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Abstract

Since the creation of the euro area significant interest rate spreads have arisen between euro area countries, both for public and private debt. We check whether these spreads could be made to work towards the goal of providing more stability to the euro area. In particular we focus on reducing the imbalances that arose between the core and peripheral members of the euro area in the first decade of its existence. The idea is that stable positive spreads in peripheral countries could have decreased domestic demand, preventing the boom-bust cycles that plagued these economies. They could also prevent such developments in the future. We find that spreads on real interest rates of 0.6 to 5.5 percentage points would have been necessary to stabilize external positions of the four peripheral euro area member countries.

JEL: E32, E43, E52,

Keywords: Euro area, imbalances, current account, panel estimation

1 Introduction

Over the first decade of its existence the euro area witnessed deep imbalances between its core and peripheral members. One of the most important reasons behind their build-up were (approximately) equal nominal interest rates across the common currency area. According to several studies these rates were too low for some members and too high for others (Honohan and Leddin, 2006; Blanchard, 2007; in't Veld et al., 2012; Brzoza-Brzezina et al., 2014). Inflation differentials aggravated the problem since inflation rates in peripheral countries tended to be relatively high, bringing real rates to even lower levels (ECB, 2003; Zdarek and Aldasoro, 2009). As a result, several peripheral economies of the euro area faced boom-bust cycles[1]. Rapid growth of internal demand, driven by mild financing conditions, boosted somewhat domestic output but the bulk of additional demand was supplied from abroad. At the same time domestic inflation picked up and started to exceed that of core euro area countries. As a result of high demand and lost competitiveness, current account deficits swelled. Figure 1 shows a synthetic picture of these developments, plotting the change of real interest rates before and after 1999 against the current account balance after 1999 for 11 euro area countries. Those countries where real interest rates declined the most whitnessed highest current account deficits.

Things changed when the financial crisis broke out. Interest rates started to diverge. Risk premia in highly indebted countries contributed to higher spreads on sovereign debt and bank loans to the private sector (see Figures 2 and 3). Domestic demand in peripheral economies collapsed and current account deficits narrowed sharply (for instance the unweighted average CA/GDP ratio for Greece, Ireland, Portugal and Spain increased from -10.0% in 2007 to -0.3% in 2012). Their external positions improved amid a deep recession, whose seeds were sawn during the preceeding boom.

These developments bring forward the idea that the interest rate spreads between euro area countries could be exploited in a way that brings more stability to the euro area. However, it should be made clear from the very beginning that we do not speak of variable spreads as they emerged recently. These proved to work in exactly the oposite way we

[1] As a matter of fact, the problem affected also (and sometimes even more) countries that addopted hard pegs against the euro, Estonia, Latvia and Lithuania (Kuodis and Ramanauskas, 2009; Brixiova et al., 2009).

propose. They increased in depressed, peripheral countries only after the outbreak of the crisis, making recovery even more difficult. This was recently deemed worrying by the ECB President. Mario Draghi rightly pointed out that this could impair the proper working of monetary transmission in the euro area (Draghi, 2012).

In contrast, we speak of stable spreads that could bring more stability to the euro area. If peripheral countries had faced higher average interest rates in the past, imbalances would not have been so dramatic and, as a result, the adjustment that these countries have been undergoing since 2009 could have been much less painful. Higher average interest rates for peripheral countries could also prevent macroeconomic imbalances from increasing again in the future. In contrast to the case when countercyclical spreads destabilize the economy, here we discuss equilibrium spreads, constant over time so that they do not interfere with monetary policy. The bottom line of this argument is that the idea of spreads between monetary union countries should possibly not be rejected completely. If financial markets provided relatively stable spreads of the right size (possibly with some educated guidance of the ECB), the gains for euro area stability could be substantial. Referring again to President Draghi (2013), he also pointed out that the ECB would not reduce those parts of sovereign bond yields that are "fundamentally justified". This is exactly what our paper is about, although we go one step further and postulate keeping "fundamentally justified" spreads on private borrowing as well. The policy conclusion from this paper would be that the ECB should not condemn and fight spreads accross the board but rather take into account their equilibrium level for various countries.

While interest rate spreads in a monetary union do not, at first, look like an attractive idea, one has to bear in mind three things. First, if the renewed rise of imbalances is to be prevented, some sort of break must be put on more spending-oriented parts of the euro area. If it is not spreads (higher price), it must be quantitative restrictions on capital inflows (e.g. limited credit supply). One has to consider what is less appealing in a monetary union. Second, whether one likes it or not, spreads are already there (as well as quantitative restrictions as a matter of fact). With some guidance they could possibly benefit the common currency. Lastly, despite the last reforms of macroprudential policy in the euro area in the wake of sovereign debt crisis, especially stronger enforcement of the limits on fiscal deficits, implementation of fiscal policy is still a competence of the Member States. The idea underlying this model (e.g. centralized monetary policy with independent fiscal policy) is still that the incentives for fiscal discipline should largely come from the financial markets that are able to distinguish and properly price country-specific risk (which nevertheless proved false in the first decade of the EMU).

The idea of using spreads to stabilize a heterogeneous monetary union is, to our knowledge, a new one. The closest thing in the literature in terms of concept and methodology is probably the estimation of equilibrium exchange rates. For instance in his fundamental equilibrium exchange rate concept Williamson (1994) calculates the theoretical real exchange rate that (i.a.) brings the CA balance to an exogenous target. We do the same for real interest rates.

We define equilibrium spreads as the difference between a country's real interest rate and the euro area average real interest rates that would, on average, keep its current account balance in equilibrium. Given the described developments, the current account balance seems to provide a relatively universal measure of a currency union member's overheating. To this end we estimate a panel data model and use it to calculate the elasticity of the current account balance with respect to the real interest rate. Next, we use the IMF's External Sustainability methodology to calculate equilibrium current account balances for individual euro area member states. Finally both results are used to calculate theoretical real interest rate spreads that would have bridged the gaps between current account balances and the norms for individual countries.

