

Euro area macroeconomic imbalances and their asymmetric reversal: the link between financial integration and income inequality

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Abstract This paper explores the impact of the Economic and Monetary Union (EMU) and the ensuing financial integration on Euro Area (EA) macroeconomic imbalances. It is found that EMU caused an exceptional deterioration of current account positions in relatively unequal EA countries more than in the others. The explanation provided is that the large increase in money supply following the abolition of capital controls in 1990, of exchange rate risks in 1999 and the parallel softening of domestic credit market regulation throughout the 1990s that lead to downwards interest rate convergence had the effect of relaxing collateral constraints specifically for lower-income households, whose share is found to rise with levels of income inequality. Optimistic expectations about future income led to over-borrowing by these groups. Consequently, current account reversal was asymmetric because the crisis forced indebted lower-income (unskilled) households to abruptly reduce consumption, as they were the first to be pulled out of the labour market and hardly had financial buffers. The hypothesis is tested using a difference-in-difference approach to panel data.

Keywords Current account · Income inequality · Financial liberalization · Debt leverage · Difference-in-difference

JEL Classification F32 · F41 · E2

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1 Introduction

The period following the introduction of the single currency left the Euro Area (EA) divided into a periphery with significant current account deficits and a core with equally substantial current account surpluses. While the former started reversing as of 2011 in the midst of the Euro crisis, the latter did not go through a symmetric adjustment (for empirical evidence, see for example Lane and Milesi-Ferretti 2011). This paper identifies a common explanation for both the build-up and the asymmetric reversal of macroeconomic imbalances in the EA. Focus is on the behavior of the private sector, and more specifically on the drivers of debt-financed household consumption and the way in which (over)-borrowing might have been distributed across categories of income in each country.

The debate on the origins of EA imbalances and the mechanism through which they have been unwinding in the periphery and not in the core is not fully settled. Some support the competitiveness hypothesis, according to which imbalances relate to differences in cost competitiveness between the core and the periphery that have come to light following the loss of the exchange rate as a policy instrument (Zemanek et al. 2009; Belke and Dreger 2013). Others stress the role played by capital flows. In this case, imbalances reflect the fact that excess savings in the high-income core of Europe moved to the low-income periphery following the abolition of capital controls in the European Single Market (ESM) as of 1990 and the subsequent elimination of exchange rate risks starting with 1999. This downhill flow of capital is justified both on the supply and the demand side. Credit supply by core countries is driven by the expected rate of return (Abiad et al. 2007; Giavazzi and Spaventa 2010; Jaumotte and Sodsriwiboon 2010; Schmitz and Von Hagen 2011). Credit demand in poorer peripheral countries stems from the fact that households get indebted to increase current consumption, for example, because they become optimistic about future income as in standard inter-temporal consumption models (Blanchard and Giavazzi 2002; Fagan and Gaspar 2007a, b).¹

Both hypotheses have limits. The competitiveness hypothesis does not account for the decoupling of export performance and standard cost competitiveness indicators, e.g. unit labour costs (ULC) or real effective exchange rates (REER) deflated by ULC (Gaulier and Vicard 2012). It is also not necessarily consistent with the fact that current account reversal in deficit countries was mainly achieved through a contraction in demand (Lane and Milesi-Ferretti 2011). On the other hand, the capital-flow hypothesis overestimates the role of per capita income and treats countries like homogenous blocks, failing to account for the role of household heterogeneity and in particular for the fact that the propensity to get indebted is likely to vary along the income distribution. The question of who holds debt is

¹ It should be noted that the distinction between the competitiveness and the capital-flow hypothesis is a bit artificial here as the two explanations are not mutually exclusive. So, for example, criticism of the competitiveness hypothesis does not necessarily imply that differences in prices and wages do not play a role. Capital flows into the periphery lead to overheating and an acceleration in wage and price growth that ultimately hinges on competitiveness. Yet, the distinction between the two hypotheses allows better identifying the nature of the EMU shock, i.e. whether stemming from competitiveness divergences or rather from capital mobility and its consequences.

relevant because it determines the macroeconomic consequences of household indebtedness over the cycle (Eggertsson and Krugman 2012), potentially shedding light on current account reversal.

The argument we put to the test is that some EA countries imported large amounts of capital from abroad hence their current account deficits because they were relatively unequal societies, with a large cohort of lower-income groups that experienced a sudden relaxation of collateral constraints following EMU-induced financial integration. They then started over-borrowing against optimistic expectations about future income. The same is not true for less unequal EA countries where, prior to EMU, collateral constraints had been biting only for a smaller negligible share of the population.² The hypothesis is tested with a difference-in-difference approach to panel data so as to isolate a causal relation between EMU-induced financial integration and external imbalances. Our perspective is equally useful to understand the reversal of current account deficits. The crisis and the ensuing credit constraints forced deleveraging on the same portion of the population that got indebted in the first place and that had no alternative but to restrain consumption considering that lower-income (unskilled) workers were the first to be pulled out of the labour market and hardly had financial buffers.

There is indeed suggestive evidence that there is something about external positions and income distribution starting with the 1990s. Figure 1 shows the relation between the current account in proportion to GDP and income inequality for a group of EA countries including early members plus Greece. Income inequality is captured by the Gini coefficient, which measures the distance in income between two random income groups in the population. Values are taken from Solt (2009), who provides a standardised indicator so as to allow cross-country comparability. The time frame from 1980 to 2015 is divided in two sub-periods, one before EMU-induced financial integration from 1980 to 1998, and one after full financial integration from 1999 up to 2015. The year 1999 is chosen to indicate full financial integration because this is the time when exchange rate risks are eliminated, thereby enhancing capital mobility and therewith also downwards interest rate convergence. Starting income inequality is juxtaposed to the average current account position over each sub-period. The current account-inequality nexus becomes statistically significant and negative only under full financial integration. On the other hand, conditioning the relation between per capita income relative to the US and external positions on the expected level of financial integration does not deliver equally strong results arguably because mean per capita income does not allow exploiting moments in the distribution of income, which is what is expected to drive the results in our framework.

² We use income inequality as a proxy of relative poverty. Figure A (in the “Appendix”) shows for each country the relation between a standard measure of income inequality such as the Gini coefficient and the share of the population that is considered at risk of poverty because her income is lower than 60 percent of the median disposable income, as in the definition used by the Eurostat (we use the year 2006 because this is the first year for which the Eurostat provides data for all European countries but France). Clearly, the two are interrelated. This is also because of the way in which relative poverty is defined, which makes it a statistic of income distribution. In the statistical analysis, we use the standardised Gini coefficient, which provides better coverage of both countries and time.

