Current Accounts in the Eurozone Countries: The Role of Euro, Fiscal Policies and Financial Developments

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Abstract

Should we blame the euro for widening of current account deficits in the EMU? In this paper, we employ time-specific fixed effect estimator to study determinants of the current account deficits of the EU countries before and after adoption of the euro. Our aim is to assess to what extent the increased current account deficits could be attributed to the single currency and to the role of other variables, especially fiscal policy and developments of financial sector. We show that euro had negative effect on current account balances of southern countries. Moreover, we provide evidence that the role of fiscal policy in current account dynamics changed with euro adoption and twin deficits emerged in many countries. Finally, we document significant role of growing credits to private sector for built-up of persistent current account deficits, hence the negative effects of excessive lending on external balance should be addressed by the regulators and policy makers in the future.

Keywords: current account, euro, fiscal balance, financial system
JEL codes: E42, E62, F14

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1 Introduction

The Great Recession revived the debate about appropriateness of the euro for all countries within the eurozone when asymmetric macroeconomic effects appear. The lively debate surrounds the current account deficits and long-term shifts in competitiveness in the monetary union. These issues put into question the long-term sustainability of the eurozone and persistent intra-european imbalances pose a serious challenge for the policy makers. Strikingly, it is not clear whether an improvement in macroeconomic policies could make the eurozone more resistant to asymmetric shocks. The basic question is whether the euro itself can be blamed for widening current account imbalances or there are other important determinants along with the single currency.

Answering this question seems to be essential for the debate as it could bring insights into the nature of the problem the eurozone is facing. In fact, if the euro currency as such had been responsible for larger imbalances (particularly deficits), it would be rather difficult to ensure the continuation of euro in the current eurozone as a whole and for the countries with the largest deficits it might be desirable to leave the eurozone and to adjust via depreciation of their currencies. If on the other hand there had been other important determinants of current account imbalances, e.g. fiscal policy, then single currency might be sustainable in all current eurozone members and the countries with larger current account imbalances should focus on improving the economic policies and competitiveness.

Interestingly, the perception of current account (CA) deficits evolved dramatically over time and originally, larger current account deficits in the EU periphery were supposed to signal positive changes in competitiveness of those countries in the future. The arguments were based on inter-temporal approach to current accounts stating that deficits in less developed countries may be seen as a sign of consumption smoothing alleviated by increasing international goods and capital flows (the Lawson Doctrine). Blanchard & Giavazzi (2002) provide evidence from early years of eurozone confirming a view that current account deficits could be one of the benefits of monetary union.

On the other hand, exchange rate is a tool enabling (certain type of) automatic rebalancing of labor productivity differences as well as cushion for unex-

pected shocks hitting the economy. Its absence can be compensated by other measures (such as internal deflation); however they are more painful and difficult to design. Empirical research targeting interplay of current account and real exchange rates comprises for example Belke & Dreger (2011), claiming that current account deficits in eurozone are better explained by real exchange rate changes than by inter-temporal consumption smoothing. Another example is Arghyrou & Chortareas (2008) confirming the role of real exchange rate in CA dynamics in Europe. Moreover, nominal exchange rate volatility is an indicator of international capital market's trust and can be reflected in the costs of borrowing therefore imposing certain borrowing constraint on the economy. Abolition of nominal exchange rate can thus lead to overly dispersed current account positions and pose a threat.

In this paper, we address role of the euro adoption in the emergence of large current account deficits in the South and surpluses in the North (in particular in Germany) prior the Great Recession empirically. We examine current account balances of EU members in order to empirically estimate the effect of euro on them within context of other eventually relevant determinants with focus on longer-term dynamics. Determinants stem from the theory of intertemporal approach, which determines the set of variables, such as national productivity or demographic structure of population whose interaction is responsible for evolution of current account balances. These determinants have been repeatedly tested and found significant (see for example Chinn & Prasad (2000) as the early attempt that deals with this issue or Barnes *et al.* (2010) for more recent work). We then add dummy variables to control for the effect of eurozone membership.

This approach helps us to eliminate other effects and target solely the effect of euro and allows us to capture eventual heterogeneity of responses of different types of the EU economies. If we find that the responses differ across groups of economies we can confirm significant role of euro in built-up of current account deficits in a group of south countries and surpluses in the core EU countries. However, the opposite results would lead to rejection of such hypothesis and shield euro from being blamed for (unsustainable) current account dynamics in the last years.

Our approach is somewhat comparable to the analysis by Jaumotte & Sod-

sriwiboon (2010), who investigated determinants of current account imbalances on global sample with special treatment on eurozone members. Their results confirm negative effect of euro on current account balances in eurozone vis a vis the global sample without significant difference in coefficient estimates for the southern periphery and core countries.

Furthermore, we focus explicitly on the interplay between fiscal policy and current account deficits after the euro adoption. The importance of fiscal policy stance in the dynamics of current accounts increases rapidly in monetary union and so far, no consensus about the link between fiscal policy and current account balances emerged. Since there is certain evidence, e.g. Beetsma *et al.* (2008), suggesting that twin deficit hypothesis holds in the European Union, confirmation of this fact might lead to enhancement of economic policies so that they can properly target the problem of CA deficits (or take into consideration side effects on current accounts when designing measures oriented towards other goals). As far as we know, there is no other paper examining the effect of single currency on relationship of fiscal and current accounts.

An alternative hypothesis often forwarded in most recent papers stresses the role of financial system (Constâncio 2014). Opposite to the view that the crisis reflects fiscal indiscipline, shared mainly by economists and policy makers from Germany, this approach insists that the core problem was excessive lending not limited to public sector but available also for private players. We therefore include private credit to GDP ratio to our regression to capture the effect of private indebtedness.

We employ time-specific fixed effect estimator with robust standard errors. Static model was chosen due to danger of misleading estimates based on assumption of their homogeneity which is present in dynamic models (Pesaran & Smith 1995). Instead, 3-years non-overlapping averages were used to overcome problems with time dependencies in CA balances. This approach has been widely used in quantitative research regarding medium- (and long-) term determinants of CA balances (Ca' Zorzi *et al.* 2009).

