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by

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Current Account Imbalances and Cost Competitiveness: The Role of the Euro

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Abstract

The changing environment that the Euro has brought to its member countries could have fuelled the deteriorating effect that net capital inflows have on cost competitiveness. This paper uses a difference-in-differences (DID) approach to assess the effect of the Euro on the relationship between net capital inflows, as measured by current account imbalances, and cost competitiveness over the period 1980-2014. The sample consists of annual data for 26 developed economies and comprises the EA12 countries as well as non-Euro countries, which are used as the comparison group in the analysis. First, we find evidence that positive capital inflows may negatively impact cost competitiveness levels in recipient countries. Second, and this is the main contribution of our paper, we find that the Euro seems to have amplified the deteriorating effect of net capital inflows on cost competitiveness. Therefore, although the policy debate is focused on constraining unit labour cost growth through structural reforms, additional macroprudential policies should be implemented to mitigate the detrimental effect that capital inflows may have in an economy.

Keywords: current account imbalances, cost competitiveness, EMU, diff-in-differences.

JEL classification: F32, F45, C21, C23.

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1 Introduction

The outbreak of the Great Recession in 2008 highlighted the fragility of the European Monetary Union (EMU) in terms of its stabilisation capacity, especially when coupled with growing scepticism in the financial markets, and as the sustainability of the external imbalances accumulated in some countries became a concern. Among these imbalances, the external debt and the cumulative current account deficits were the ones subject to most attention by policy makers, as the lending drought that followed the onset of the financial crisis caused some of the Eurozone economies to experience a liquidity and debt crisis that eventually had a direct impact on the real economy.

In both the policy debate and the literature, it is widely agreed that the current account imbalances played a major role in creating the European debt crisis. Divergence in price and cost competitiveness −in other words, inflation and unit labour cost growth differentials− between the periphery and the northern core of the Eurozone were at the heart of current account imbalances within the common currency block. However, these differentials should not be a concern in a monetary union according to Balassa (1964) and Samuelson (1964), who linked them with the real convergence process of lower income countries within a currency union: real convergence leads to higher productivity growth, which eventually translates into higher real wages, especially in the tradable sector. Nevertheless, the recent literature on this topic (Alberola, 2000 and Rogers, 2007) shows how the differentials are much higher than those predicted by the Balassa-Samuelson effect, which has a weak explanatory power in the Eurozone case.

In line with this perspective that price divergence is a major concern in a monetary union, we find the Optimum Currency Area (OCA) theory developed in the celebrated seminal paper of Mundell (1961). The author explained how, in a fixed exchange rate regime with different idiosyncratic demand shocks, such as those observed among the Eurozone members, these shocks need to be compensated for by using price and wage flexibility. Nevertheless, the Eurozone has proven not to be an OCA, in terms of symmetry among its members and price flexibility at national level. This divergence in cost competitiveness and need for flexibility has been at the centre of the policy debate in European and national institutions; over the past years, their efforts have been directed at deregulation and liberalisation in both the goods and labour markets, in order to tackle the lack of cost competitiveness in the periphery and achieve the optimal level of price and wage flexibility. The Euro Plus Pact, adopted on the 25th March 2011, represents a good example of the approach undertaken by the EU in order to strengthen cost competitiveness and prevent the future accumulation of financial and economic imbalances. Among the measures that the pact stipulates, reviews of wage contracts, such as indexed and public sector wages, reflect concerns about restricting unit labour cost growth in order to restore competitiveness. Related to this line of theories, we find López-Salido et al. (2005), who use a DSGE model to show how wage indexation clauses are major determinants of inflation differentials in Spain; and Zemanek, Belke and Schnabl (2010), who use panel regression to show a significant impact of private restructuring and public structural reforms on intra-euro area competitiveness.

However, there is another strain of literature and policy debate that, rather than focusing on cost competitiveness divergence as the main driver of the imbalances, pays more attention to the current account, and its determinants, as the drivers of said divergences. In particular, recent research points towards the existence of financial cycles that foster domestic demand booms, which are seen as the main drivers of the current account imbalances. Comunale and Hessel (2014), estimating panel error-correction models for the trade balance, conclude that, although differences in price competitiveness have an effect on the trade balance, differences in domestic demand are more important and, financial cycles fluctuations provide a more convincing explanation of trade balance fluctuations than normal business cycles do. Mendoza and Terrones (2012), using a sample of 61 emerging and industrial countries over the period 1960-2010, find that credit booms are synchronised internationally and follow surges in capital inflows. As explained by Sinn (2014), the capital movements from northern core countries towards the periphery played a major role in financing the booming economies of that region, a boom that was further facilitated by the common currency and the greater financial integration following the establishment of the internal market in 1991 and the abolition of capital controls.