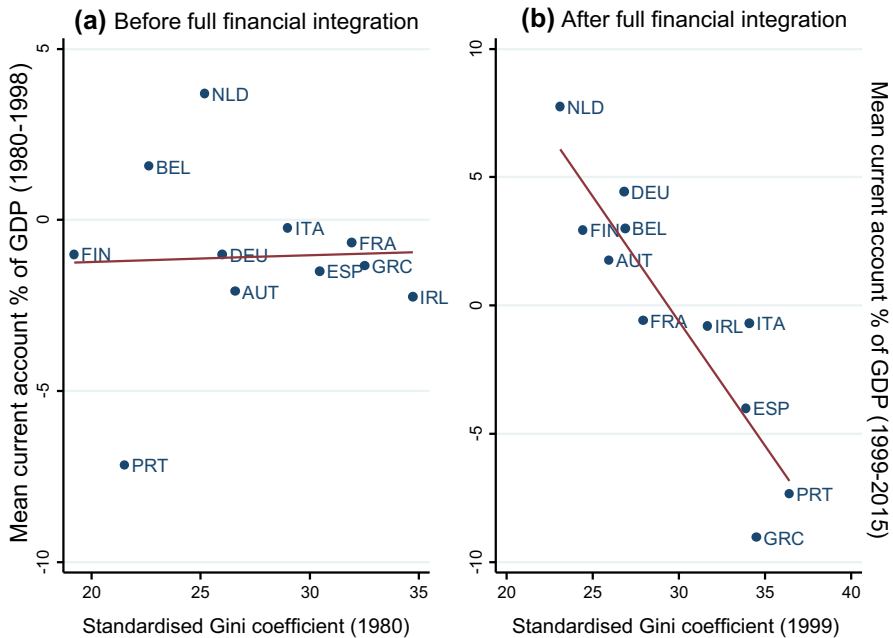


Fig. 1 Mean current account and initial inequality **a** before full financial integration (1980–1998) and **b** after full financial integration (1999–2015). Source: Own elaboration based on Ameco and Standardised World Income Inequality Database (SWIID). The sample includes all euro area countries that entered in the first wave (except Luxembourg) plus Greece

The link between income inequality and current account positions is not new in the literature. Kumhof et al. (2012) have shown that greater inequality induces those that are negatively affected to borrow because of habit persistence, which also leads to the endogenous development of domestic credit markets. With increasing openness to international capital markets as well, higher-income groups become intermediaries of foreign savings, something that allows them to significantly increase their consumption. Current account deficits are therewith generated. More similarly to what is done in the present paper, Al-Hussami and Remesal (2012) introduce heterogeneity in an inter-temporal consumption model and argue that rising inequality is associated with worse external positions because of the behaviour of low/middle-income groups, who borrow to emulate the consumption patterns of high-income groups. They further show that such an outcome is reinforced in countries with above-average levels of financial liberalization. Compared to them, we make a different point in that we explore the effects of EMU-induced financial integration for different income distributions, independently of the actual dynamics of inequality.

This paper contributes to the existing literature in a number of ways. First, while building on the idea that current account deficits in the periphery reflect capital inflows financing households that try to maximize consumption inter-temporally as, for example, in Blanchard and Giavazzi (2002) and Fagan and Gaspar (2007a, b),

we depart from a representative-agent framework by assuming that desired private indebtedness varies depending on initial levels of income, being mostly concentrated at the lower end of the income distribution once collateral constraints get relaxed. This explains why, under EMU, more unequal countries that had a higher share of lower-income groups had also worse external positions than the others. Second, differently from both Kumhof et al. (2012) and Al-Hussami and Remesal (2012), we are not concerned with the dynamic relation between income inequality and external positions, but with the impact of financial integration for different income distributions. Third, we stress the role of forward-looking expectations in driving inter-temporal consumption rather than habit persistence and/or the desire to emulate wealthier groups. Finally, an additional feature of our framework is that we use the EMU process to represent an exogenous shock in credit supply differently from, for example, Kumhof et al. (2012), where liquid credit markets emerge endogenously from inequality dynamics. We are thus justified in using a difference-in-difference estimation technique, which together with other elements in the specification minimises the problem of the endogeneity that may well exist between financial integration and income inequality.³

The rest of the paper is structured as follows. Section 2 reviews the literature on macroeconomic imbalances. Section 3 presents stylized facts. Section 4 discusses the empirical strategy and the results. Section 5 concludes.

2 Review of the literature

There is a growing literature looking at the reasons behind the recent build-up of macroeconomic imbalances in Europe. As divergences became both significant and persistent starting with the 1990s, the emerging consensus is now that the monetary union itself played a role in this dynamics.⁴ We isolate two dominant explanations: the competitiveness and the capital-flow hypothesis⁵ integration.

2.1 The competitiveness hypothesis

Supporters of the competitiveness hypothesis argue that the loss of the exchange rate as a policy instrument brought to light fundamental cross-country differences in price and cost competitiveness. The general argument is that countries in the core were competitive already before the single currency was introduced, while countries in the periphery that relied extensively on devaluation to recoup competitiveness are found to have suffered from the loss of the exchange rate. This is reflected in the

³ There is recent evidence showing that capital account openness causes income inequality both in the short- and medium-run (Furceri and Loungani 2015).

⁴ Interestingly, Hope (2016) uses a synthetic control method to prove that the introduction of EMU was responsible for the divergence in current account balances among member states in the run-up to the euro crisis.

⁵ We avoid offering a thorough theoretical account of sources of macroeconomic imbalances that would be unrelated to European monetary unification (e.g. twin-deficits hypothesis, demographics, etc.), but include them as control variables in the econometric exercise that follows.

strong statistical relationship that some of the literature finds between real exchange rates and current account balances (Zemanek et al. 2009; Belke and Dreger 2013). The institutional version of the competitiveness hypothesis alludes to differences in wage bargaining systems as the main driver of wage and price differentials between the deficit and surplus countries (Carlin 2013).

The competitiveness hypothesis has been criticised on a number of fronts. For example, Gros (2011) and Gaulier and Vicard (2012) suggests that unit labour costs (ULC) are poor predictors of exports. Gabrisch and Staehr (2015) show convincingly that rising ULC follow from capital inflows rather than being the cause of current account deficits in peripheral member states. More specifically, the competitiveness hypothesis is unable to account for the Spanish and the Irish performance, whose cost competitiveness in the early 1990s improved on the back of a deteriorating current account balance (Fig. 7 in the “Appendix”). Finally, existing evidence shows that the reversal of current account deficits was mainly driven by a dramatic drop in domestic demand (Lane and Milesi-Ferretti 2011), rather than being preceded by a fall in relative prices which fails to confirm that macroeconomic imbalances solely reflect, possibly with a lag, cross-country differences in cost competitiveness.