Our findings show that indeed interest rate spreads could have signifficantly lowered the gaps between current account balances and their equilibrium levels (norms). For the four peripheral countries we show that interest rate spreads against euro area average that would have closed the gaps between CA balances and their respective norms in the period 1999-2007 range from 5.5 percentage points in Portugal to 0.6 percentage points in Ireland.

The rest of the paper is structured as follows. Section 2 describes the methodology for calculating current account norms. Section 3 presents the data, Section 4 estimation methods and results. In Section 5 we calculate the theoretical equilibrium spreads. Section 6 concludes.

2 Current account norms

As already mentioned in the Introduction, we proceed in three steps. Firstly, we calculate reference levels (norms) for current account balances. Secondly, we estimate elasticity of the current account with respect to the real interest rate. Finaly, we calculate the interest rates that would have closed the gaps between current accounts and their reference levels. This chapter presents the first step.

The literature on calculating equilibrium/ reference/ norm levels for current account balances is vast. A substantial part of research has been conducted by the International Monetary Fund. Several methodologies were developed by its Coordinating Group on Exchange Rate Issues (CGER) in the 2000s (IMF, 2006; Isard and Faruqee, 2008). So called S-I norms are based on applying medium run values of regressors to coefficients of an estimated CA equation. External Sustainability (ES) norms rely on the notion of stabilizing the net foreign asset to GDP ratio (more details below). A more recent approach of the Fund is the External Balance Assesment (IMF, 2013). This method starts with estimating a current account regression and then applying normative policy benchmarks for selected regressors, including the fiscal balance, capital controls and monetary policy. Nevertheless, aside of this fairly advanced method, EBA also uses the ES approach known from the CGER.

We decided to follow the IMF's External Sustainability approach embeded in the CGER and EBA methodologies. This method, as described in detail below, is simple and transparent. In particular, ES does not involve discretionary choices. We believe that given our exercise, the great simplicity of the norm calculation is a serious advantage. Considering how rich the literature on equilibrium CA balances is, we do not want to leave the impression that our results can be made for ES norms only. While clearly the final answer (interest rate spread) depends on the norm, we treat the estimated interest rate semi-elasticities as the main, and fixed ingredient for calculating the spreads. The ES norms only provide an ilustration and if one has a different view on equilibrium CA balances, it is trivial to substitute it.

The ES methodology calculates the current account balance that stabilizes the net foreign asset position of the economy. It relies on the intertemporal budget constraint which requires that the present value of future trade surpluses suffices to repay the country's external debt.

The intertemporal budget constraint can be satisfied by ensuring that the net foreign assets to GDP ratio is stabilized, thus preventing assets or liabilities from growing without bound.

The starting point for calculating the CA norm is the accumulation equation for net foreign assets:

$$NFA_t - NFA_{t-1} = CA_t \tag{1}$$

where NFA_t denotes the net foreign asset stock and CA_t the current account balance. Denoting with lower-case letters the ratio of a given variable to GDP this equation can be written as:

$$nfa_t - nfa_{t-1} = ca_t - \frac{g_t}{1+g_t} nfa_{t-1} \tag{2}$$

where g_t stands for nominal GDP growth. Hence, the CA to GDP ratio that stabilizes the net foreign asset position at previous year's level is:

$$\bar{ca}_t = \frac{g_t}{1+g_t} nfa_{t-1} \tag{3}$$

From Equation (3) we calculate current account norms for the 11 euro area countries in our sample. Next we calculate the gap between each countrys current account position and its norm. Table 6 shows the average current account balance, norm and gap in the sample 1999-2012. Clearly all numbers differ between countries. In particular the peripheral countries that noticed large current account deficits also show the biggest gaps between CA balances and norms, ranging from 1.9% of GDP in Ireland to 7.8% of GDP in Greece.

3 Data

The estimation was conducted for 11 euro area countries which formed initialy the monetary union: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain. Due to the high share of the financial sector to GDP which could distort the estimation results, we excluded Luxemburg from the sample. The time span used for estimation covers the period from 1995 to 2012 providing 18 annual observations. We used data since 1995. Because in the period preceding the euro adoption fluctuations of the nominal exchange rates in our sample were limited allowing us to lenghten our sample by 4 years making the estimation results more robust.

The choice of a single appropriate interest rate which determines the relationship between domestic savings and investments, and finally the CA position, is not straightforward. The heterogeneity in the structure of savings across the euro area countries, the changes in their structure over time as well as different horizons for savings and investments motivate us to use several measures of interest rates. In turn, we employed three different interest rates: the yield on ten year sovereign bonds, the average lending rate for non-financial corporations (maturity up to one year) and the average interest rate on deposits from the non-financial sector (both for new contracts). The yield on sovereign bonds is a long–term interest rate, while two latter variables may be perceived as medium-term interest rates. All interest rates have been adjusted for HICP inflation.

While investigating the role of the interest rates in determining the current account balance, we should also account for other variables which influence the relationship between domestic investments and savings in the medium- to long term and are not related to the business cycle. The list of potential determinants of the CA balance is very comprehensive (see IMF, 2013, Chudik et al., 2012) and depends both on the underlying theory and the sample of the countries under interest. While selecting control variables, we focus only on "structural" (long-term) indicators to avoid a contemporaneous relationship with interest rates. The idea is to allow the interest rate to capture the whole cyclical component of the CA movement. From among the most widely used structural CA determinants we use the following variables which we find suitable for the euro area countries: net foreign assets position, demographic factors, structural fiscal balance, the variables expressing the stage of development like GDP per capita or productivity, the rule of law and the capital to output ratio. Below we describe the selected control variables and their expected impact on the CA balance.