The reasoning behind this theoretical framework lies in the fact that financial fluctuations are associated with credit booms, which boost domestic demand and widen external imbalances. Close attention should thus be paid to this literature, which breaks with the assumption that cost competitiveness is the main driver of external imbalances, and calls for further exploration of the causal relationship between these two elements. It is therefore reasonable to believe that capital inflows themselves, coming in the form of current account imbalances, are associated with fostering domestic demand and investment, and that they could generate inflationary pressures, which can eventually lead to divergence in cost competitiveness, such as the that observed in the Eurozone.

Since capital inflows are themselves a direct consequence of current account (CA, hereafter) imbalances, it is then natural to think that these imbalances end up affecting competitiveness in an economy, and not only the other way around. In fact, the two reciprocally feed into each other. This direction of causality, from CA imbalances to cost competitiveness, has received scant attention in the literature and it constitutes our first research question in this paper. The question that follows concerns the extent to which the Euro has acted as a mechanism that fuels the transmission of CA imbalances into cost competitiveness. Although the policy debate in Europe is focused on restoring competitiveness, if capital flows have been a main determinant of divergence in competitiveness, and the Euro has contributed to intensifying this relationship, the policy debate should perhaps then focus on more macroprudential policies aimed at slowing the unsustainable credit growth that may stem from a net entrance of capital.

This paper seeks to contribute to the understanding of the bidirectional relationship between CA imbalances and cost competitiveness. First, the possible causality from an accumulation of CA imbalances to a deterioration of cost competitiveness is analysed. To this end, and using data from the IMF and OECD for the period 1980-2014, we start by analysing the time-series properties of cost competitiveness and current account measures to rule out any possible spurious correlation between them.[1] Then, we employ Granger causality tests to investigate the direction of causality proposed in this paper, that is, from current account deficits (capital inflows) to cost competitiveness. Second, the main novelty of this paper is that, to the best of our knowledge, this is the first time in this literature that a difference-in-differences (DID) approach has been employed to investigate whether the introduction of the Euro has had any impact on this relationship, through the different channels discussed below. To anticipate our results, positive evidence is found regarding the causality direction proposed, and the DID results show that the introduction of the Euro has intensified the effect in question.

In what follows, we first review the existing literature on capital inflows and cost competitiveness in Section 2. In Section 3, we describe the data and the main variables of the analysis. Section 4 reports the preliminary time-series analysis of the sample and the Granger causality tests. Next, in Section 5, we explain our econometric identification strategy and report the estimation results. In Section 6, we detail our conclusions.

2 Current Accounts and Cost Competitiveness

2.1 Current Accounts and Capital Inflows

As previously mentioned, the literature to date has mainly focused on how cost competitiveness differentials among Eurozone countries have had an impact on their current accounts, or in other words, the trade balance. Nonetheless, the evidence suggests that the reverse causal relationship also needs to be explored. A current account deficit, when viewed narrowly as the gap between exports and imports, is associated with a negative effect on the economy, resulting in lower employment in export and import competing industries. Under this perspective, the existing literature sees cost competitiveness as the main determinant of the current account balance. However, national income accounting shows how a current account deficit can be reinterpreted in terms of capital inflows, which actually provide financing funds that can potentially boost domestic demand and investment through credit booms, giving rise to inflationary pressures, which eventually lead to a deterioration of cost competitiveness.

The national income accounts define the gross national product (GNP) as the value added from producing goods and services, grouped into the following categories: private consumption (C), private investment (I), government purchases (G), and net exports plus net factor income (X-M)[2]. Hence, the GNP is defined as:

$$GNP = C + I + G + X - M \tag{1}$$

GNP can also be defined as any income received by individuals that can be used as private consumption (C), savings (S), paid in taxes (T) or transferred abroad (TR):

$$GNP = C + S + T + TR \tag{2}$$

[1]Data from Eurostat have also been retrieved for robustness purposes, as presented in Section 3.

[2]Net factor income accounts for returns on domestic and foreign assets.

Making equation (1) equal to (2), and rearranging terms, the following identity is obtained:

$$X - M - TR = (S - I) + (T - G) \tag{3}$$

where X-M-TR is the current account (CA) of the economy, defined as the surplus of private savings over investment plus the difference between government tax receipts and government expenditure on goods and services (government surplus).