2.2 The capital-flow hypothesis

By definition, macroeconomic imbalances mirror capital flows. Namely, current account deficit countries are importers of capital, while surplus countries are net exporters. The reason why some countries become net importers and others exporters is explained in neoclassical terms with the argument that mobile capital tends to fly from high-income countries, where the return to investment is lowest, to low-income countries, where return is highest. This is described as a standard downhill flow of capital, a process that is fully driven by market dynamics and that is expected to allow lower-income countries to catch up with the rest of the union (Abiad et al. 2007; Giavazzi and Spaventa 2010; Jaumotte and Sodsriwiboon 2010; Schmitz and Von Hagen 2011).

While the downhill-flow-of-capital story focuses on credit supply, the symmetric argument on the credit demand side is that lower-income countries that join an integrated economic area borrow from outside to finance consumption in the expectation that they will be able to pay back their debt in the future. Blanchard and Giavazzi (2002) and Fagan and Gaspar (2007a, b) have explained private debt accumulation and current account deficits in the South of Europe by alluding to this mechanism. Empirically, the evidence is that relative per capita income is an important determinant of euro area imbalances. Schmitz and Von Hagen (2011) confirm that differences in per capita income are the main drivers of current account positions in the EA. Lane and Pels (2012) show that growth expectations of consumers in the periphery played a key role as in inter-temporal consumption models, whilst but being over-optimistic.

Whether it is credit supply or demand that is at the centre of the analysis, the point is that macroeconomic imbalances originate in the capital account with the main shock coming from financial integration rather than from the loss of the

exchange rate. This hypothesis is incomplete or not fully satisfactory in a number of respects. Firstly, as it will be shown in the next section, the evidence indicates that low-income countries have been importing capital before capital controls were fully eliminated. Secondly, the capital-flow hypothesis is not sufficiently concerned with the role of household heterogeneity in each country.- Lebartz (2014) shows, for example, that the propensity to borrow tends to vary along the income distribution, being concentrated at the lower end. The section below expands on this point.

2.3 The capital-flow hypothesis revisited

The mere opening up of credit markets seems insufficient to explain the entire debt cycle in the euro area periphery going from accumulation to abrupt deleveraging. Financial integration is a necessary condition for explaining current account divergence in the euro area but it is per se not sufficient. The argument we put to the test is that the country-specific distribution of income plays a role, with relatively unequal countries of the EA more likely to borrow from the outside in the face of financial integration coinciding with downwards interest rate convergence and the ensuing relaxation of collateral constraints. That is because more unequal countries are found to have a relative higher share of lower-income groups than less unequal ones.⁶ This is relevant to the extent that lower-income groups are the ones that typically start borrowing once credit constraints are fully relaxed, as supported by the empirical literature (Lebartz 2014).

The link between income inequality and external positions has been explored before. Kumhof et al. (2012) show that idiosyncratic shocks to the income distribution induce affected groups to both domestically and internationally in order to smooth consumption. The need for well-developed credit markets would thus arise endogenously. Top earners are likely to act as intermediaries of foreign capital. This further increases their share of domestic income. This generates the evidence that more unequal countries tend to have relatively poor external positions. Building on an inter-temporal consumption model augmented with household heterogeneity, Al-Hussami and Remesal (2012) argue that rising inequality leads to current account deterioration because low/middle-income groups borrow to imitate the consumption patterns of higher-income groups, especially in relatively high levels of financial liberalization.

Our hypothesis is that financial openness and downwards interest rate convergence during the early 1990s led to strong consumption in more unequal EA countries because it was associated with a relaxation of collateral constraints for the large cohort of lower-income groups that populated these countries. Compared with both Kumhof et al. (2012) and Al-Hussami and Remesal (2012), we are not concerned with the dynamics of inequality but just with the effect of EMU for different income distributions. Our perspective would, among others, explain a large current account deficit in a relatively competitive yet relatively unequal country such as Ireland. It also helps interpreting the evidence that the correction of current account deficits was mainly achieved via abrupt demand compression. In fact,

⁶ See Footnote 4.

indebted lower-income (unskilled) groups had no alternative but to compress consumption considering that they were first to be pulled out of the labour market and had no financial buffers. This generated a standard debt cycle going from boom to bust in the unequal periphery, yet not necessarily in the core of the monetary union where EMU did not come as a credit shock as much as it did in the former group of countries.

3 Stylised facts

3.1 Beyond relative per capita income

The capital-flow hypothesis builds on the idea that differences in relative per capita income drive the downhill flow of capital inside the EA. The empirical literature typically finds a statistically significant relationship between relative per capita income and external positions, with the latter improving in higher levels of per capita income (Debelle and Faruqee 1996; Chinn and Prasad 2003; Abiad et al. 2007; Jaumotte and Sodsriwiboon 2010; Schmitz and Von Hagen 2011). This seems to hold true for the EA as well. Nevertheless, when conditioning it on the degree of financial integration, it seems that the time when capital controls and then exchange rate risks are fully eliminated is not different from times when financial integration was less deep.

Figure 2 (upper quadrants) sketches the relationship between per capita income relative to the US expressed in purchasing power parity (PPP) and the current account balance as a proportion of GDP over 1980–2015. The sample includes all countries that entered EMU in the first wave plus Greece distinguishing between two sub-periods, 1980–1998 and 1999–2015. The year of the formal beginning of EMU is chosen to isolate the beginning of full integration. The suggestive evidence is that relatively low-income countries tend to have worse external positions than high-income countries, whether capital markets are partially liberalized as in the period 1980–1998 or fully liberalized as in 1999–2015. That low-income countries import capital possibly to engage in inter-temporal consumption thus predates EMU.

By contrast, a time break characterises the relationship between income inequality and current account positions. Figure 2 (lower quadrants) displays the link between the standardized Gini coefficient and the current account over the same time span. The sample is the same used in the previous figure and the beginning of financial integration is again set in 1999. In this case, it does matter whether capital markets are partially or fully liberalized. Prior to full capital mobility, there is no relation between the distribution of income and the external balance. Yet, this becomes significant and negatively signed following the opening up of capital accounts as of 1999, with high inequality associated with worse current account balances. The evidence is suggestive of a “special” interaction between financial integration, the shape of the income distribution and current account balances.

