Japan, Norway, USA; Cgroup26 includes EU15 and Australia, Canada, Iceland, Japan, Korea, Mexico, New-Zealand, Norway, Switzerland, Turkey, USA; and Cgroup36 includes EU25 and Australia, Canada, Iceland, Japan, Korea, Mexico, New-Zealand, Norway, Switzerland, Turkey, USA;
Test based on Westerlund and Edgerton (2007).

In order to determine whether the estimated long-run relationships should incorporate (or not) a constant and a linear time trend, we conducted a series of Wald tests on the estimated cointegration vectors, and found that the null of absence of trend is never rejected, whereas it is always the case for the null of absence of constant. This led us naturally to incorporate only a constant term in the cointegrating relationships, since it turned out to be significant in all specifications considered. Actually, even from an economic point of view considering a cointegrating equation for the current account including a (positive) linear trend may be seen as not very convincing, since it would mean that, *ceteris paribus*, current account will go up, and up and up which may make the model incongruent. Indeed, there will be a permanent drift in the current account equilibrium level that would be hard to justify economically. The SUR estimation results are reported in Tables 4a and 4b, respectively for the country groups EU25 and Cgroup36.

Country	Coefficients		t-	Probability	Country	Coefficients		t-	Probability
	α, β in eq.		Statistic			α, β in eq.		Statistic	
		(6)					(6)		
Austria	α	0.10	0.27	0.78	Lithuania	α	-9.41	-12.54	0.00
	β	0.22	3.05	0.00		β	-0.09	-0.58	0.56
Belgium	α	2.94	6.83	0.00	Luxembourg	α	13.97	23.42	0.00
	β	0.16	4.01	0.00		β	-0.27	-2.29	0.02
Bulgaria	α	-8.07	-6.16	0.00	Latvia	α	-7.08	-4.46	0.00
	β	-0.32	-1.66	0.10		β	2.38	6.41	0.00
Czech Republic	ά	-2.63	-4.91	0.00	Malta	ά	-0.99	-0.65	0.51
	β	0.26	3.20	0.00		β	0.67	3.09	0.00
Denmark	α	-0.62	-1.41	0.16	Netherlands	α	4.52	11.31	0.00
	β	0.04	0.69	0.49		β	0.14	1.79	0.07
Estonia	ά	-10.00	-11.58	0.00	Poland	α	-2.81	-3.84	0.00
	β	0.28	1.33	0.18		β	-0.08	-0.65	0.52
Finland	α	1.92	2.72	0.01	Portugal	α	-5.02	-5.64	0.00
	β	-0.40	-6.59	0.00		β	0.07	0.51	0.61
France	α	-0.78	-2.88	0.00	Spain	α	-4.15	-9.87	0.00
	β	-0.06	-0.84	0.40		β	-0.61	-10.41	0.00
Germany	α	1.76	4.55	0.00	Slovakia	α	-7.36	-8.15	0.00
	β	0.04	0.44	0.66		β	-0.31	-4.46	0.00
Greece	α	-3.48	-4.75	0.00	Slovenia	α	-2.53	-5.97	0.00
	β	-0.06	-1.13	0.26		β	-0.30	-2.90	0.00
Hungary	α	-8.38	-5.56	0.00	Sweden	α	1.69	3.32	0.00
	β	-0.23	-1.02	0.31		β	-0.09	-2.54	0.01
Ireland	α	-1.95	-2.87	0.00	UK	α	-1.98	-7.46	0.00
	β	0.24	3.75	0.00		β	-0.18	-3.99	0.00
Italy	α	-1.10	-2.71	0.01					
	β	-0.10	-2.32	0.02					

Table 4a. SUR estimation for the EU25 panel (1970-2007)

Note: Seemingly Unrelated Regression, linear estimation after one-step weighting matrix. Unbalanced system, total observations: 718.