- Net foreign assets (NFA) position. In the literature most specifications of the CA equation include the country's lagged or initial NFA position expressed usually in relation to GDP. Nevertheless, the sign of the relationship with the CA balance is ambiguous. On the one hand, countries with a more positive NFA position tend to have a higher CA balance due to more favorable income balance stemming from higher net foreign investments. On the other, countries with a less favorable NFA position may afford for a lower trade balance to maintain the constant NFA to GDP relationship. The potentially negative relationship between the initial NFA position and the CA may also result from the fact that highly indebted countries may be forced to improve their current account balance to increase their solvency. The latter explanation may be suitable for the euro area countries in the period covered by our research.

- Demographic factors – we expect a negative relationship between the number of economically dependents in the population and the level of national savings and, further the CA balance. Following the literature we account for demographic factors in the model by using a variable expressing population growth.

- Stage of development – due to the shortage of domestic savings lower income countries are usually forced to finance investments by external borrowing, which results in a CA deficit. This process stays in line with the theory that capital flows from higher to lower productivity countries. We express the stage of development by two alternative measures: GDP per capita and the level of productivity.

- Structural fiscal balance – according to several theoretical models we expect a positive relationship between the fiscal balance and the CA balance. Only when Ricardian equivalence holds, changes in the budget deficit do not affect aggregated savings and investments. In the model we test the significance of the fiscal balance with respect to CA. To avoid the contemporaneous link with the interest rates we use the structural fiscal balance (in relation to GDP) i.e. the fiscal balance adjusted for the business cycle position of the economy.

- Rule of law – better institutions and regulations increase productivity and export performance in many ways. Firstly, they reduce quasi-fixed costs like corruption or time needed to complete administration duties. Secondly, they minimize excessive uncertainty in doing business, resulting from e.g. low contract enforcement, which allows firms to plan long-term investments or cooperate and make use of synergy. As a variable in the model we use the perceived rule of law from the World Governance Index dataset. We expect the parameter's sign to be positive.
- Capital to output ratio - this variable represents endownment in capital and is a proxy for foreign capital needs. Moreover, more productive techonologies are usually capital-emboddied, therefore we expect the sign to be positive.

The data comes from the IMF, Eurostat and AMECO databases.

4 Estimation results

4.1 Estimation methods

In this section we discuss the estimation technique applied by us. In particular, we concentrate on two issues. Firstly, we explain why, in contrast to the much of the literature, we use a dynamic panel data model. Secondly, we explain our choice of preferred estimator.

In panel data analysis of macroeconomic data, the dynamic nature of a process is often ignored by researchers, partly due to econometric limitations (see below). Indeed, a number of panel data studies on CA use static models with autocorrelation correction (e.g. IMF, 2013). In this paper, we decided to include the lagged CA on the right hand side of the regression. Our arguments for such an approach are as follows. Firstly, one of our goals is to assess the long-term effect of real interest rate changes on CA. Thus, while in static specifications one assumes that all shocks in explanatory variables affect the CA only in the same period, in the dynamic case the long-term impact of change in the explanatory variable x_k is given by $\frac{x_k}{1-\rho}$, where ρ stands for the autoregressive coefficient of the lagged dependent variable. Secondly, the decision whether to include a lagged dependent variable or not, depends in our opinion on the state-dependency of the CA. In our view, agents' decision on whether to invest abroad or trade with foreign markets is affected by the past choices. Factors like (partial) irreversibility of investment, sunk costs of foreign market research, long-term contractual agreements between parties or involvement into global supply chains may be good examples. Thirdly, our approach allows us to adress the issue of autocorrelation existing in the data as well.[2]

Regarding the appropriate estimation technique, our choice may be perceived as a trade-off between methods that minimize the bias and those that give lower standard errors. This is because, as it is often the case for macroeconomic data, the time dimension of our dataset is quite large ($T = 18$) but the cross-sectional dimension is rather low.[3]

[2]As a cross-check, we ran our regressions also in a static form with panel-corrected standard errors. Obtained estimates of an immediate impact of a change in the real interest rate on the CA were similar to those in our preffered dynamic model. However, the high estimated coefficient of autocorrelation of residuals from the static model, as well as high and robust significance of the lagged CA in the dynamic specification suggest that the latter one should be our preffered choice.

[3]Time dimension of 18 observations may, indeed, seem quite large for a panel dataset. However, it is rather small for cointegration time-series methods, such as panel ECM models proposed by Pesaran and

As well documented in the literature, OLS yields inconsistent estimates in the presence of unobserved heterogeneity. In a dynamic specification, the bias of the OLS autoregression coefficients is positive (Baltagi, 2005). A straightforward way to deal with heterogeneity between units and omitted variable bias would be to include a set of country dummies, i.e. fixed effects (FE). However, there are two problems with a dynamic FE estimator. Firstly, including unit-specific dummies is very likely to make parameter estimates of rather time-invariant variables statistically insignificant, even if their importance for a given economic phenomenon is deeply verified and documented in the theoretical literature (seePlümper et al., 2005 and references). Fortunately, interest rates that we focus on show enough volatility over time. The second (and far more important) problem with the fixed effects approach is, however, a downward bias of the autoregressive coefficient, known as Nickell bias after the seminal work by Nickell (1981). This bias is especially important in short datasets with highly persistent variables, as it diminishes as $T \to \infty$ but is significant if $\rho \to 1$. In our case, $T = 18$ which may diminish the bias, yet the dependent variable is highly persistent (autocorrelation coefficient of first order is as big as 0.95 and autocorrelation coefficient of even third order is still higher than 0.8).