The dataset comprises data from years 1977- 2012. Observations from past periods allow us to capture patterns of current account dynamics of EU members irrespective on their membership in eurozone. Since we focus on the

period of built-up of CA imbalances, our baseline estimation is performed on the sample ending in 2009. The period after 2009 is characterized by unwinding balances and exceptional policy measures such as intra-European fiscal transfers, increasing TARGET imbalances, restrictive fiscal and unprecedented expansionary monetary policy, therefore not a part of built-up process.[1]

Our results suggest that there is certain negative effect of euro on current account imbalances in southern eurozone, whereas the effect is insignificant for other countries using euro. Even though the euro adoption seems to have the same, negative effect in all groups of countries, only in case of the southern periphery the effect is significant. Regarding the role of fiscal policy on CA balances, we provide an evidence of higher sensitivity of current account balances to fiscal policy stance after adoption of euro pointing to the importance of twin deficits nature of imbalances in the eurozone. Among the set of other determinants of CA imbalances the relative income and availability of credit to private sector were most significant suggesting that the built-up of imbalances in countries with relatively lower income would not have been possible without large financial market integration and capital inflows. In this respect, our results support the hypotheses that excessive lending belongs to the main causes of current account imbalances in the EU and that the risk of excessive lending in some countries of the eurozone should be addressed by the regulatory framework and macroprudential policy.

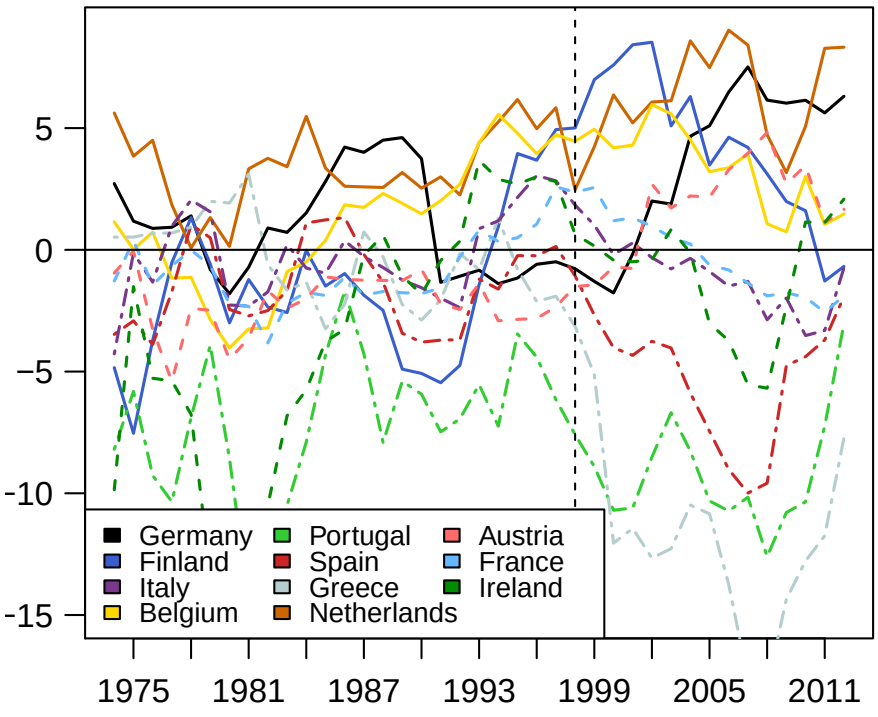
This paper is structured as follows: Section two presents the main facts about the recent developments of current account balances in the EU and the third section presents literature review. In the next section description of methodology and data is provided. Section 5 presents the results, implications for economic policy and section 6 robustness checks. The final section concludes.

[1]The results for the full sample are provided as a useful robustness check.

2 Current accounts in the EU member states

The dynamics of current accounts in the EU member states had followed relatively similar pattern up to the early 2000's (see Figure 1). They evolved quite close to balanced positions, there was one exclusive creditor (Netherlands) and no exclusive debtors. After the introduction of common currency (dotted vertical line), some changes became evident. Persistence of deficits and surpluses increased and the differences between certain groups of countries widened. Germany, Austria and Belgium became net the creditors, on the other hand, countries of southern periphery - Greece, Portugal, Spain and Italy experienced massive, long-lasting deterioration of current account balances of relatively large magnitudes.

Figure 1: CA balances as share of GDP



However, it is not possible to argue that such dispersion of the current accounts dynamics was a consequence of common currency due to a risk of *post hoc ergo propter hoc* kind of mistake. First, there might be other influential factors in play and second, current account imbalances widened also in non-euro countries such as Denmark, Sweden and United Kingdom. Also around 2008, the imbalances were reduced on both sides most probably due to global financial crisis (Atoyan *et al.* 2013). Estimates of standard deviations of CA

balances of the EU member states complement previous findings (Figure 2). Relatively modest dispersion can be observed in the decade preceding euro adoption with the differences amongst eurozone skyrocketing afterwards. The dispersion peaked around 2007 and reversed after again as a consequence of global financial crisis. Interestingly, the fiscal policy stance evolved in line with the current account balances. Figure 3a reports annual correlation of fiscal and CA balances for the founding eurozone members[2]. While in the 1970s and 1980s, the correlation between the two deficits was rather low, since the mid 1990's the fiscal and current account balances have become positively correlated. The positive long-term correlation suggest rising importance of twin deficit hypothesis for explanation of rising current account deficits. The pattern becomes a bit distorted in the last years however it still persists.