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Regarding the SUR results for the relationship between budgetary and current account balances, it is possible to observe a statistically significant (at the 5 per cent level) positive effect of budget balances on current account balances for several EU countries: Austria, Belgium, Czech Republic, Ireland, Latvia, and Malta (see Table 4a). On the other hand, a statistically significant (at the 5 per cent level) negative effect of budget balances on current account balances can be found for Finland, Italy, Luxembourg, Spain, Slovakia, Slovenia, Sweden and the UK, although the magnitude of the estimated β coefficient varies considerably across countries. In terms of the broader Cgroup36 panel (see Table 4b), the previous country specific findings for the EU25 panel are broadly confirmed while the heterogeneity of the results is the main feature, both regarding the sign of the estimated effect of budget balances on current account balances and regarding its absolute magnitude, but there is no evidence pointing to a close relationship. We also assessed the homogeneity of β_i across country using a Wald test, but such null hypothesis was rejected.

For the case of the relationship between budgetary and current account balances, and the effective real exchange rate the results are reported in Tables 4c, 4d and 4e, respectively for country groups EU15, EU25, and Cgroup36.²³

According to the SUR results there is a statistically significant effect of the real effective exchange rate on the current account balance for the majority of the countries. Some exceptions occur for the cases of Luxembourg and the UK in the EU15 panel, for the Czech Republic, Lithuania, Luxembourg and the UK in the EU25 panel, and for The Czech Republic, Iceland, Lithuania, Luxembourg, New Zealand, Switzerland and the UK in the Cgroup36 panel.

Table 5 summarises the SUR results regarding the sign of the coefficient (the effect between budget balances and current account balances) for the EU15 and Cgroup36 panels, both for the specification without and with the effective real exchange rate.

4. Conclusion

In this paper we assessed the existence of a cointegration relationship between current account and budget balances, and between current account, budget balances and effective real exchange rates, using recent bootstrap panel cointegration techniques and the Seemingly Unrelated Regression methods, which, to the best of our knowledge, was not employed before in this context. For the period from 1970 to 2007, and for different EU and OECD country groupings, we also investigate the magnitude of these relationships for each country. The results of the panel unit root tests that we performed suggest that for the series of the current account balances, budget balances and effective real exchange rates, the unit root null cannot be rejected at the usual significance levels for most of the tests.

On the basis of the stationarity results, we tested for the existence of cointegration between current account balances and budget balances and also between current account balances, budget balances and effective real exchange rates using the bootstrap panel cointegration test proposed by Westerlund and Edgerton (2007). For the EU25 and Cgroup36 panel sets cointegration is detected between budgetary and current account balances in the EU25 panel set, and in the Cgroup36 panel, set using bootstrap critical values.

²³ Additional results for the country groups Cgroup21 and Cgroup26 are presented in Appendix C.