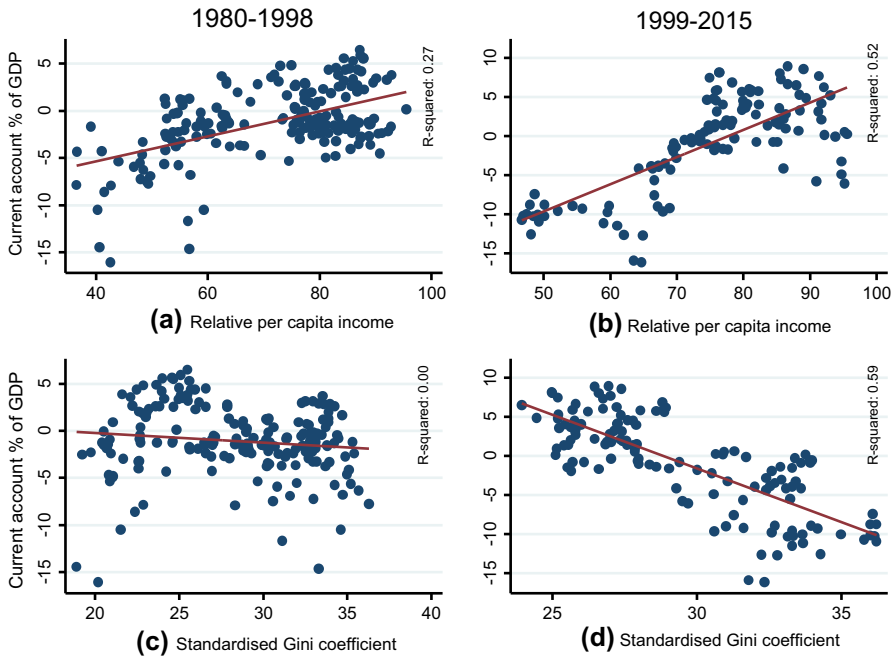


Fig. 2 The relation between the current account, relative income, and inequality (1980–2015). Source: Own elaboration based on AMECO Database, Penn World Tables and Standardised World Income Inequality Database. The sample includes all euro area countries that entered in the first wave (except Luxembourg) plus Greece

3.2 Households' leverage and financial buffers

At the core of our hypothesis is the idea that, in relatively unequal EA countries, a large share of the population starts getting indebted for consumption purposes after gaining easy access to credit during the EMU process. Figure 3a compares mean household debt-to-income ratios across more and less unequal EA countries classified as those above and below average inequality respectively. While household indebtedness was on average higher in less unequal countries for most part of the 1990s, with the Netherlands in particular driving the results, it rose significantly in more unequal countries starting from the early 1990s, eventually overshooting the former group as of 2003. The phenomenon went hand in hand with an erosion of the net financial assets to income ratio in the more unequal part of the union as opposed to the less unequal one, which account for a potentially difficult deleveraging process (see Fig. 3b).⁷

⁷ The erosion of net financial assets was probably also driven by highly volatile returns from financial investment.

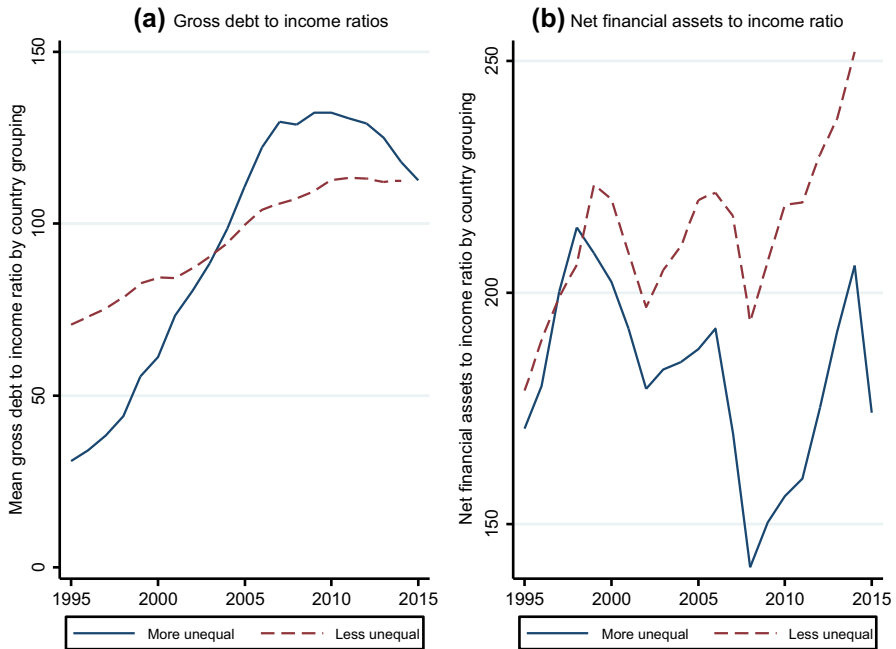


Fig. 3 Gross household debt (a) and net financial assets to income ratios (b) (1995–2015). Source: Own elaboration based on Eurostat. The sample includes all euro area countries that entered in the first wave (except Luxembourg) plus Greece. Unequal includes Greece, Ireland, Italy, Portugal and Spain; equal consists of Austria, Belgium, Finland, France, Germany, and The Netherlands. The gross debt to income ratio is defined as debt arising from loans, recorded at the end of each calendar year, to the gross disposable income of the same year (Eurostat). The net financial assets to income ratio is defined as total financial assets minus liabilities at the end of each calendar year to the gross disposable income of the same year (Eurostat)

3.3 Asymmetric reversal and low-skilled employment

The question of “who holds debt” is important because it conditions the macroeconomic consequences of deleveraging. We explain asymmetric current account reversal by the fact that the crisis reverted the large credit supply shock initially associated with EMU. Financial distress meant that credit constraints were back in place, thereby putting pressure especially on poorer indebted households, as those that were the first to be pulled out of the labour market when the crisis hit. Figure 4 plots the evolution of the current balance and of the employment rate for the lowest-skilled distinguishing between more and less unequal countries. In more unequal countries, with the massive collapse of employment for the least skilled, which represents 66% of all the employed, came a drop in consumption that led to a significant correction in current account deficits. By contrast, the data do not suggest any significant correlation between low-skilled employment and external positions in the group of less unequal countries.

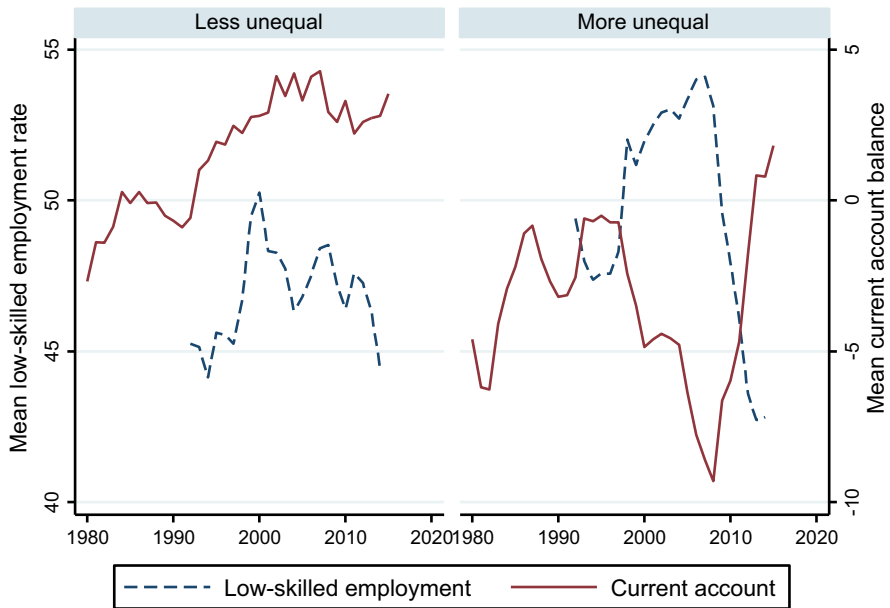


Fig. 4 The relation between the current account and low skilled employment (1995–2015). Source: Own elaboration based on Eurostat. The low-skilled employment rate is given by the employment rate of those with pre-primary and primary education (Eurostat). The sample includes all euro area countries that entered in the first wave (except Luxembourg) plus Greece. Unequal includes Greece, Ireland, Italy, Portugal and Spain; equal consists of Austria, Belgium, Finland, France, Germany, and The Netherlands