In this context, it is useful to employ the bias-corrected dynamic fixed effects estimator, an estimator that is particularly well-designed for a dataset like ours (Bruno, 2005). It borrows from Kiviet (1995) and later works byJudson and Owen (1997), Bun and Kiviet (2003) and Bun and Kiviet (2006). Such a strategy allows us to verify if the time dimension of our dataset is large enough to bring the Nickell bias of our parameters to acceptably low levels.

Another way to deal with Nickell bias would be to use instrumental variable estimation, such as Anderson and Hsiao (1982) first-difference estimator (FD). However, apart from the fact that asymptotic efficiency of the FD estimator depends on the sample's cross-section dimension (which is very low in our case), weak instrumentation issues can make the FD estimation a cure worse than disease. This is also the case for us. For all three interest rates the F-statistic in the first-stage regression is far below 10 (which is a rule-of-thumb

Smith, 1995; Pesaran et al., 1997. What is more, power of unit root test for our dataset seems rather low, as their asymptotic properties depend on T and N being large. Instead, we prefer to include lagged dependent variable to control for autocorrelation and year dummies to control for common shocks and possible trends in the data.

value to identify problems with weak instrumentation, following influential work by Staiger and Stock, 1997) and Kleibergen-Paap Wald rk F statistic is unacceptably low (less than 2, while 19.93 critical value by Stock and Yogo (2002) corresponds to 10% IV bias). Similarly, high autocorrelation of dependent variable weakens instruments also for the Difference-GMM estimator (see Blundell and Bond, 1998)[4].

Summing up, given the pros and cons of each estimator, we decided to estimate an AR(1) panel data model (with year dummies), using three estimators: OLS, FE and bias-corrected FE. FE and OLS estimates constitute lower and upper bounds for our results (Mátyás and Sevestre, 2008), while the use of bias-corrected FE estimator allows us to assess the size of the Nickell bias, and, consequently, the reliability of the FE estimator. For the reasons listed above, we do not use IV/GMM methods that could be perfectly fine in some macroeconomic applications but for different dataset size, e.g. one with a wider set of countries and a shorter time dimension.

4.2 Estimation results

Now we turn to the estimation results. We followed a *from general to specific* approach and, in the first step, we included the full set of variables listed in Section 3. Part of them (i.e. structural deficit, rule of law, capital to output ratio, GDP per capita and the level of productivity), however, turned out to be insignificant in almost every model. One reason for that could be that these variables show such low volatility in time that their variance was absorbed by country-specific dummies. Alternatively, some variables that truly influence the CA position in a broader set of countries may not be crucial in our sample. For example, the perceived rule of law may be decisive for the choice of FDI location between two emerging economies while the differences in regulatory environments between EA countries could be negligible in this context. Eliminating these statistically insignificant variables from the regression did not change our core results, therefore, for the sake of simplicity, in the remaining part of this paper we refer to the model of CA with only four regressors. Those

[4]As a cross-check, we also used System-GMM estimates that have better properties if $\rho \to 1$, keeping in mind that due to overidentification (large number of instruments relative to the number of observations) they should be interpreted with great caution (see Roodman, 2009 for extensive discussion). These results, however, are fairly similar to those obtained by OLS and FE estimators and are available on request.

are, respectively, the lagged CA to GDP ratio, the lagged NFA to GDP ratio, the real interest rate and the rate of population change. Our regression is then:

$$CA_{i,t} = \rho CA_{i,t-1} + \beta_1 NFA_{i,t-1} + \beta_2 r_{i,t} + \beta_3 Population_{i,t} + \mu_i + \sum_t d_t + \varepsilon_{i,t} \qquad (4)$$

where $\mu_i$is a country-specific effect, $\sum_t d_t$ is a set of year dummies and $\varepsilon_{i,t}$ is the error component (assumed to be i.i.d.).

Table 6 shows the estimation results of our regression for three real interest rates. Columns (1) to (3) show OLS, FE and bias-corrected FE estimates for a model with the lending rate for non-financial corporations (*lending*), columns (4) to (6) reffer to the interest rate on deposits from the non-financial sector (*depo*), while columns (7) to (9) present the estimates of a model with the yield on sovereign bonds (*Maastricht*) as a regressor. Now we discuss the results given by the three estimators and explain the choice of the preferred one. The signs of parameters given by all three estimators seem well in line with the expectations. In particular, the parameter for the real interest rate is always postive regardless of the choice of interest rate. A negative sign of the parameter for population change suggest that, not suprisigly, a shrinking (ageing) society is more likely to be dissaving and therefore soaking up the capital from abroad. Although population change did not always turn statistically significant, due to strong priors we keep this variable in the model. Finally, the negative sign of lagged NFA coefficient shows that no country may run CA deficits/surpluses forever.

In the next step we explain the choice of our preffered model. As expected, OLS estimates of parameter ρ are somehow larger than those of FE. However, reported point estimates of parameters using bias-corrected FE (we employed Bruno, 2005 Stata routine) are almost the same as the FE estimates, which suggest that the Nickell bias seems negligible in our context (and that OLS estimates suffer from omitted variable bias). Also the significance of country dummies suggests that OLS estimates may not be the most reliable ones. Finally, it should be noted that the FE estimates have a relatively small variance, especially if compared to consistent estimators as GMM (Mátyás and Sevestre, 2008) or bias-corrected FE. For these reasons we choose the simple FE estimator as the preffered one. Regarding the specification tests, the Arellano-Bond test for autocorrelation shows that including the lagged dependent variable and year dummies reduces problems with autocorrelation. At no reasonable significance level the null hypothesis (i.e. that there is no autocorrelation) should be rejected. To deal with heterogeneity we use robust standard errors.