Country	Country Coefficients		t-Statistic Probability		Country	Coefficients		t-Statistic	Probability
	α, β in eq.					α, β in eq.			
		(6)					(6)		
Australia	α	-3.70	-13.76	0.00	Latvia	α	-6.85	-4.69	0.00
	β	0.14	2.30	0.02		β	2.41	7.13	0.00
Austria	α	0.28	0.81	0.42	Lithuania	α	-9.44	-13.52	0.00
	β	0.31	4.80	0.00		β	-0.07	-0.55	0.59
Belgium	α	3.39	8.88	0.00	Luxembourg	α	14.11	25.52	0.00
	β	0.25	9.39	0.00		β	-0.31	-3.52	0.00
Bulgaria	α	-8.22	-6.66	0.00	Malta	α	-0.36	-0.25	0.80
	β	-0.40	-2.23	0.03		β	0.71	3.55	0.00
Canada	α	0.18	0.65	0.52	Mexico	α	-2.49	-4.38	0.00
	β	0.30	9.43	0.00		β	-0.19	-2.93	0.00
Czech Republic	α	-2.69	-5.47	0.00	Netherlands	α	4.74	12.90	0.00
	β	0.27	3.78	0.00		β	0.23	3.60	0.00
Denmark	α	-0.65	-1.57	0.12	New Zealand	α	-4.83	-23.44	0.00
	β	0.06	1.73	0.08		β	-0.47	-9.10	0.00
Estonia	α	-9.98	-12.08	0.00	Norway	α	-0.30	-0.28	0.78
	β	0.26	1.32	0.19		β	0.75	11.10	0.00
Finland	α	1.83	2.88	0.00	Poland	α	-2.73	-4.05	0.00
	β	-0.36	-8.47	0.00		β	-0.05	-0.47	0.64
France	α	-1.04	-4.40	0.00	Portugal	α	-4.29	-5.63	0.00
	β	-0.16	-4.02	0.00		β	0.23	2.29	0.02
Germany	α	1.93	5.63	0.00	Spain	α	-4.19	-10.38	0.00
	β	0.12	1.97	0.05		β	-0.64	-13.43	0.00
Greece	α	-3.65	-5.38	0.00	Slovakia	α	-6.83	-8.06	0.00
	β	-0.09	-1.94	0.05		β	-0.27	-4.25	0.00
Hungary	α	-8.17	-5.91	0.00	Slovenia	α	-2.57	-6.50	0.00
	β	-0.24	-1.18	0.24		β	-0.34	-3.60	0.00
Iceland	α	-6.41	-7.25	0.00	Sweden	α	1.69	3.70	0.00
	β	-1.02	-5.44	0.00		β	-0.07	-2.49	0.01
Ireland	α	-1.47	-2.41	0.02	Switzerland	α	8.61	12.96	0.00
	β	0.34	7.93	0.00		β	-0.04	-0.14	0.89
Italy	α	-0.99	-2.65	0.01	Turkey	α	-5.18	-8.01	0.00
	β	-0.08	-2.24	0.03		β	-0.15	-2.49	0.01
Japan	α	1.90	8.09	0.00	UK	α	-1.89	-7.78	0.00
	β	-0.11	-4.59	0.00		β	-0.15	-4.36	0.00
Korea	α	-0.80	-1.01	0.31	USA	α	-1.84	-5.92	0.00
	β	0.55	2.16	0.03		β	0.06	1.63	0.10

 Table 4b. SUR estimation for the Cgroup36 panel (1970-2007)

Note: Seemingly Unrelated Regression, linear estimation after one-step weighting matrix. Unbalanced system, total observations: 1075.

In addition, performing the panel data cointegration tests between current account balances, budget balances and effective real exchange rates produces significant evidence in favour of the existence of a cointegration relationship for three panel sets out of five (EU15, Cgroup21, Cgroup26) if one relies on asymptotic p-values. Results are even stronger if one uses bootstrap p-values since in this case the null hypothesis of cointegration cannot be rejected for the five panel sets. This underlines the relevance of considering the effect of the effective real

exchange rate in assessing the cointegration hypothesis between budgetary and current account balances.

Country	Coe	fficients	t-	Probability	Country	Coef	ficients	t-	Probability
	α, β, δ		Statistic			α, β, δ		Statistic	
	in	eq. (7)				in eq. (7)			
Austria	α	-19.76	-4.47	0.00	Italy	α	7.84	5.76	0.00
	β	0.68	4.74	0.00		β	-0.10	-2.58	0.01
	δ	0.21	4.52	0.00		δ	-0.08	-6.41	0.00
Belgium	α	27.00	9.38	0.00	Luxembourg	α	17.36	2.00	0.05
	β	0.27	6.31	0.00		β	-0.53	-2.54	0.01
	δ	-0.22	-8.25	0.00		δ	-0.03	-0.33	0.74
Denmark	α	-28.49	-8.55	0.00	Netherlands	α	13.20	3.00	0.00
	β	0.07	1.18	0.24		β	0.13	1.18	0.24
	δ	0.28	8.40	0.00		δ	-0.08	-1.98	0.05
Finland	α	25.48	7.50	0.00	Portugal	α	20.95	5.10	0.00
	β	-0.04	-0.36	0.72		β	0.23	1.56	0.12
	δ	-0.21	-7.09	0.00		δ	-0.27	-6.32	0.00
France	α	6.25	1.68	0.09	Spain	α	10.48	5.91	0.00
	β	-0.03	-0.32	0.75		β	-0.73	-10.23	0.00
	δ	-0.06	-1.91	0.06		δ	-0.14	-8.52	0.00
Germany	α	23.06	7.47	0.00	Sweden	α	22.60	13.00	0.00
	β	-0.04	-0.43	0.67		β	0.05	0.94	0.35
	δ	-0.20	-6.99	0.00		δ	-0.18	-12.23	0.00
Greece	α	13.83	2.46	0.01	UK	α	-0.32	-0.18	0.86
	β	0.03	0.28	0.78		β	-0.14	-2.44	0.01
	δ	-0.16	-3.21	0.00		δ	-0.02	-0.93	0.35
Ireland	α	-13.21	-2.70	0.01					
	β	0.22	2.69	0.01					
	δ	0.10	2.35	0.02					