4 Empirical strategy and results

4.1 Baseline specification

To show that the financial integration associated with EMU had a causal effect on macroeconomic imbalances, we adopt a difference-in-difference (*DiD*) approach to panel data. The sample includes all countries that entered the first wave, except Luxembourg, which in many respects is an outlier, plus Greece, a country that accessed the monetary union in 2011. The sample is divided in two subgroups based on their income-inequality record immediately prior to full financial integration. More unequal countries include Greece, Ireland, Italy, Portugal and Spain. Less unequal countries are Austria, Belgium, Finland, France, Germany, and the Netherlands (for evidence, see also Fig. 1).⁸ We take relatively unequal countries to represent the treatment group, as these are the countries where a significant share of the population is believed to have been credit-constrained prior to full financial integration, hence where “true” treatment occurred. The year of treatment is 1999, which coincides with the beginning of EMU, in particular with the elimination of exchange risks on top of all other market-based and administrative capital controls that had been lifted starting with 1990. It is as if we were modelling financial

⁸ The distinction coincides with that between core and periphery.

integration and the ensuing downwards interest rate convergence as a change in share of the population that gets access to credit, an approach that is not unusual in the literature (see, for example, Landau and Wieladek 2012). By assumption, one group is exposed to treatment in the second period, from 1999 to 2015, but not in the first period from 1980 to 1998. The second group is not exposed to treatment during either period, as if financial integration had no specific impact on access to credit in the control group because here interest rate levels were generally contained and collateral constraints had not been biting for anyone.

The baseline specification is as follows:

$$CA_{it} = \alpha_0 + \gamma E_s + \phi d_t + \delta(E_s \times d_t) + \beta CAN_{it} + \varepsilon_{it}, \quad (1)$$

where CA is the current account balance as a share of GDP in country i and period t ; E and d capture the treatment group and the second period respectively; $E \times d$ is the so-called difference-in-difference estimator; CAN is the current account (CA) norm, namely the (equilibrium) current account level that should prevail on the basis of fundamentals; ε is the robust error term.

Following the methodology in Salto and Turrini (2010), the CA norm is extracted from a panel regression of current account balances on factors including the oil balance, the fiscal policy stance relative to trading partners, the old-age dependency ratio, real GDP per capita growth, the relative per capita income level and net foreign assets as a percentage of GDP with standard errors robust with respect to heteroskedasticity and residual correlation within panels. All variables are calculated as 4-year non-overlapping averages.⁹ By including the CA norm, we are de facto estimating for deviations from “normal” current account positions that can be attributed to EMU. It should be noted that the inclusion of the CA norm comes with some significant advantages. First, it is able to explain both the cross-section and time-series variation in the data such that additional fixed effects are not necessary. Second, it allows us to opt for a static specification so that no solution has to be found to account for the fact that the current account is typically exposed to mean reversion. Third, it justifies the absence of determinants on the supply side in the specification to the extent that a deviation from the norm means by definition that the REER is either under- or over-appreciated.

Table 1 reports results from three different estimation techniques. There is significant (non-linear) heteroscedasticity in the data that warrants the use of robust error terms, as evident from the outcome of the White’s test based on estimating the baseline specification by ordinary least square (OLS) (Model 1). Model (2) addresses the heteroskedastic error structure by clustering errors at the country level. Model (3) estimates the same specification by feasible generalised least squares (FGLS). The similarity of the results between Model (2) and Model (3) is guarantee of the fact that there is no structural misspecification. The difference-in-difference estimator is significant and negatively signed across the board, which confirms that the beginning of EMU in 1999 was responsible for a deterioration of the current account position (or its deviation from equilibrium levels) in more unequal countries relatively to less unequal ones. Our preferred estimation technique is FGLS because

⁹ See list of variables in the “Appendix”.

Table 1 The causal impact of the EMU process on EA external imbalances (1980–2015)

Variables	(1) OLS	(2) Cluster-robust SE	(3) FGLS
Treat	−1.034* [−1.915]	−1.034 [−0.643]	−0.0258 [−0.0556]
Post	3.039*** [6.014]	3.039** [3.110]	2.866*** [6.976]
Diff-in-diff	−5.921*** [−7.980]	−5.921*** [−3.985]	−5.733*** [−8.883]
CA norm	0.775*** [7.043]	0.775* [1.854]	0.940*** [8.370]
Constant	0.657** [1.995]	0.657 [0.756]	0.527* [1.944]
Observations	352	352	352
R-squared	0.492	0.492	n.r.
Number of countries	11	11	11
White's test	Chi2(8) = 45.33		

Estimation methods: Model 1 = ordinary least squares (OLS); Model 2 = errors clustered at country level allowing for heteroskedastic error structure; Model (3) = feasible generalised least squares (FGLS) allowing for heteroskedastic error structure with neither cross-sectional correlation nor autocorrelation within panels. The use of weights here is based on the quadratic function of the inverse of the error term of a first-stage OLS. The sample includes all countries that participated in the first wave of EMU (AT, BE, FI, FR, DE, IE, IT, LU, NL, PT, ES) plus Greece over 1980–2015

t-statistics in brackets *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

it does not require as many groups as cluster-robust standard errors do and because it better fits a situation in which all aspects of the model are completely specified, which is likely to be the case given the inclusion of the CA norm.

4.2 Additional controls

We introduce additional controls. In order to have a more explicit test of the role of inequality, we include each country's inequality record in 1999 as measured by the standardised Gini coefficient, which is our proxy of the share of the population that was credit-constrained immediately prior to full financial integration. We include it both as a covariate (Model 1) and in interaction with a dummy for relatively unequal countries and a time dummy for the period after 1999 (Model 3), where the latter approach should allow to better capture whether there is something peculiar about the EMU period. The value of income inequality immediately prior to treatment is statistically significant with higher levels of inequality associated with worse external positions after 1999. Additionally, we include real long-term interest rates both alone (Model 2) and in interaction with the treatment (Model 4) as for income inequality to control for the fact that the behaviour of more unequal countries is also driven by the cost of credit (or of perceived risk), which significantly fell for these countries following the downwards convergence in interest rates induced by the financial integration process. Looser credit conditions came with a deterioration in these countries' external positions, a result that confirms the role of financial integration and that complements the finding about the importance of starting

income inequality, which rather captures the size of the population that suddenly faces looser credit conditions. Model (5) shows indeed both interactions.