Figure 2: Standard deviations

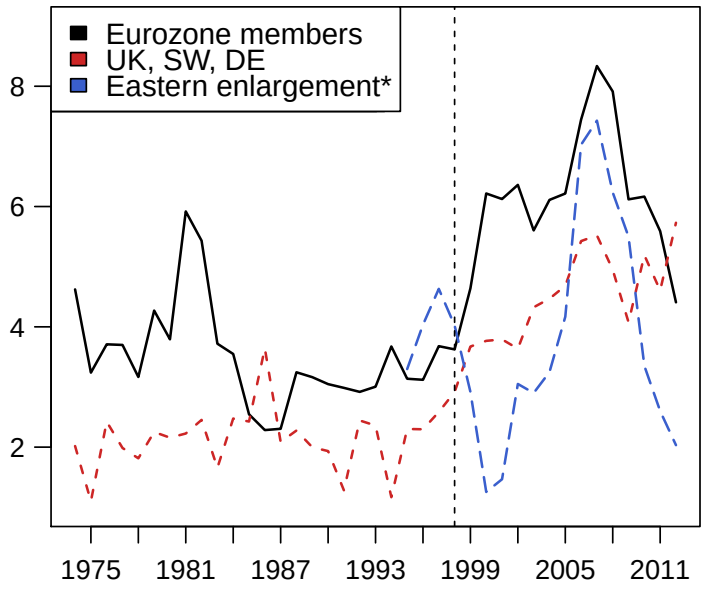


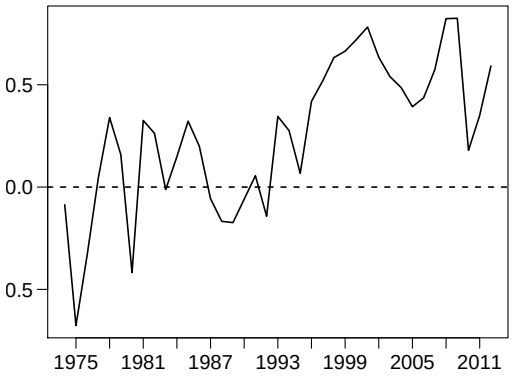
Figure 3b shows a scatter plot of fiscal balances and current account balances. Blue line represents the regression on observations since the euro adoption with a positive slope and significant slope (estimated coefficient is 0.55). The red lines connect the observations prior the euro adoption and countries outside the eurozone. In this case the correlation almost disappears (dashed red line) and becomes insignificant even when eventual influential observations

[2]These countries are Belgium, Germany, Ireland, Spain, France, Italy, the Netherlands, Austria, Greece, Portugal and Finland

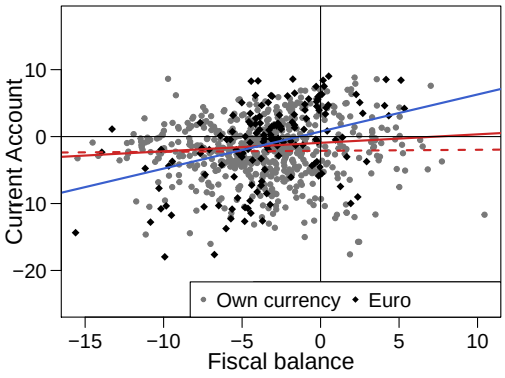
with very large current account deficits were excluded from the sample (solid red line)[3].

Figure 3: Fiscal and CA balances

(a) Correlation



(b) Scatter plot



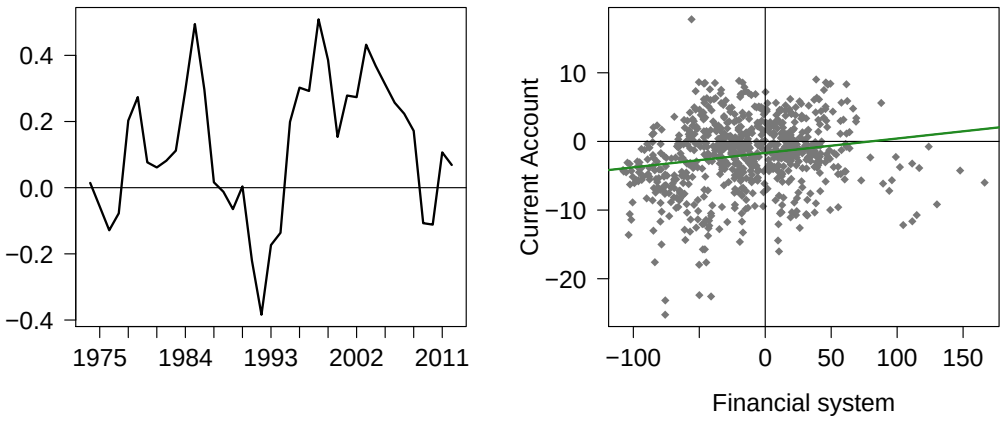
Correlation: Eurozone members - own calculation.
Scatter plot:
Blue line - observations from Eurozone, fiscal bal. significant
Dashed red line - observations outside Eurozone, fiscal bal. not significant
Solid red line - observations outside Eurozone (CA $< 10\%$), fiscal bal. significant

We constructed similar statistics for relationship of financial development approximated by private credit to GDP ratio[4] and current account balance. Figure (4a) shows that these two are generally positively correlated, however there are periods where correlation is close to zero or even negative. Contrary to figure 3a this plot does not reveal any significant change that could be attributed single currency. The second part (figure 4b) advocates importance of financial system. Estimate from simple OLS model is positive and highly significant (green line).

[3]Regressions were calculated using standard OLS method
[4]It is measured as deviation from European average.

Figure 4: Financial system and CA balances

(a) Correlation (b) Scatter plot



Correlation: EU members - own calculation.
Scatter plot:
Green line - observations from EU, financial system significant

Overall, presented evidence suggests that the dynamics of current account balances might have changed in times of euro adoption especially when considering changes in the relation with fiscal deficits. In the following sections we try to find out to what extend it can be attributed to the single currency and to what extend other variables, in particular financial system, are more important determinants of current account balances in the EU member states.

3 Literature review

The current literature on determinants of current account balances is based on intertemporal trade theory (Sachs *et al.* 1981; Obstfeld & Rogoff 1994). This theory sees current account balance as a consequence of choices of agents rationalizing their consumption (or savings) and investment with respect to expected lifetime income (expected net present value of investment, respectively). It is therefore driven by variables determining consumption choices. As a result of interplay of underlying determinants, current account deficits cannot be considered harmful without further examination of the causes. In fact, it can be one of the gains from international trade and given certain conditions, it can enhance the welfare both in deficit and surplus countries by firstly enabling consumers to smooth consumption and secondly providing more efficient allocation of capital resources by equalizing the marginal product of

capital internationally. The set of the main variables affecting inter-temporal choices comprises productivity (productivity shocks), demographic variables, initial stock of foreign assets, level of intermediation in financial sector, degree of economic openness, natural resources endowment and other variables - see for example Jaumotte & Sodsriwiboon (2010) or Barnes *et al.* (2010).[5] Variables commonly considered in the literature are included in our regression to distinguish the impact of euro adoption from other effects.

3.1 Current accounts in eurozone

Overall, the effect of common currency on current accounts is supposed to increase cross-border capital flows along with elimination of other barriers to trade. In the EU, the frictions are further reduced due to common legislative and supranational authorities accompanying the process of integration. Several authors analyzed to what extent financial markets reflex these factors. Lane (2008) offers survey of literature concluding that the euro reshaped financial markets and international investments significantly and that financial markets across the eurozone became highly integrated.[6] However, the advances in financial integration posed new challenges, namely increased risk of over-borrowing, overly deficit-financed consumption and investments in low productivity sectors leading to a steady loss of competitiveness and further deficits in countries importing capital and surpluses in countries exporting it.[7]

The existence of a link between the euro adoption and current account deficits especially in the south of the eurozone is documented by Jaumotte & Sodsriwiboon (2010). They claim that deficits in countries like Greece, Spain or Portugal were larger than can be explained by the fundamentals itself (and some variation across countries). The view that euro adoption lead to an increase of current account deficits in the South of the eurozone is further supported by Abiad *et al.* (2007), Herrmann & Winkler (2008) or Danniger & Jaumotte (2008) which identify financial integration as the main channel through which this effect appeared. The dynamics of the process is that as a consequence of

[5]The up-to-date research on inter-temporal trade theory is summarized in Table A.1 in Appendix A.