Table 4c. SUR estimation for the EU15 panel (1970-2007)

Note: Seemingly Unrelated Regression, linear estimation after one-step weighting matrix. Balanced system, total observations: 570.

The SUR analysis shows a statistically significant (at the 5 per cent level) positive effect of budget balances on current account balances for several EU countries: Austria, Belgium, Czech Republic, Ireland, Latvia, and Malta. On the other hand, a statistically significant (at the 5 per cent level) negative effect of budget balances on current account balances can be found for Finland, Italy, Luxembourg, Spain, Slovakia, Slovenia, Sweden and the UK, although the magnitude of the estimated β coefficient varies considerably across countries.

The country specific findings for the EU25 panel are essentially confirmed for the broader Cgroup36 panel. In addition, the heterogeneity of the results is the main feature, both regarding the sign of the estimated effect of budget balances on current account balances and regarding its absolute magnitude, but there is no evidence pointing to a close relationship. Therefore, additional factors other than fiscal policy contributed to the development of the current account balances of the countries in our sample, for instance, liquidity constraints in the international capital market, and different monetary policy regimes (see, for instance, Gruber and Kamin, 2007).

Country	Coefficients		t-	Probability	Country	Coe	fficients	t-	Probability
	α, β, δ		Statisti		,	C	α, β, δ	Statistic	,
	in	eq. (7)	С			in	eq. (7)		
Austria	α	-20.02	-4.73	0.00	Lithuania	α	-9.82	-3.19	0.00
	β	0.71	5.18	0.00		β	0.02	0.11	0.91
	δ	0.21	4.79	0.00		δ	0.01	0.15	0.88
Belgium	α	27.25	10.02	0.00	Luxembourg	α	17.44	2.07	0.04
	β	0.27	6.76	0.00		β	-0.55	-2.71	0.01
	δ	-0.22	-8.84	0.00		δ	-0.03	-0.35	0.73
Bulgaria	α	16.90	6.83	0.00	Latvia	α	8.17	1.15	0.25
	β	-0.47	-2.83	0.00		β	-1.73	-3.38	0.00
	δ	-0.24	-9.97	0.00		δ	-0.26	-3.13	0.00
Czech Republic	α	-4.20	-1.90	0.06	Malta	α	-54.75	-5.38	0.00
	β	0.18	2.20	0.03		β	1.38	7.21	0.00
	δ	0.01	0.61	0.54		δ	0.62	5.46	0.00
Denmark	α	-28.81	-9.07	0.00	Netherlands	α	13.06	3.04	0.00
	β	0.06	1.16	0.25		β	0.15	1.35	0.18
	δ	0.28	8.91	0.00		δ	-0.08	-1.99	0.05
Estonia	α	-1.33	-0.40	0.69	Poland	α	6.73	2.88	0.00
	β	-0.49	-2.50	0.01		β	-0.03	-0.28	0.78
	δ	-0.08	-2.59	0.01		δ	-0.10	-3.94	0.00
Finland	α	26.13	7.86	0.00	Portugal	α	21.44	5.39	0.00
	β	-0.03	-0.31	0.76		β	0.25	1.76	0.08
	δ	-0.21	-7.47	0.00		δ	-0.27	-6.61	0.00
France	α	6.01	1.70	0.09	Spain	α	10.72	6.25	0.00
	β	-0.04	-0.49	0.62		β	-0.74	-10.68	0.00
	δ	-0.06	-1.96	0.05		δ	-0.15	-8.98	0.00
Germany	α	23.58	8.13	0.00	Slovakia	α	-14.20	-4.90	0.00
	β	-0.01	-0.15	0.88		β	-0.05	-0.34	0.73
	δ	-0.20	-7.60	0.00		δ	0.07	3.26	0.00
Greece	α	16.27	3.07	0.00	Slovenia	α	14.88	1.67	0.10
	β	0.06	0.58	0.56		β	-0.22	-2.21	0.03
	δ	-0.19	-3.87	0.00		δ	-0.17	-1.93	0.05
Hungary	α	-18.41	-9.34	0.00	Sweden	α	22.47	13.11	0.00
	β	0.09	0.67	0.51		β	0.04	0.89	0.38
	δ	0.11	5.96	0.00		δ	-0.18	-12.32	0.00
Ireland	α	-13.90	-2.89	0.00	UK	α	-0.51	-0.31	0.76
	β	0.23	2.81	0.01		β	-0.15	-2.77	0.01
	δ	0.11	2.54	0.01		δ	-0.02	-0.89	0.38
Italy	α	7.90	6.01	0.00					
	β	-0.10	-2.66	0.01					
	δ	-0.08	-6.69	0.00					