5 Robustness checks

Our robustness checks include the choice of alternative time breaks; different samples to account for possible sampling errors; and the use of an alternative specification to validate our assumption that EMU-induced financial integration is exogenous.

5.1 Time breaks

As part of our robustness checks, we have tested for the causal effect of EMU-induced financial integration assuming that the “treatment” starts already in 1990, which is when capital controls are formally eliminated in the EU as a whole. One alternative time break we used is the year 1995 as this is the average time around which the capital account is significantly liberalised for most prospective EMU members, as recorded by the so-called Chinn-Ito index, which is a *de jure* measure of financial (or capital account) openness.¹⁰ The difference-in-difference estimator remains highly significant in the baseline specification independently of the time break chosen. Most interestingly, the size of the coefficient increases with time reaching its peak in 1999, which is likely to reflect the fact that market-based and administrative controls on capital flows are eliminated progressively and financial integration can be considered complete with the final elimination of exchange rate risks (Table 2).

5.2 Potential for sampling errors

We have included Luxembourg in the sample, which we had initially left out because it is in many respects an outlier. Sign, significance and size of the coefficients remain all unaltered. We have also identified a completely different sample that allows us to use the difference-in-difference approach in a more conventional fashion by testing for the causal relation between financial integration and imbalances in the most unequal euro area countries compared with a group of similarly unequal countries that did not go through the same financial shock. To do so, we extended the analysis to all OECD countries that had above-average inequality levels over 1980–2015, so as to isolate all countries with allegedly a higher share of lower-income groups. The group of relatively unequal countries selected in this way comprises 12 OECD countries, namely Australia, Greece, Ireland, Italy, Korea, Mexico, New Zealand, Portugal, Spain, Turkey, UK and USA. The assumption is that EA members are subject to treatment in 1999, while the

¹⁰ The Chinn-Ito index accounts for the number of restrictions on cross-border financial transactions as reported in the IMF’s Annual Report on Exchange Rate Arrangements and Exchange Restrictions. Greater values indicate that a country is more open to cross-border financial transactions (Chinn and Ito 2006).

Table 2 The role of starting income inequality and credit conditions (1980–2015)

Variables	(1) FGLS	(2) FGLS	(3) FGLS	(4) FGLS	(5) FGLS
Treat	6.527*** [8.204]	6.485*** [8.125]	0.329 [0.710]	3.967*** [5.153]	-0.0325 [-0.0720]
Post	2.936*** [8.608]	3.288*** [8.353]	3.378*** [7.559]	0.720** [2.257]	2.866*** [6.952]
Diff-in-diff	-5.820*** [-9.747]	-6.043*** [-10.25]			
CA norm	0.701*** [6.147]	0.751*** [6.558]	0.995*** [8.857]	0.769*** [6.411]	0.960*** [8.553]
Starting inequality	-0.909*** [-10.12]	-0.862*** [-9.490]		-0.828*** [-8.822]	
Real (LT) interest rates		0.149** [2.316]	0.190*** [2.850]		
Starting inequality × treat × post			-0.179*** [-9.573]		-0.193*** [-9.519]
Real (LT) interest rates × treat × post				-0.198* [-1.768]	0.263** [2.560]
Constant	24.07*** [10.53]	22.15*** [9.326]	-0.405 [-0.966]	23.07*** [9.414]	0.557** [2.035]
Observations	352	343	343	343	343
Number of countries	11	11	11	11	11

Estimation method: feasible generalised least squares (FGLS) allowing for heteroskedastic error structure with neither cross-sectional correlation nor autocorrelation within panels. The use of weights here is based on the quadratic function of the inverse of the error term of a first-stage OLS. The sample includes all countries that participated in the first wave of EMU (AT, BE, FI, FR, DE, IE, IT, LU, NL, PT, ES) plus Greece over 1980–2015

t-statistics in brackets *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

others are not. The evidence based on the Chinn-Ito index is in fact that, while financial integration is a global phenomenon starting with the 1980s, the level of capital account openness that EA members achieve during the EMU process is unparalleled by any other OECD countries (see Fig. 8 in the “Appendix”). Table 3 reports the results. The difference-in-difference estimator confirms that the financial shock associated with EMU caused a deterioration of the external position of EA countries characterised by high income inequality compared with countries with a similar distribution of income that did not go through the same shock.

5.3 Exogenous financial-integration shock

EMU is here conceived as a massive credit supply shock allowing access to credit for categories of income that had been constrained until then. Access to credit is normally proxied by private credit to GDP. The measure is endogenous and any estimation that includes it as a simple covariate is likely to produce biased results. To overcome this problem, we use the Chinn-Ito index which, by being a de jure

Table 3 The causal impact of the EMU process on external imbalances (1980–2015)

Variables	(1) OLS	(2) Cluster-robust SE	(3) FGLS
Treat	1.898*** [3.944]	1.898 [1.469]	2.243*** [5.569]
Post	0.351 [0.787]	0.351 [0.930]	0.0831 [0.263]
Diff-in-diff	-3.156*** [-4.830]	-3.156** [-2.893]	-3.031*** [-5.288]
CA norm	0.983*** [10.30]	0.983*** [5.063]	0.843*** [9.326]
Constant	-1.693*** [-5.529]	-1.693*** [-3.216]	-1.940*** [-9.270]
Observations	356	356	356
R-squared	0.325	0.325	n.r.
Number of countries	12	12	12

Estimation method: feasible generalised least squares (FGLS) allowing for heteroskedastic error structure with neither cross-sectional correlation nor autocorrelation within panels. The use of weights here is based on the quadratic function of the inverse of the error term of a first-stage OLS. Sample: Australia, Greece, Ireland, Italy, Korea, Mexico, New Zealand, Portugal, Spain, Turkey, UK and USA