Our core results may be then summarized as follows. An exogenous increase of the real interest rate (medium- or long-term) by 1 percentage point results in an improvement in the CA to GDP ratio of 0.25-0.28 pp in the same year. Including lagged NFA as a regressor makes the basic formula for a long-term multiplier invalid, therefore we present simulations based on the regression results in detail in Section 5. To give some intuition, though, we can say that (*ceteris paribus*) an increase in a medium-term real interest rate by 1 pp results in a rise in the NFA to GDP ratio by 0.93-1.09 that is obtained after 7-8 years and is diminishing afterwards. For the long-term interest rate, a rise by 1 pp translates into an improvement of the NFA to GDP ratio of about 1.36 after 10 years. Not surprisingly, also the long-term effect of an increase in the real interest rate on NFA to GDP ratio is clearly higher for the long-term interest rate (*Maastricht rate*) than for the deposit rate or lending rate, which suggests that it is structural factors rather than short-term ones that have the biggest influence on the external position of an economy.

In this section we presented estimation results of a dynamic panel data model of the CA to GDP ratio for a set of 11 EA countries. We argue that in our case, the best possible trade-off between efficiency and consistency is given by the FE estimator and our results show a significant impact of real interest rates on the CA. In the next section, we use them to calculate the hypothetical levels of the interest rate spreads that would have been necessary to stabilize external position of the EA countries in the first decade after the euro adoption. One final question that could be posed is why our results show a strong, significant and robust impact of the real interest rate on the current account while several other studies have not found such link. We believe that the answer is related to the explanation given in IMF (2013). When discussing their failure to find a statistically signifficant relationship between real rates and the CA, the authors point to the two channels of interest rates transmission. On the one hand, higher real rates increase savings and reduce investments, thus improving the current account. However, at the same time higher interest rates bring about an exchange rate apreciation and, as a result, reduce net exports and the CA. These effects may cancel out, at least in the short and medium term, IMF (2013) concludes. However, our research is conducted for a panel of monetary union members, where the second channel is closed by construction. What remains is the first channel, which works in the desired direction and is confirmed in our regressions. Of course this reasoning is only a hypothesis which we do not verify explicitly in this preject. It looks like an interesting topic for future research.

5 Equilibrium spreads

In the next step we assess to what extent a potentially stronger than historically observed divergence in the level of real interest rates between euro area countries could have prevented the substantial increase of external imbalances in the period after forming the monetary union and fixing nominal exchange rates. To answer this question, we conduct a counterfactual simulation, in which we calculate country-by-country the hypothetical level of the real interest rates that would have stabilized its CA balance at the equilibrium level calculated in Section 2.

Before we move to the simulations three things should be mentioned. First, as shown above our estimation results point to a large difference between short and long term multipliers for the real interest rate. This means that it is potentialy much more difficult to stabilize the CA every period than to do it on average in a longer time span. Second, our model has another hidden dynamic element - the lagged NFA position. This must be taken into account when running the simulations. Third, since the norm depends on the past NFA position, which changes during the simulation, the norm has to be dynamicaly adjusted as well. To summarize our simulation seeks for the real interest rates that solve for each country the following system of equations:

$$
\begin{array}{l}
\begin{cases}
ca_0^s = ca_0 + \hat{\beta}_2 \Delta r \\
nfa_0^s = nfa_0 + (ca_0^s - ca_0) \\
\bar{ca}_0 = \bar{ca}_0
\end{cases} \\
\begin{cases}
ca_1^s = ca_1 + \hat{\beta}_2 \Delta r + \hat{\rho}(ca_0^s - ca_0) + \hat{\beta}_1 (nfa_0^s - nfa_0) \\
nfa_1^s = nfa_1 + (ca_1^s - ca_1) \\
\bar{ca}_1 = \frac{g_t}{1+g_t} nfa_0^s
\end{cases} \\
\ldots \\
\begin{cases}
ca_t^s = ca_t + \hat{\beta}_2 \Delta r + \hat{\rho}(ca_{t-1}^s - ca_{t-1}) + \hat{\beta}_1 (nfa_{t-1}^s - nfa_{t-1}) \\
nfa_t^s = nfa_t + (ca_t^s - ca_t) \\
\bar{ca}_t = \frac{g_t}{1+g_t} nfa_{t-1}^s
\end{cases}
\end{array}
\tag{5}
$$

where spread to actual real interest rates Δr has been set to fulfil the condition that in the years 1999-2007 (2001-2007 for Greece) the difference between CA and its norm must be zero on average:

$$\sum_{t=1999}^{2007} (\bar{ca}_t - ca_t^s) = 0 \tag{6}$$

In Equation 5 the values $\hat{\rho}$, $\hat{\beta}_1$ and $\hat{\beta}_2$ denote parameter estimates from Equation 4 and the superscript s stands for the counter-factual simulated values.

Accordingly our exercise has been designed as follows. For each country we find the level of real interest rates, which would have stabilized the average CA in the period from adopting the euro in 1999 (in 2001 for Greece) to the onset of the global financial crisis in 2007. Hence the difference between the CA and the norm for the years 1999-2007 must be zero on average (2001-2007 for Greece). However taking into account the substantial discrepancy between values of short- and long-term multipliers we set the interest rates at the desired level already two years before adopting the euro (in 1999 for Greece and in 1997 for remaining ten countries). This assumption stays in line with the observation that approximately 1.5-2 years before euro adoption financial markets started to perceive countries as future euro area member states what resulted in acceleration of nominal interest rate convergence and a substantial decrease of spreads.