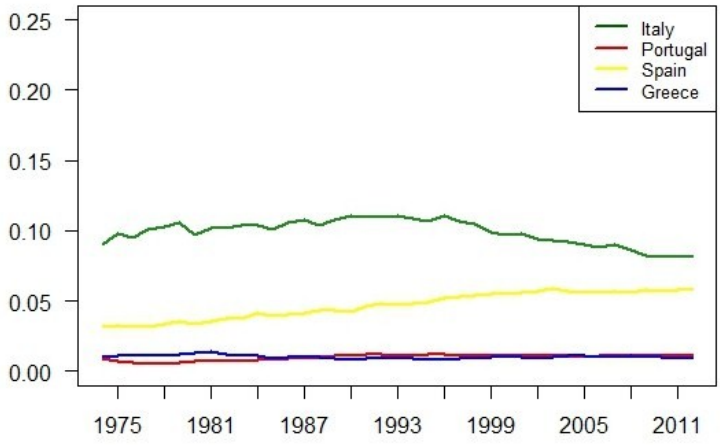
[6]This view is also supported by evolution of the Capital openness index in EU (Chinn & Ito 2008).

[7]Besides mentioned effect on current account dynamics, recent literature identifies risk of twin crisis (banking and public finances) originating from european financial integration (Pisani-Ferry 2013).

capital inflow the real exchange rates (reflecting the relative production costs) appreciated causing further deterioration of current accounts. This view is also supported by the empirical research that verified the significance of real exchange rates for development of the current account imbalances (see for example Arghyrou & Chortareas (2008); Berger & Nitsch (2010)). Belke & Dreger (2011) even add that current account deficits in eurozone are better explained by real exchange rate appreciation rather than by the hypothesis that deficit countries are continuously "catching up" the core countries. Moreover the view that capital inflows and insufficient regulation in eurozone allowed for persistent current account deficits gained a lot of popularity recently. The dominant role of developments of financial sector, deregulation and especially excessive lending in the european crisis are emphasized for example in Pisani-Ferry (2013) and Gibson *et al.* (2014).

Contrary, Schnabl & Wollmershäuser (2013) argue that the effect of real exchange rate is not very robust, depends on specification strongly and they see the main role of fiscal policy in built-up of current account imbalances. Figure (5) supports their view on role of real exchange rate. It shows shares of southern periphery economies on total exports of whole EU and rather contraditcs the theory of weakening price competitiveness due to common currency. Greece and Portugal keep the same levels over the whole period without any notable change in the last 15 years. Italian exports are decresing but the trend started already around 1995 and on the other hand Spanish exports show strong and constant growth.

Figure 5: Export shares of selected EU economies



Suggested effects of real exchange rate movements and capital flows impose doubts about optimality of longer-term deficits as implied by inter-temporal trade theory. Even though the intensity of these effects is still not clear, it needs to be taken into account in our regression. We therefore added real effective exchange rate index along with the determinants suggested by the intertemporal theory to our model.

3.2 Fiscal policy and current accounts in the eurozone

The narrative evidence shows that with euro adoption fiscal deficits followed similar pattern as the current account deficits and both became largely correlated. There are two main competing hypotheses in the literature regarding their relationship – the twin deficit hypothesis and Ricardian equivalence.[8]

First, the *Twin deficit hypothesis* predicts that pursuing fiscal deficits will eventually lead to worsening of external balance. The causality stems either from the Keynesian absorption theory, where budget deficit boosts domestic aggregate demand and therefore imports leading to deterioration of trade balance. Also, the twin deficits hypothesis arises in the Mundell-Fleming framework, under which the budget deficit induces increase in interest rates, further causing capital inflows and exchange rate appreciation and hence trade balance deterioration as well. Finally, the causality from of fiscal to current account balances stems from the Friedman's Permanent Income Hypothesis (Equation 1). It states that current accounts balances results from short- term deviations from trends of main economic variables. Substantial government spending (increase G_T) is said to induce deficits on current transactions.

$$CA_t = (Y_t - Y^*) - (G_t - G^*) - (I_t - I^*) \tag{1}$$

The *Barro-Ricardian equivalence hypothesis* (Barro 1974; 1989) postulates, that deficit-financed fiscal expansion will have no affect on national saving (and output) as households anticipate future tax increases inevitably linked with such policies and therefore reduce private consumption to offset expected tax burden. This hypothesis can be reinterpreted as absence of any re-

[8]Kalou & Paleologou (2011) also mention current account targeting hypothesis and bi-directional relationship between fiscal and current account deficits. The evidence for these relationships is however scarce and limited only to individual countries and time periods.

lationship between fiscal policy and current account.[9] Ricardian equivalence crucially depends on underlying assumptions such as perfect credit market, non-distortionary taxation, absence of uncertainty about future economic variables, and infinite planning horizon of economic agents.

Even though there is not any clear consensus about casual relationship, observed correlation supports twin deficit hypothesis. Moreover empirical research (see Table 1 summarizing results of some of the recent papers) confirms the twin deficit hypothesis as well.[10] Besides, Schnabl & Wollmershäuser (2013) even explain differences in current account positions (in loosened monetary environment) by divergences in fiscal policies. Similar conclusion regarding the role of fiscal policy was presented by Merler & Pisani-Ferry (2012).

Table 1: Estimates of effect of fiscal balance on current account

	estimate	sample	methodology
Bussière *et al.* (2005)	**0.07**	21 OECD countries	GLS
Beetsma *et al.* (2008)	**-0.83**[a]	14 EU countries	VAR
Abbas *et al.* (2010)	0.38	124 countries	contry-specific FE
Nickel & Vansteenkiste (2008)	(-0.11, **0.45)**[b]	22 industrial countries	dynamic panel threshold model
Schmitz & von Hagen (2011)	**0.08, 0.22**[c]	EU15	Feasible GLS, FE
Jaumotte & Sodsriwiboon (2010)	**0.204**	49 countries	OLS
Gehringer (2013)	**0.267**	20 EU member states	pooled OLS

bold typed values represent estimates significant for $\alpha = 10\%$
a - response (in %) to 1% incerase in government spending after 1 year, baseline specification
b - changes with levels of public indebtness (threshold) - the higher the debt the lwer the coefficient
c - dependent variable is intra European trade balance

[9]Ricardian equivalence deals specifically with link between public and private saving. The impact of fiscal policy on investment is beyond the scope of this paper. Besides it appeal with certain time delay therefore we can abstract from it in our analysis.