t-statistics in brackets *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

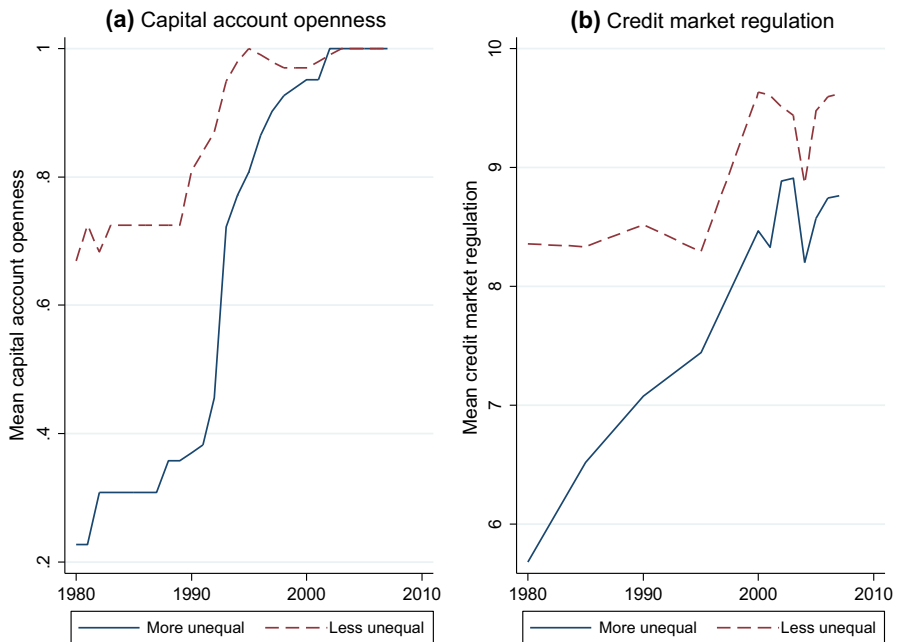


Fig. 5 Capital account openness and credit market regulations (1980–2011). Source: Own elaboration based on Chinn and Ito (2006) and Fraser Institute. The sample includes all euro area countries that entered in the first wave (except Luxembourg) plus Greece. Unequal includes Greece, Ireland, Italy, Portugal and Spain; equal consists of Austria, Belgium, Finland, France, Germany, and The Netherlands

measure of financial openness, is likely to be exogenous. To account for the parallel integration of domestic credit markets, we use an indicator for credit market regulation compiled by the Fraser Institute. Figure 5 provides a snapshot of the evolution of financial integration with respect to both international and domestic credit markets across two groups of countries.

Figure 5a shows average capital account openness in more unequal (Greece, Ireland, Italy, Spain and Portugal) versus less unequal countries (Austria, Belgium, Finland, France, Germany, Netherlands) over 1980–2011. Greater values indicate that a country is more open to cross-border financial transactions. In the early 1990s, when phase I of EMU kicked in, less unequal countries were relatively open financial systems so that in fact the regime change of the early 1990s was less significant for them than for the others. Figure 5b displays differences in credit market regulations over the same period. The indicator accounts for private versus government ownership of banks, government borrowing compared with private borrowing, interest rate controls and the magnitude of negative real interest rates if present. Greater values signify less regulation. As in the case of capital account openness, less unequal countries had on average looser credit market regulation than more unequal countries. The evidence on trends in credit market regulation also underpins the argument that, when financial integration took place in the early 1990s, some countries enjoyed easier access to credit not only through foreign markets but also through a less regulated domestic credit market, with domestic banking systems significantly contributing to credit bubbles (Lane and McQuade 2014.)

In order to test whether renewed access to credit played an important role in explaining why more unequal euro area countries got indebted and less unequal ones much less so, we estimate the equation below on the sample of all countries that accessed the euro area in the first wave plus Greece over the period 1980–2015:

$$CA_{it} = \beta_0 + \beta_1 CAN_{it} + \beta_2 KA_{it} + \beta_3 EMU + \beta_4 KA_{it} \times Unequal_i + \beta_5 KA_{it} \times Unequal_i \times EMU + \varepsilon_{it}, \quad (2)$$

where CA is the current account balance as a share of GDP; CAN is the CA norm described as above; KA account for capital account openness as measured by the Chinn-Ito index (Chinn and Ito 2006); $KA \times Unequal$ is the interaction between capital account openness and a dummy for relatively unequal countries; $KA \times Unequal \times EMU$ interacts capital account openness, a dummy for more unequal countries and a time dummy for the period after 1999 so as to capture whether EMU-induced financial integration made a difference. The same estimation is run substituting capital account openness with a measure for credit market regulation for a comprehensive assessment of credit conditions in each country.¹¹ For robustness purposes, results are shown both for fixed and random effects. The outcome from the Hausman test suggests that both estimations are unbiased.

Table 4 reports the results. While both financial openness and credit market regulation tend to be positively associated with external positions, the situation changes under EMU for more unequal countries with higher financial integration

¹¹ For a definition of variables and sources, see “Appendix”.

Table 4 The causal impact of the EMU process on EA external imbalances depending on financial regime (1980–2015)

Variables	(1)	(2)	(3)	(4)
	FE	FE	RE	RE
CA norm	0.323*** [3.153]	0.359** [2.526]	0.364*** [3.663]	0.481*** [3.525]
Financial openness	4.364*** [3.032]		4.225*** [4.181]	
EMU	2.218*** [4.524]	2.321** [2.584]	2.218*** [4.688]	2.479*** [3.440]
Financial openness × unequal	−2.202 [−1.226]		−1.738 [−1.490]	
Financial openness × unequal × EMU	−6.301*** [−7.342]		−6.428*** [−7.844]	
Credit market regulation		0.854 [1.431]		0.762*** [3.044]
Credit market regulation × unequal		−0.373 [−0.505]		−0.0637 [−0.334]
Credit market regulation × unequal × EMU		−0.739*** [−4.507]		−0.798*** [−5.892]
Constant	−2.915*** [−4.185]	−6.044** [−2.168]	−2.873*** [−3.681]	−6.096*** [−2.966]
Observations	351	173	351	173
R-squared	0.267	0.249		
Number of countries	11	11	11	11
Hausman test	16.13 [0.0065]	11.70 [0.0392]		

Estimation methods: random- and fixed-effects. The sample includes all countries that participated in the first wave of EMU (AT, BE, FI, FR, DE, IE, IT, LU, NL, PT, ES) plus Greece over 1980–2015

t-statistics in brackets *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

being associated with a deterioration in the current account, a result that confirms that these countries were more exposed to the EMU's regime change than the others.

6 Conclusions

The first decade of EMU was associated with an unprecedented rise in macroeconomic imbalances. The crisis led to a correction of current account deficits but not to a symmetric adjustment of excessive surpluses. We find that the EMU process itself was responsible for excessive imbalances. Building on the capital-flow hypothesis, we suggested that the reason behind it revolves around household indebtedness, with more unequal EA countries prone to borrow more than the others because here a higher share of the population saw collateral constraints being softened following EMU-induced financial integration and the rapid downwards interest rate convergence. The crisis forced deleveraging onto the

same portion of the population because indebted lower-income (unskilled) households were the first to be pulled out of the labour market and hardly had financial buffers. They deleveraged the hard way by cutting down on consumption, which led to a significant correction of current account deficits in more unequal EA countries.

There are of course some caveats. This paper has been mostly concerned with the demand side of current account imbalances. This is not to deny that imbalances may be driven by supply-side factors, being the reflection of a country's export performance and of the relative resilience of world market shares. We have addressed the issue by including the current account norm and thus by estimating for deviations from equilibrium levels, which would imply that real effective exchange rates and either over- or under-valued.