The simulation results are collected in Table 3. We present the outcome for our three interest rates. The numbers in the table are the differences between historical real interest rates and our counterfactual rates. The results clearly show that for four euro area countries: Ireland, Portugal, Greece and Spain the historical real interest rates were too low to prevent these economies from building up external imbalances. The highest discrepancy between actual and desired interest rates can be observed for Portugal and Greece. Depending on the choice of the interest rate the difference ranges from 5.8 to 7.5 pp for Portugal and from 4.3 to 5.4 pp for Greece. Slightly lower but still negative spreads are calculated for Spain (2.0-2.5 pp) and Ireland (1.5-2.0 pp). For two countries: France and Italy the historical real interest rates were almost in line with the simulated counter-factual rates. Five euro area countries experienced real interest rates which resulted in average surplus of current account over their norm in the reference period. For these countries the historical real rates were above the desired rates by 1.3 to 1.6 pp in case of Belgium, by 1.7 to 2.2 pp for Austria and by 1.9 to 2.5 pp for Germany. The highest positive discrepancy between historical rates and the rates stabilizing the CA balance show up for Finland (7.7-10.1 pp) and the Netherlands (4.7-6.0 pp). However the results for both countries may be to some extent biased. In the first case there were large jumps in the NFA stock in years 1999-2000 due to valuation effects. For the Netherlands gas exports and the role of the port of Rotterdam are likely to substantially improve the average CA.

In Table 3 we collect the results of the simulation in terms of spreads to the historical real interest rates. However, although up to 2007 the differences in historical nominal interest rates between euro area member states were in general negligible, real interest rates differed due to discrepancy in the inflation rates. On Figure 4 we present the counter-factual average historical real interest rates calculated as a sum of spreads from Table 3 and the historical average real rates for years 1999-2007 for subsequent countries related to the historical average real interest rate for the euro area (EA11 weighted by GDP contribution). In other words we show the spread against the EA 11 average instead of each country's historical average. For three euro area countries: France, Italy and Ireland the desired real long-term interest rate should have been slighly above the average real rate for the euro area (from 0.4 to 0.6 pp). Spain should have had real interest rates higher by 1.6 pp than an average for the euro area while for Greece this spread should have equaled 3.8 pp. According to our calculations, the highest positive spread would have been necessary for Portugal, amounting to 5.5 pp.

Finaly, we look at the time series of simulated current account deficits in our four most interesting countries. Since we introduce a constant spread between historical and counterfactual rates, the simulated CA equals the norm only on average. The question is, how much it deviates from the norm over time. As shown in Figure 5, not surprisingly, the counterfactual CA deficits do not overlap perfectly with the respective norms. However, at least in Greece, Portugal and Spain the deviations are not large and a clear improvement of the situation can be observed - the simulated CA is clearly closer to the norm than to its historical level. The situation is less obvious in Irealand, and this is for two reasons. First, the average gap between the CA and the norm was relatively small in this country. Moreover, valuation effects for net foreign assets increased the volatility of the norm. However, even there a clear improvement of the counterfactual over the historical CA can be observed.

6 Conclusions

This research project originates from two observations. Firstly, large macroeconomic imbalances plagued the euro area since its creation. Peripheral countries faced too low interest rates which increased domestic demand, undermined competitiveness and resulted in large current account deficits. Secondly, substantial interest rate spreads emerged recently between member countries of the euro area. In fact, these spreads played an important role in destabilizing the euro area, since spreads increased mostly in countries hit by deep recession.

In this paper we check whether interest rate spreads could potentially play a stabilizing role as well. Instead of time varying spreads, we consider constant spreads, higher for countries with a higher propensity to spend, lower in more saving-oriented coutries. To this end we estimate a model that links current account deficits to real interest rates, and then calculate by how much real interest rates would have to differ from the euro area average in order to bring current account balances to assumed targets. Our results show that spreads between real interest rates of 0.6 to 5.5 percentage points would be necessary to reduce current account deficits in the four peripheral countries (Greece, Portugal, Ireland and Spain) to their equilibrium levels.

The policy conclusion from this paper is that instead of fighting spreads accross the board, the ECB could accept their existence, provided that they behave in a relatively stable way and are close to the equilibrium levels that we calculate. Otherwise it cannot be excluded that the history of diverging current account balances, lost competitiveness and sharply rising spreads at the least desirable moment will repeat itself in a few years.

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Tables and figures

Table 1: Current accounts, norms and gaps

Country	CA balance	CA norm	CA gap
Austria	1.9	-0.6	2.4
Belgium	1.9	1.5	0.4
Finland	4.0	-2.1	6.1
France	-0.2	-0.1	-0.1
Germany	4.0	0.4	3.6
Greece	-8.6	-1.6	-7.0
Ireland	-1.1	0.7	-1.9
Italy	-1.1	-0.3	-0.8
Netherlands	6.0	-0.2	6.1
Portugal	-9.0	-1.2	-7.8
Spain	-5.2	-1.8	-3.4

Note: The table presents average values for the period 1999-2012, all numbers expressed in per cent of GDP.

Table 3: Spreads between actual and desired real interest rates (stabilizing NFA stock).