Table 4d. SUR estimation for the EU25 panel (1970-2007)

Note: Seemingly Unrelated Regression, linear estimation after one-step weighting matrix. Unbalanced system, total observations: 705.

Country	Coe	efficients	t-	Probability	Country	Coe	fficients	t-	Probability
Australia	α	-7.77	-10.19	0.00	Latvia	α	9.33	1.37	0.17
	β	0.12	2.12	0.03		β	-1.89	-3.93	0.00
	δ	0.03	5.51	0.00		δ	-0.27	-3.43	0.00
Austria	α	-24.63	-7.43	0.00	Lithuania	α	-10.76	-3.86	0.00
	β	0.88	8.79	0.00		β	-0.15	-0.85	0.39
	δ	0.26	7.56	0.00		δ	0.01	0.40	0.69
Belgium	α	28.24	12.12	0.00	Luxembourg	α	11.09	1.90	0.06
	β	0.28	7.68	0.00		β	-0.46	-3.51	0.00
	δ	-0.23	-10.81	0.00		δ	0.03	0.58	0.56
Bulgaria	α	17.53	7.47	0.00	Malta	α	-49.09	-5.06	0.00
	β	-0.50	-3.20	0.00		β	1.35	7.34	0.00
	δ	-0.25	-10.67	0.00		δ	0.56	5.16	0.00
Canada	α	9.02	8.66	0.00	Mexico	α	-7.01	-3.37	0.00
	β	0.24	6.63	0.00		β	-0.22	-3.21	0.00
	δ	-0.07	-8.75	0.00		δ	0.05	2.36	0.02
Czech Republic	α	-5.19	-2.56	0.01	Netherlands	α	18.02	6.55	0.00
	β	0.18	2.34	0.02		β	0.18	2.50	0.01
-	δ	0.02	1.11	0.27		δ	-0.12	-4.91	0.00
Denmark	α	-28.77	-11.30	0.00	New Zealand	α	-2.77	-1.59	0.11
	β	0.04	0.98	0.33		β	-0.45	-8.34	0.00
	δ	0.28	11.08	0.00		δ	-0.02	-1.20	0.23
Estonia	α	-1.55	-0.50	0.62	Norway	α	25.23	2.67	0.01
	β	-0.50	-2.72	0.01		β	0.72	8.11	0.00
Einden al	δ	-0.08	-2.04	0.01	Delevel	δ	-0.24	-2.07	0.01
Finiand	α	28.80	12.71	0.00	Poland	α	5.70	2.04	0.01
	ß	-0.04	-0.01	0.54		ß	-0.02	-0.10	0.00
Franco	0	-0.23	-12.10	0.00	Dortugol	0	-0.09	-3.79	0.00
France	ß	-0.10	-1 33	0.14	Fortugal	ß	0.32	2 72	0.00
	ρ	-0.05	-1.80	0.13		$\frac{\rho}{\delta}$	-0.27	-8.02	0.01
Germany	<i>a</i>	24.32	10.89	0.07	Snain	<i>0</i>	13 53	11 31	0.00
Connuny	ß	0.01	0.14	0.89	opulli	ß	-0.78	-15.89	0.00
	δ^{ρ}	-0.21	-10.20	0.00		δ^{ρ}	-0.18	-15.44	0.00
Greece	a	28.13	8.13	0.00	Slovakia	a	-13.41	-4.89	0.00
	ß	0.21	3.18	0.00		ß	-0.07	-0.53	0.60
	8	-0.29	-9.39	0.00		δ	0.07	3.10	0.00