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Appendix

See Figs. 6, 7, 8 and Table 5.

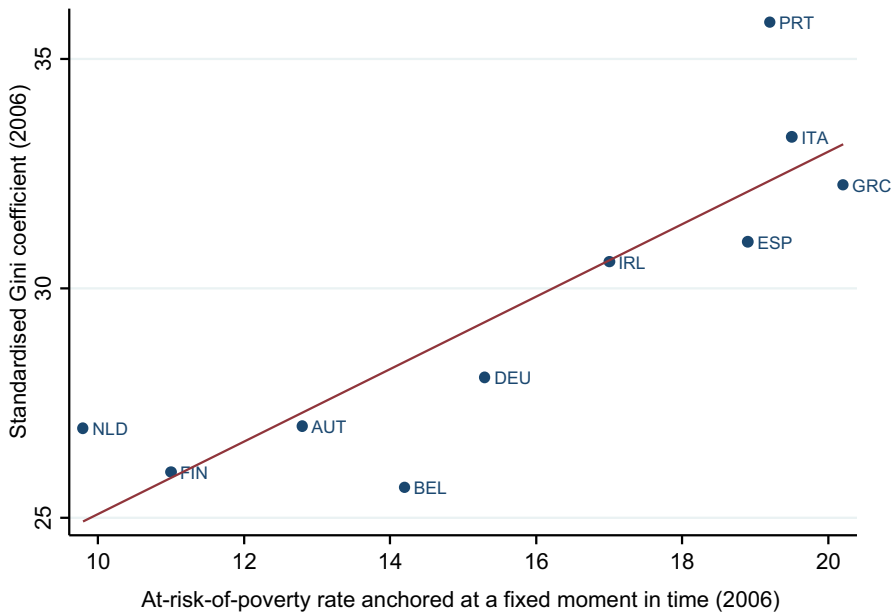


Fig. 6 The relation between income inequality and relative poverty, 2006. Source: Own elaboration based on Eurostat and Standardised World Income Inequality Database (SWIID). The sample includes all euro area countries that entered in the first wave (except Luxembourg) plus Greece. The at-risk-of-poverty rate is the share of the people with an equivalised disposable income (after social transfers) below the at-risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income after social transfers. The Eurostat does not provide data on the at-risk-of-poverty rate for France

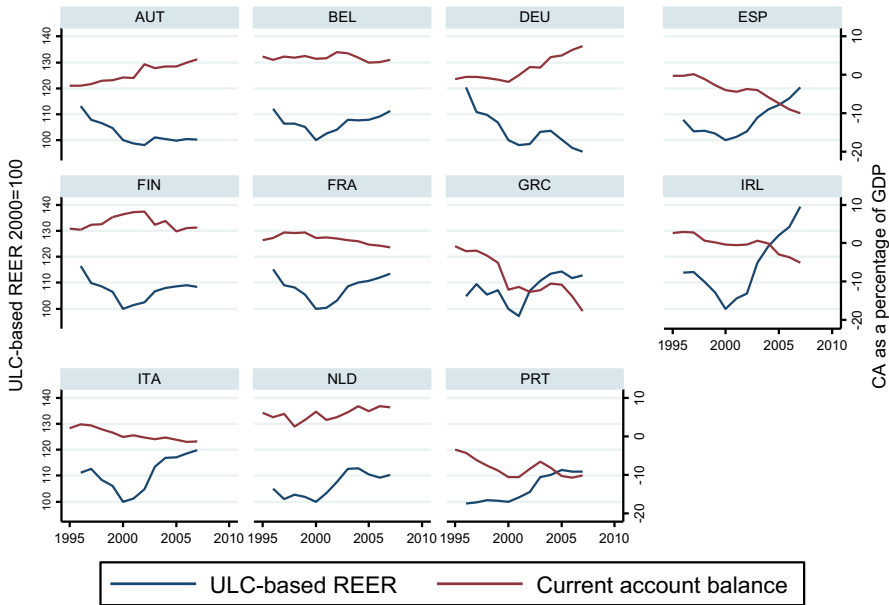


Fig. 7 Current accounts and ULC-based REER, 1995–2007, EA. Source: Own elaboration based on AMECO Database. The sample includes all countries that participated in the first wave of EMU plus Greece

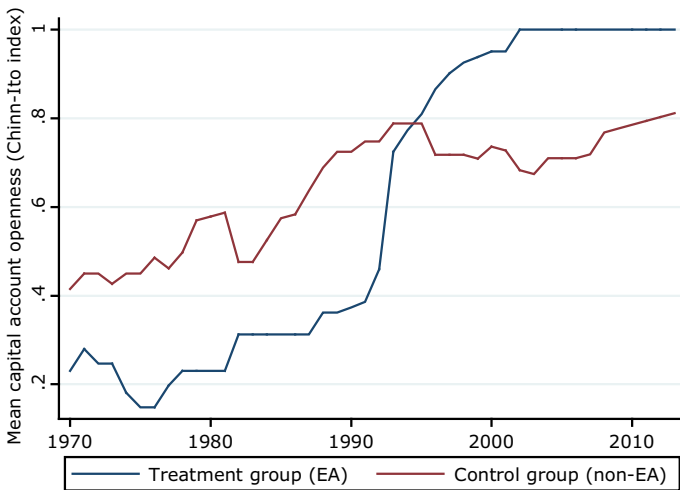


Fig. 8 Capital account openness in EA vs the world 1980–2011. Source: Own elaboration based on Chinn and Ito (2006). Treatment group = Greece, Ireland, Italy, Portugal and Spain. Control group = Australia, Korea, Mexico, New Zealand, Turkey, United States, United Kingdom

Table 5 List of variables

Variable	Definition	Source
Current account	Current account balance (% of GDP)	AMECO
Net foreign assets	Net foreign assets (% of GDP)	AMECO
Credit market regulation	The indicators included in the index for credit market freedom are: (1) private versus government ownership of banks; (2) government borrowing compared to private borrowing; and (3) interest rate controls and the magnitude of negative real interest rates if present	Fraser Institute
Capital account openness	It is a <i>de jure</i> measure of financial openness and is measured by the number of restrictions on cross-border financial transactions as reported in the IMF's Annual Report on Exchange Rate Arrangements and Exchange Restrictions	Chinn and Ito index
Gini coefficient	Gini coefficient	Standardized World Income Inequality Database (SWII)
Top 1 %	Share of top 1 % of income distribution	Standardized World Income Inequality Database (SWII)
Relative income	Per capita income relative to the US (=100) at current prices (PPP)	Penn World Tables
Real GDP growth	Real GDP growth rate	OECD
Old dependency ratio	Ratio of people older than 64 to the working-age population	WDI
Fiscal policy stance	Cyclically adjusted net lending/borrowing of general government (% of GDP)	AMECO

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