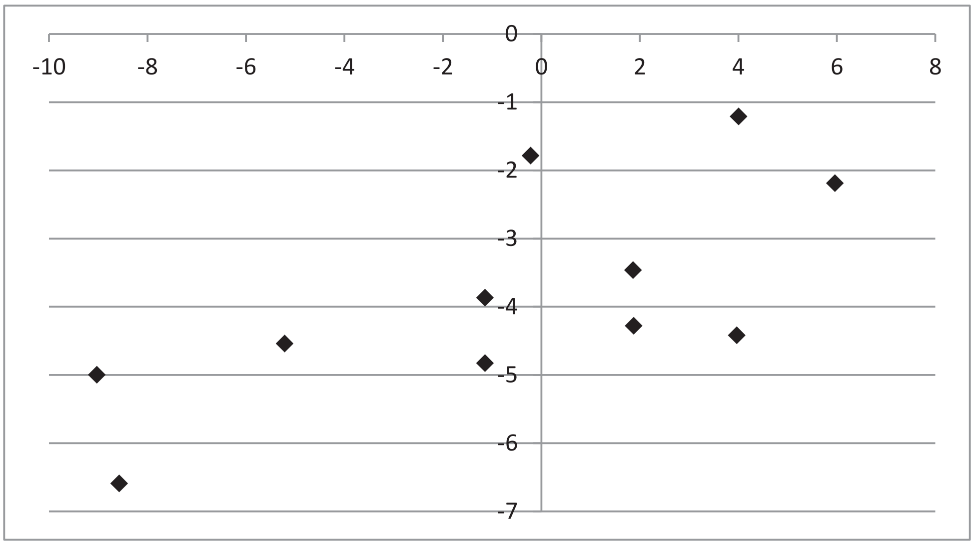
Country	Maastricht rate	Depo rate	Lending rate
Finland	-7.7	-8.7	-10.1
Netherlands	-4.7	-5.2	-6.0
Germany	-1.9	-2.2	-2.5
Austria	-1.7	-2.0	-2.2
Belgium	-1.3	-1.5	-1.6
France	-0.5	-0.7	-0.7
Italy	0.0	0.0	0.0
Ireland	1.5	1.8	2.0
Spain	2.0	2.2	2.5
Greece	4.3	4.7	5.4
Portugal	5.8	6.5	7.5

Table 2: Estimation results

	(1) lending	(2) lending	(3) lending	(4) depo	(5) depo	(6) depo	(7) Maastricht	(8) Maastricht	(9) Maastricht
	OLS	FE	BC-FE	OLS	FE	BC-FE	OLS	FE	BC-FE
L.CA	1.005***	0.815***	0.815***	0.993***	0.834***	0.834***	1.003***	0.870***	0.913***
	(0.0299)	(0.0439)	(0.0701)	(0.0306)	(0.0450)	(0.0736)	(0.0303)	(0.0479)	(0.0543)
Population change	-0.272	-0.584**	-0.568	-0.201	-0.520*	-0.507	-0.0197	-0.170	-0.133
	(0.203)	(0.270)	(1.787)	(0.198)	(0.288)	(1.864)	(0.194)	(0.344)	(1.376)
Real interest rate	0.104	0.254***	0.244	0.265**	0.281***	0.267	0.303***	0.281***	0.267***
	(0.0870)	(0.0735)	(0.444)	(0.113)	(0.106)	(0.570)	(0.0452)	(0.0505)	(0.0663)
L.NFA	-0.00799**	-0.0147***	-0.0137	-0.00792**	-0.0150***	-0.0140	-0.00384	-0.0103**	-0.0138***
	(0.00335)	(0.00447)	(0.0247)	(0.00359)	(0.00469)	(0.0250)	(0.00372)	(0.00486)	(0.00501)
Constant	1.537***	1.593***		1.687***	1.901***		0.730**	1.071***	
	(0.585)	(0.600)		(0.557)	(0.603)		(0.340)	(0.404)	
AR(1) test	0.053	0.266		0.084	0.287		0.269	0.500	
AR(2) test	0.389	0.457		0.497	0,.502		0.833	0.299	
Heteroskedasticity test	0.245	0.058		0.310	0.052		0.216	0.077	

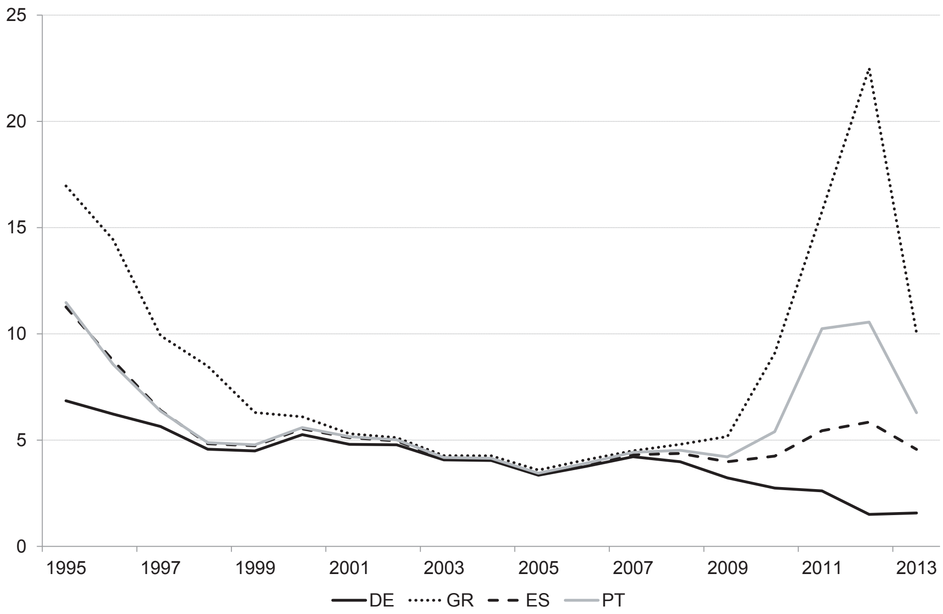
Year dummies included. AR(1) and AR(2) are p-values of Arellano-Bond test. Heteroskedasticity test is p-value of White-Kroneker test. Standard errors robust for autocorrelation and heteroskedasticity in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Figure 1: Real interest rate change vs. CA balance