[10]See Ricciuti (2003) for survey oriented on validity of Ricardian equivalence (and twin deficit hypothesis). Then there is a pile of literature examining Ricardian equivalence from somewhat different point of view, for example Röhn (2010) reports private saving offset to fiscal policy changes of magnitude between 1/2 and 1/3. These studies can also be interpreted as proofs of partial Ricardian equivalence.

3.3 Role of Financial Sector

Cheung *et al.* (2010) show how are measures of financial deeping negatively associated with current account balances through relaxation of borrowing constraints. But on the other hand, a sound financial system can offer incentives to save more. Hence the coefficient is difficult to predict in this case. Even significance may be underestimated if it affects both investmet and savings in the same way. Opposite to results from global samples (Herrmann & Winkler 2008), financial sector in European Union seems to support consumption smoothing.[11] There is large and robust evidence for it including for example Herrmann & Winkler (2008), Danniger & Jaumotte (2008), Jaumotte & Sodsriwiboon (2010) or Polito & Wickens (2014). Later on, throughout 2013, the role of banking sector and the necessity to consider macroeconomic implications of regulatory activities entered mainstream policy discussions and finally lead to steps towars the banking union in the EU (Goyal *et al.* 2013).

Proposed evidence suggests that fiscal balance as well as European financial system might have significant effects on current accounts; therefore it is reasonable to add them as determinants to our regression. Validity of twin deficit hypothesis (positive significant estimate) of fiscal balance would have important consequences on identifying causes of current imbalances as well as designing measures to unwind them. On the other hand, insignificant estimates would support Barro-Ricardian equivalence and therefore no direct impact of fiscal policy stance on current account. Significant negative estimate of financial system would stress the role of financial system and provide arguments for discussions about its regulation.

4 Methodology and data

We proceed with panel regression. It is specified as follows:

$$ca_{it} = \alpha + X_{it}^{'}\beta + \gamma_1 F_{it} + \gamma_2 (D_{it} * F_{it}) + \gamma_3 D_{core,it} + \gamma_4 D_{south,it} + \gamma_5 D_{east,it} + \epsilon_{it} \quad (2)$$

[11] In European Union, financial market frictions and exchange rate risk are substantially reduced due to common legislative and supranational authorities accompanying the process of integration. The extent to which it influences financial markets has been analyzed by a number of authors. Lane (2008) offers survey of their results validating the view of highly integrated European financial markets.

where ca_{it} is current account balance, α is a scalar and β is a vector of coefficients of order Kx1. i denotes cross-sections and t time periods. X is a matrix of explanatory variables containing current account determinants derived from inter-temporal trade theory[12] and real effective exchange rate. Fiscal balance is expressed by variable F and we also include a cross-product of dummy variable D_{it} and fiscal balance. D_{it} has value 1 if country was part of eurozone in given year and 0 otherwise. This variable allows us to capture a possibility of change in the relationship between fiscal and current account balances in eurozone.

Finally, three additional variables were added to separate the effect of eurozone membership into different groups: south, core and east (see Table 2 for the division of countries into specific groups).[13] We also include new EU member states into our analysis. Even though most of the countries entering EU in 2004 or 2007 did not adopt euro yet, these countries serve as a control sample to separate the effects of other variables from the effect of the euro itself. Also so-called statistical effect of eastern enlargement might have altered capital flows within EU and eurozone which is another reason for including them into regression.

[12]Choice of determinants was based on information criteria, adjusted R^2 and significance in regressions

[13]Preliminary evidence revealed that differences in current account dynamics may divide countries of eurozone into members of southern periphery experiencing massive deterioration and group of core countries keeping the levels at surplus or at more or less balanced positions. The causes can be traced to initial income per capita levels, different accompanying policies and increasing volumes of intra-eurozone capital flow leading from more developed to less developed countries (from core to south and east). Therefore surpluses in more developed and deficits in less developed countries are naturally created. This divergence must be taken into account in our regression.

Table 2: Distribution of Eurozone countries to subgroups

Country	*south*	*core*	*east*
Austria		1999	
Belgium		1999	
Finland		1999	
France		1999	
Germany		1999	
Greece	2001		
Ireland		1999	
Italy	1999		
Netherlands		1999	
Portugal	1999		
Spain	1999		
Cyprus			2008
Malta			2008
Slovakia			2009

Years in the table refer to years when individual countries started to use euro. Countries using their own currencies are excluded.

We employ the estimator by Pesaran & Smith (1995) that marries benefits of dynamic approaches and it still allows for heterogeneity of coefficients across groups of countries. We use 3-year non-overlapping averages (even though 4 to 5-year averages are common in literature), to be able to get enough observations even for relatively young post-communist countries.[14] The group-specific fixed effects (in the form of dummies) are preferred over country specific fixed effects that could wipe out much of the influence of individual-specific factors and might significantly affect estimates of membership in monetary union, which is of our primary concern. Additionally, the LM test suggests presence of time-fixed effects, (see Table A.2). Therefore time-specific fixed effect estimator with heteroskedasticity-robust standard errors was used. [15]

[14]Using non-overlapping averages is common for majority of papers dealing with determinants of CA balances because besides correcting for inconsistency of estimates it also provides solution to concerns about quality of the data - see for example Chinn & Prasad (2000). Further discussion about advantages and drawbacks of different approaches is presented in Ca' Zorzi *et al.* (2009).

[15]Covariance matrix as proposed by Arellano (1987) allowing for fully general structure with respect to heteroskedasticity and cross-sectional correlation.

4.1 Data

The dataset contains data from all members of European Union except Luxembourg, Estonia, Litva, Lithuania, Slovenia and Croatia[16] giving us total of 22 countries. The time sample depends on data availability and is country specific. For most countries, the first observations are from 1977, for Germany, Portugal and Greece the sample starts in 1980 and for the post-communist countries the first observations are from the 1990's. In total, we utilize unbalanced panel with 177 observations.