Hungary	a	-18.21	-10.16	0.00	Slovenia	α	12.92	1.59	0.11
	β	0.05	0.40	0.69		β	-0.25	-2.79	0.01
	δ	0.10	6.30	0.00		δ	-0.15	-1.87	0.06
Iceland	α	-12.98	-1.78	0.07	Sweden	α	22.94	16.84	0.00
	β	-1.11	-5.50	0.00		β	0.09	2.63	0.01
	δ	0.06	0.91	0.37		δ	-0.18	-16.22	0.00
Ireland	α	-11.60	-3.50	0.00	Switzerland	α	-5.64	-0.44	0.66
	β	0.27	4.72	0.00		β	0.23	0.66	0.51
	δ	0.09	3.03	0.00		δ	0.14	1.11	0.27
Italy	α	7.51	7.04	0.00	Turkey	α	2.90	1.02	0.31
	β	-0.08	-2.34	0.02		β	-0.12	-1.85	0.06
	δ	-0.08	-7.73	0.00		δ	-0.09	-2.94	0.00
Japan	α	0.73	1.45	0.15	UK	α	0.21	0.15	0.88
	β	-0.06	-2.06	0.04		β	-0.11	-2.56	0.01
	δ	0.02	2.60	0.01		δ	-0.02	-1.53	0.13
когеа	α	13.69	3.98	0.00	USA	α	1.46	2.01	0.04
	β	0.10	0.63	0.53		β	0.01	0.32	0.75
1	ιð	-0.12	-4.43	0.00	1	ιð	-0.03	-5.01	0.00

Table 4e. SUR estimation for the Cgroup36 panel (1970-2007)

Note: Seemingly Unrelated Regression, linear estimation after one-step weighting matrix. Unbalanced system, total observations: 1062.

	it i it	it i	_
Country panel	Regression	Sign	Countries
	-	of	
	eq (6)	+	AU, BE, CZ, IR, LV, MT
EU15		-	FI, IT, LU, SP, SK, SL, SW, UK
	eq (7)	+	AU, BE, IR
		-	IT, LU, SP, UK
		+	AUS, AU, BE, CAN, CZ, DE, IR, KOR, LV, MT, NL, NOR, PT
	eq (6)	-	BG, FI, FR, GR, IT, IC, JP, LU, SP, SK, SL, SW, TR, UK
		+	AUS, AU, BE, CAN, CZ, GR, IR, MT, NL, NOR, PT, SW
Cgroup36	eq (7)	-	BG, ET, IT, IC, JP, LV, LU, MEX, NZ, SP, SL, UK

Table 5. Sign of estimated β in (6), $CA_{it} = \alpha_i + \beta_i BUD_{it} + u_{it}$, and in (7), $CA_{it} = \alpha_i + \beta_i BUD_{it} + \delta_i REX_{it} + u_{it}$,10% significance

From a policy purpose, one main result is that one has to be aware that the implementation of fiscal tightening may not diminish the current account deficit. Indeed, our overall evidence, although pointing in some cases to a twin-deficits relationship, depicts a low estimated magnitude for such cointegration relationship.

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