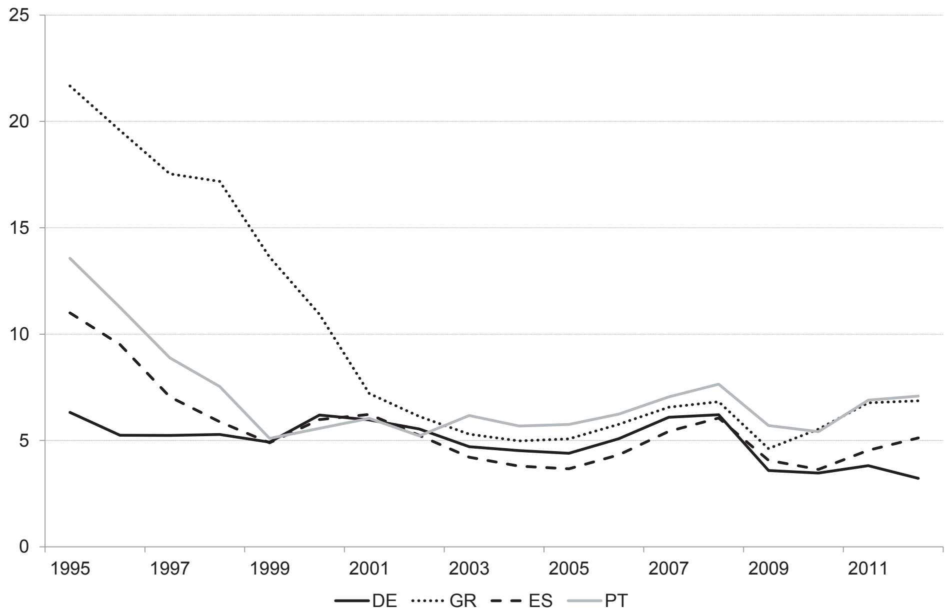
Note: average CA balance (1999-2012) on horizontal axis against average change of the real lending rate for non-financial corporations (1999-2012 vs. 1990-1998) on vertical axis; EA-11.

Figure 2: Yields on sovereign debt in selected EA countries



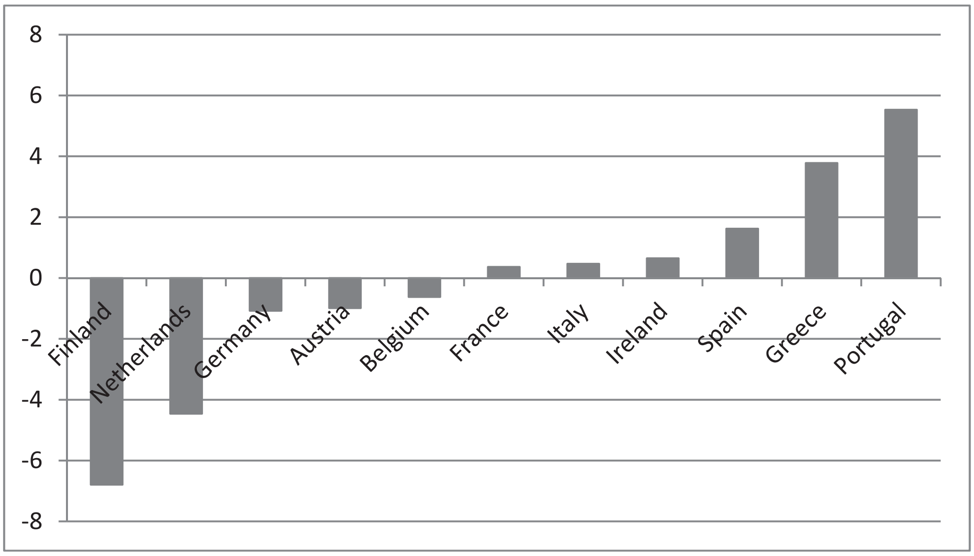
Note: yields are for the long term (10 year) government bonds (Maastricht definition).

Figure 3: Lending rates in selected EA countries



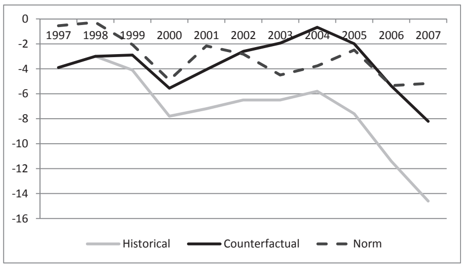
Note: lending rate to non-financial corporations (up to 1 year maturity, new business)

Figure 4: Spreads of desired real interest rates vs EA-11 average.

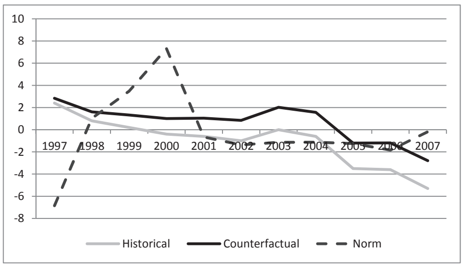


Note: the EA11 average interest rate has been weighted by GDP shares. The results are presented for the Maastricht rate.

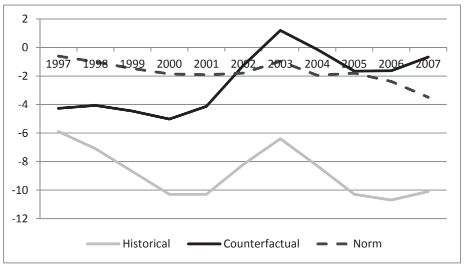
Figure 5: Historical and counterfactual CA in selected countries



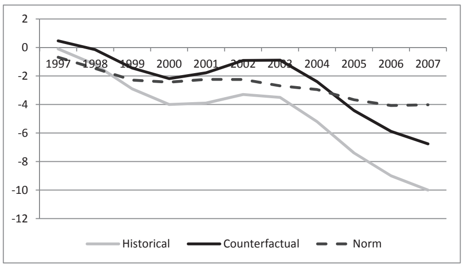
Greece



Ireland



Portugal



Spain

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