The main data sources are World Bank's World Development Indicators (WDI) and European Commision's Annual Macroeconomic Database (AMECO). Current account balance as a percent of GDP originates in AMECO database. The net foreign assests measure comes from database created by Lane & Milesi-Ferretti (2006) that was updated to year 2011. Productivity measure – output gap comes from AMECO. Relative income is calculated as the deviations from the EU14 (i.e. EU15 less Luxembourg) average of PPP GDP per capita (WDI and OECD Economic Outlook).

The demographic variables comprise young and old dependency ratios[17] (WDI), and projection of the old dependency ratio 30 years ahead (referred as the Projected old dependency).The projected old dependency ratio is calculated from the population projections by Eurostat and interpolated to annual data from 5 year periods. Deviations from the EU26 averages are used for calculations.

Financial system development is represented by domestic credit to private sector as a share of GDP (WDI, deviations from EU14 averages are used). Fiscal balance reports the fiscal balance to GDP ratio denoting fiscal deficits with negative signs and fiscal surpluses with positive signs. The data are derived from AMECO; few missing values were added from OECD Economic Outlook and IMF WEO. It reports the fiscal balance to GDP ratio denoting fiscal deficits with negative signs and fiscal surpluses with positive signs. Finally, the trade openness is a sum of country's export and imports as a share of GDP and the fuel balance (calculated from fuel exports and imports, % of

[16]Omitted because of data availability and in the case of Luxembourg also special structure of the economy

[17]Dependency ratios represent the ratios of dependent population to working population

GDP, WDI) is included to account for natural resources endowment. More details are provided in Table A.3 in appendix.

5 Results

The decline in current accounts in many countries of the eurozone coincided with introduction of the euro, however the regression analysis shows that there are also other important determinants, often more significant than the euro adoption itself (Table 3).[18] The set of significant variables comprise relative income (+), output gap (-), predicted old dependency (+) and, importantly, we provide evidence of the negative effect of the financial system development on current accounts.

The effect of euro adoption is slightly significant (at 10%) in the southern euro area countries, for other groups of countries the effect has been insignificant. The insignificant estimates of the dummy variables representing euro adoption in the other groups point most likely to heterogeneity of the nature of CA balances within each group itself. In this respect, our results are in line with Jaumotte & Sodsriwiboon (2010) and others claiming significant role of common currency in the built-up process of current account imbalances in the southern countries.

Additionally, our results indicate that the effect of euro has been weak in other groups of eurozone countries, with some tendency to the same, negative direction, as in the southern part. Hence, we may conclude that our results provide evidence that the deterioration of current account balances in the southern countries might have been caused by euro adoption, however, we do not find any sizeable positive effect of euro adoption in other groups that would justify the claims that euro might have caused divergence of current accounts.

With respect to fiscal policy, we confirm the positive correlation between fiscal balances and current accounts, although this relationship is much stronger after euro adoption than before (as seen from significance of variable D_{fiscal}). Hence, the evidence of twin deficits in the eurozone pointed out already in

[18] We report results from regression without eurozone dummies as well to verify that adding these dummies did not notably alter estimates of other determinants.

Table 3: Determinants of CA

	Fixed-effects	
Net foreign assets	0.034 *	0.022
	(0.019)	(0.017)
Relative income	0.518 ***	0.543 ***
	(0.109)	(0.103)
Output gap	-0.484 ***	-0.537 ***
	(0.136)	(0.135)
Real effective exch. rate	-0.023	-0.028
	(0.040)	(0.036)
Young dep. ratio	0.162 *	0.134
	(0.088)	(0.091)
Old dep. ratio	-0.120	0.001
	(0.172)	(0.137)
Predicted old dependency	0.236 *	0.265 **
	(0.120)	(0.110)
Financial system	-0.041 ***	-0.032 ***
	(0.011)	(0.009)
Fiscal balance	0.229 *	0.088
	(0.083)	(0.078)
Trade openness	0.011	0.007
	(0.013)	(0.013)
Fuel balance	0.126	0.073
	(0.243)	(0.245)
European union	-0.169	0.004
	(0.885)	(0.912)
D_{core}		-0.773
		(1.615)
D_{south}		-3.063 *
		(1.613)
D_{east}		-6.326
		(5.723)
D_{fiscal}		0.653 ***
		(0.233)
Adjusted R^2	0.493	0.544

***, ** and * represent coefficient significant on 1%, 5% and 10% α levels, respectively
standard errors are in parentheses

section 2 (Figure 4) is fairly robust even after other determinants of current account balances are included in regressions. Fiscal policy is therefore important determinant of current accounts and negative fiscal balances that we could have witnessed in the years preceding crisis were one of the driving factors as well.

The existence of twin deficits can be considered as evidence of reduced validity of Ricardian equivalence in monetary union and it supports certain concerns about validity of national inter-temporal budget constraints when exchange rate movements are absent.

Interestingly, we find that the effect of real effective exchange rate on current account is insignificant and hardly distinguishable from zero, so one of the usual suspects can be sorted out. We believe that this result can be interpreted as a support for views approaching to real exchange rate appreciation prior the eurozone debt crisis as a consequence of capital inflows rather than being cause of the CA imbalances by itself, a view presented for example in Schnabl & Wollmershäuser (2013) and Gabrisch & Staehr (2012). Moreover significant and robust role of output gap supports concerns of balance of payment crisis within eurozone in case of asymmetric shocks and corroborates necessity of policies enhancing optimum currency area characteristics.

Overall, we can derive three main policy implications from the results. First, to some extent, the evolution of current account balances in the southern eurozone was caused by the euro adoption and the dynamics was different from the rest of the eurozone or the EU members.

Secondly, the results support the hypothesis of twin deficits in the eurozone as the current account balances become more increasingly sensitive on public finance developments, suggesting that excessive and unwished development could have been related to loosened fiscal policy as well.

Finally, persistent deficits were allowed due to financial sector developments that allowed strong credit expansion leading to over-borrowing and excessive lending. In this respect, our results provide support for creation of the Banking union and extension of the regulatory framework, since without the credit expansion, persistent current account imbalances would have been hardly allowed

(see Pisani-Ferry (2013); Gibson *et al.* (2014); Constâncio (2014), for similar argumentation on the role of banking sector in persistent imbalances in the EU).

6 Robustness check

We performed a battery of sensitivity checks to see whether the main results are not subject to change with minor changes in specification.

6.1 Endogeneity concerns

First, we investigated, whether our results are not subject of endogenity bias. Endogeneity might arise due to the fact that fiscal balance could contemporaneously react to CA balances, therefore an eventual bi-directional relationship might exist. To check whether our estimates were not affected by such interference, we re-estimated the model using instrumental variable (IV) estimator. The most common instrument used in literature is lagged value of variable under scrutiny. It is however not plausible here because of effects on investment that fiscal policy exerts.[19] Alternative proposal comes from Cheung *et al.* (2010) who proxy fiscal balances by government effectiveness index issued by World Bank.[20] The index ranges from -2.5 (poor performance) to 2.5 (excellent performance). We opted for this approach despite the need to restrict the sample due to the fact that the first observations of the index come from 1996. The main results are listed in Table 4, full results are available in Table B.1 in Appendix B.

The qualitative results are unchanged; however, certain changes in magnitudes appear. The coefficients on eurozone dummies were largely magnified but this was partially offset by increase in standard error estimates. The signs are negative, but although their significance increased the impact is still the same on all subgroups. Note, that this regression revealed significant and negative effect of euro adoption also for the core countries.

[19]Under the assumption that expansionary fiscal policy is correlated with fiscal deficits. The time delay of fiscal policy measures is well documented phenomenon therefore using lagged fiscal balance as an instrument could bias the estimates by introducing link to investment which is not in the scope of our analysis.

[20]This index captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. It is composed from 17 indicators (Source: World Bank Worldwide governance indicators).

Table 4: Regression with instrumental variable

	estimate	std. error	p-value
D_{Core}	-13.027	(6.084)	**
D_{South}	-12.416	(4.555)	***
D_{East}	-4.084	(7.757)	
IV†	0.052	(1.761)	
D_{IV}†	6.020	(3.096)	*

† - Instrumental variable - government effectiveness index
Number of observations = 82
Time-specific fixed effects estimator with heteroskedasticity robust standard errors clustered with respect to individual countries was used.

6.2 Influential observations

We dropped all the observations of CA balances that exceeded the threshold of -10% of GDP to study the impact of influential observations.
These estimates reveal that influential observations had only minor effect on our original conclusions and support the importance of the twin deficits hypothesis. Again, the dummies for core and south euro area countries are of the same, negative direction in both subgroups (the effect being more significant in the south). On the other hand, both fiscal balance and financial sector developments remained significant and both signs and magnitudes consistent with the baseline results. Hence, the hypothesis of twin deficits allowed by financial sector developments has been confirmed even when influential observations have been eliminated. The detailed results are presented in Table B.2 in the appendix.
Similarly, we reestimated the model without observations from the southern eurozone countries (Table B.3). The twin deficit problem is somewhat relaxed, although still significant at 10% level after euro adoption and the impact of the developments of financial sector remains significant and negative.

6.3 Impact of Great Recession

We further extended our time sample with most recent data from years 2010-2012. This period is characteristic of unwinding of current account imbalances (Atoyan *et al.* 2013) and unprecedented policy measures (strong expansionary monetary policy, international fiscal transfers, and fiscal austerity). Examining data from the period of rebalancing allows us to evaluate effectiveness of policy

tools that could be used to fight already unbalanced positions. The results show that only a little has changed after the crisis (Table B.4).

Importance of fiscal policy as a determinant decreased which substantially lowers importance of fiscal policies in targeting current account dynamics. This result might serve as evidence that public finances austerity might not be helpful in correcting current account imbalances even though previous results confirmed that they are one of the causes of such development. On the other hand, D_{south} is still significant; supporting view that euro might still hinder rebalancing process in southern periphery.

However significance of other variables needs to be taken into consideration before deriving conclusions. The most robust variables in the whole regressions are relative income level and output gap. Therefore economic reforms targeting productivity and economic growth could be concerned as alternative (and preferable) tools for targeting imbalances of current accounts. Also, the contribution of financial system developments (measured by share of credit to private sector on GDP) to current account imbalances remains significantly negative.

7 Conclusion

In this paper we have examined the effect of euro on current account balances of the eurozone members prior the Great Recession using time-specific fixed effect panel regression on determinants of current account balances. Eurozone members have been divided into three groups (core, south and east) and different effect for each group was allowed to check whether the effect of common currency has been similar in all countries or diverse.

We have found that to some extent, the introduction of euro contributed to built-up process of external imbalances in southern eurozone members. Furthermore, we have investigated the interplay between the current account deficits and fiscal deficits to verify eventual changes in their relationship that could be attributed to single currency. We have documented substantial shift in the role of fiscal policy after the euro adoption and our results imply stronger link between current account deficits and fiscal deficits in monetary union, hence the twin deficits phenomenon. Additionally, we have proven that the current account deficits were driven also by developments of financial sector, in particular, increased private credit. This finding implies that financial sector regulation could be considered as an instrument treating also the external balances.

The results with an extended sample covering the period following the Great Recession characterized by fiscal austerity have shown that twin deficits are a matter of coincidence but not causal relationship. With fiscal consolidation effort the link between fiscal and current account balances decreased. Rather macroprudential policy and banking regulation on the European level could contribute to gradual elimination of current account imbalances.

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Appendix

A Additional tables

Table A.1: Medium-term determinants of current account

	Chinn & Prasad (2000)	Gruber & Kamin (2005)	Chinn & Ito (2005)	Cheung *et al.* (2010)	Barnes *et al.* (2010)	J&S (2010)[a]
Net foreign assets	+	+	+	+	+	+
Fiscal balance	+	+	+	+	+	+
Rel. income	+	+	+	**mixed**	+	+
Demography	−	−	−	−	−	−
Openness	−	+	+	+	+	excluded
Oil balance	+	excluded	+	+	excluded	+
Fin. sector	+	excluded	−	−	+	−
Productivity	mixed	−	+	mixed	+	−
Sample countries	99	61	117	94	25	49
Sample years	71-95	82-03	71-03	73-08	69-08	73-08

bold typed signs stand for coefficients with significance at least 10%
a = Jaumotte & Sodsriwiboon (2010)

Table A.2: Tests for time-specific fixed effects

test	Honda	Breush-Pagan
p-value	$3.045e-10$	$3.045e-10$

Table A.3: Data sources

variable	code	source
Balance on current trans. with the rest of the world	UBCA	AMECO
Gross domestic product at current market prices	UVGD	AMECO
Net foreign assets	-	LM-F‡
GDP at 2005 market prices per head of population	RVGDP	AMECO
GDP per capita, PPP (constant 2005 international $)	NY.GDP.PCAP.PP.KD	WDI
Gap between actual and potential GDP at 2005 market prices	AVGDGP	AMECO
Real effective exchange rate index (2005 =100)	PX.REX.REER	WDI
Population growth (annual %)	SP.POP.GROW	WDI
Age dependency ratio, young (% of working age population)	SP.POP.DPND.YG	WDI
Age dependency ratio, old (% of working age population)	SP.POP.DPND.OL	WDI
1st January population by sex and 5-year age gropus	proj_10c2150p	Eurostat
Domestic credit to private sector (% of GDP)	FS.AST.PRVT.GD.ZS	WDI
Net lending or net borrowing: general government	UBLG	AMECO†
Imports of goods and services at current prices	UMGS	AMECO
Exports of goods and services at current prices	UXGS	AMECO
Merchandise exports (current US$)	TX.VAL.MRCH.CD.WT	WDI
Fuel exports (% of merchandise exports)	TX.VAL.FUEL.ZS.UN	WDI
Merchandise imports (current US$)	TM.VAL.MRCH.CD.WT	WDI
Fuel imports (% of merchandise imports)	TM.VAL.FUEL.ZS.UN	WDI
GDP (current US$)	NY.GDP.MKTP.CD	WDI

† - missing values for Greece were added from IMF *World Economic Outlook*, missing values for Austria, Finland and Italy from OECD *Economic Outlook*
‡ - Lane & Milesi-Ferretti (2006)

Table A.4: European Union members

date of entry	**European Union**	**Eurozone**
Founding members		
Belgium	25. 3. 1957	1. 1. 1999
France	25. 3. 1957	1. 1. 1999
Germany	25. 3. 1957	1. 1. 1999
Italy	25. 3. 1957	1. 1. 1999
Netherlands	25. 3. 1957	1. 1. 1999
First enlargement		
Denmark	1. 1. 1973	-
Ireland	1. 1. 1973	1. 1. 1999
United Kingdom	1. 1. 1973	-
Mediterranean enlargement		
Greece	1. 1. 1981	1. 1. 2001
Portugal	1. 1. 1986	1. 1. 1999
Spain	1. 1. 1986	1. 1. 1999
Scandinavian enlargement		
Austria	1. 1. 1995	1. 1. 1999
Finland	1. 1. 1995	1. 1. 1999
Sweden	1. 1. 1995	-
Eastern enlargement		
Bulgaria	1. 1. 2007	-
Cyprus	1. 5. 2004	1. 1. 2008
Czech republic	1. 5. 2004	-
Estonia	1. 5. 2004	1. 1. 2011
Hungary	1. 5. 2004	-
Latvia	1. 5. 2004	-
Lithuania	1. 5. 2004	-
Malta	1. 5. 2004	1. 1. 2008
Slovakia	1. 5. 2004	1. 1. 2009
Slovenia	1. 5. 2004	1. 1. 2007
Poland	1. 5. 2004	-
Romania	1. 1. 2007	-

Luxembourg was omitted because of data availability and special structure of its economy causing it to be an outlier in international trade statistics

B Full results

Table B.1: Regression with instrumental variable

	estimate	std. error	significance
Net foreign assets	0.003	(0.018)	
Relative income	0.701	(0.161)	***
Output gap	-0.349	(0.167)	**
Real effective exch. rate	-0.109	(0.088)	
Young dep. ratio	0.308	(0.212)	
Old dep. ratio	0.059	(0.210)	
Predicted old dependency	0.329	(0.148)	**
Financial system	-0.045	(0.012)	***
Instrumental variable†	0.052	(1.761)	
Trade openness	-0.015	(0.017)	
Fuel Balance	0.024	(0.230)	
EU membership	-3.039	(1.675)	*
D_{Core}	-13.027	(6.084)	**
D_{South}	-12.416	(4.555)	***
D_{East}	-4.084	(7.757)	
$D_{IV}{}^{\dagger}$	6.020	(3.096)	*
number of obs.	82		
Adj. R^2	0.573		

† - Government effectiveness index

Table B.2: Regression without observations where CA $> -10\%$

	estimate	std. error	significance
Net foreign assets	0.014	(0.010)	
Relative income	0.465	(0.072)	***
Output gap	-0.346	(0.134)	**
Real effective exch. rate	-0.027	(0.024)	
Young dep. ratio	0.264	(0.067)	***
Old dep. ratio	0.071	(0.087)	
Predicted old dependency	0.310	(0.074)	***
Financial system	-0.029	(0.008)	**
Fiscal balance	0.191	(0.072)	**
Trade openness	0.002	(0.009)	
Fuel Balance	-0.283	(0.154)	
EU membership	0.509	(0.630)	
D_{Core}	-1.780	(1.032)	
D_{South}	-3.639	(1.280)	***
D_{East}	-10.168	(8.113)	**
D_{Fiscal}	0.313	(0.214)	*
number of obs.	168		
Adj. R^2	0.534		

Table B.3: Regression without observations from south countries

	estimate	std. error	significance
Net foreign assets	0.010	(0.019)	
Relative income	0.422	(0.124)	***
Output gap	-0.473	(0.134)	***
Real effective exch. rate	-0.042	(0.037)	
Young dep. ratio	0.099	(0.097)	
Old dep. ratio	0.033	(0.165)	
Predicted old dependency	0.249	(0.115)	**
Financial system	-0.028	(0.011)	***
Fiscal balance	0.126	(0.093)	
Trade openness	0.006	(0.015)	
Fuel Balance	-0.024	(0.273)	
EU membership	0.001	(0.990)	
D_{Core}	-0.6001	(1.615)	
D_{South}	-	-	-
D_{East}	-5.173	(6.531)	
D_{Fiscal}	0.398	(0.037)	**
number of obs.	134		
Adj. R^2	0.472		

Table B.4: Regression with data from 2010 - 2012

	estimate	std. error	significance
Net foreign assets	0.000	(0.014)	
Relative income	0.496	(0.109)	***
Output gap	-0.428	(0.144)	***
Real effective exch. rate	-0.032	(0.035)	
Young dep. ratio	0.070	(0.089)	
Old dep. ratio	-0.000	(0.129)	
Predicted old dependency	0.268	(0.098)	***
Financial system	-0.021	(0.010)	**
Fiscal balance	0.121	(0.080)	
Trade openness	0.015	(0.012)	
Fuel Balance	0.057	(0.205)	
EU membership	0.282	(0.788)	
D_{Core}	-0.429	(1.838)	
D_{South}	-4.683	(2.050)	**
D_{East}	1.475	(1.758)	
D_{Fiscal}	0.337	(0.280)	
number of obs.	195		
Adj. R^2	0.527		