Finally, one unit of savings (S) is classified according to the type of asset it buys: domestic physical capital, which is investment (I), domestic government debt, which is equal to the budget deficit (G-T), and foreign asset (FA) of any type (financial or physical). Hence:

$$S = I + (G - T) + FA \tag{4}$$

Rearranging we have:

$$FA = (S - I) + (T - G) \rightarrow FA = X - M - TR = CA \tag{5}$$

Equation (5) is the other side of the coin of equation (3). The relationship between the two is interpreted as the accumulation of foreign assets when domestic savings are enough to finance private investment and the government budget deficit, captured by the current account sign. If $CA > 0$, then the economy becomes a net lender to the rest of the world, or in other words, the economy experiences a capital outflow. When $CA < 0$, the economy becomes a net debtor to the rest of the world, which by the same token implies that the economy experiences a capital inflow.

In his book, *The Euro Trap*, Sinn (2014) uses data from Euro countries to show that current account deficits should be interpreted not only as the result of divergences in prices and wages within the Eurozone, but also as the result of capital movements from the northern core to southern regions, movements that enabled southern economies to finance their domestic consumption and investment. In fact, the author argues that capital flows are the drivers of the contemporaneous divergences in competitiveness, as they had an inflationary effect, particularly in peripheral economies. These economies are now faced with the need to run current account surpluses (capital outflows) in order to honour their external debt, which was amassed during the first decade of the Euro by running current account deficits (capital inflows).

2.2 Literature Review: From Capital Inflows to Cost Competitiveness

The literature on capital inflows and their relationship with cost competitiveness dates back to Keynes (1929), with his article *The German Transfer Problem.* The celebrated economist discussed how Germany would have to depreciate its wages, in terms of gold, in order to honour World War I reparations; in other words, the continuous capital outflow required would lead to an improvement in the economy's cost competitiveness and thus boost exports, the revenues from which could be used to pay the sanctions. By the same token, the author also pointed out that the recipient countries of those transfers (the allies) would experience a deterioration of their real exchange rate.

In the literature, this type of phenomena is also referred to as *The Dutch Disease*[3], identified in a trade model developed by Corden and Neary (1982) and Corden (1984). The model is not focused on the effect of capital inflows themselves, but the authors explain a parallel mechanism to that of the *transfer problem* in terms of short-term changes in demand for non-traded products. A capital inflow provides resources for domestic absorption, which will be directed to both the tradable and non-tradable sector. While prices in the tradable sector are quoted internationally, the non-tradable sector will experience an increase in prices and factors of production, resulting in an appreciation of the real exchange rate.

While Corden and Neary focused on a booming exporting sector that provides revenues for domestic absorption, the increased demand for non-tradable over tradable goods need to be borne in mind, especially in the Eurozone case, where periphery countries have experienced sharp growths in non-tradable sectors such as real estate. It is reasonable to believe that the capital inflows, along with the shift in demand towards the non-tradable sector, may have had a detrimental effect on the cost competitiveness of these economies. Belke et al. (2009) highlight the relevance of the non-tradable sector and its relationship with unit labour cost growth, while López-Salido et al. (2005) provide a general equilibrium approach for explaining the transmission mechanism of prices from the non-tradable to the tradable sector.

Going back much further, other episodes can be found where capital inflows had negative effects on the competitiveness of an economy. One such example occurred in Spain between the 16th and the 17th centuries; Forsyth and Nicholas (1983), Flynn (1982) and Drelichman and Voth (2005) cite the new influx of silver from the New World in the 16th century, along with other factors, as one of the causes for the decline in export industries such as wool. The increased supply of silver pushed down its purchasing power, giving rise to inflationary pressures and a deterioration of the export industries.

More recent studies have been founded on more empirical and quantitative grounds. Calvo et al.(1993), employing a dynamic set of equations, characterise the surges in capital inflows in Latin American countries, and examine how these episodes are followed by an appreciation of the real exchange rate. Bakardzhieva et al.(2010), employing a panel of 57 emerging economies, decompose capital inflows depending on their nature and analyse their effects separately, revealing that portfolio investments, foreign borrowing, aid and income lead to real exchange rate appreciation, while FDI has no effect. Gelman et al.(2013) find that capital flows are cointegrated with the real effective exchange rate, which is a widely accepted measure of competitiveness, suggesting that capital movements move together with cost competitiveness and nominal exchange rates.

Finally, Gabrisch and Staehr (2015) and Gabrisch (2015), employing Granger causality tests and VAR models for a sample of EU and Balkan countries, find positive evidence that capital inflows Granger cause cost competitiveness. They conclude, however, that this causality direction cannot be easily generalised; rather, given the numerous studies

[3]The term 'Dutch Disease' was coined to describe the results of the 1958 discovery of the Groningen natural gas field. It stems from a large increase in a country's income, usually associated with natural resources discoveries, or any large foreign capital accumulation.

providing positive evidence in favour of both causality directions, it likely depends on the empirical study and the sample being employed.

Therefore, the causal direction that we investigate in this paper is well-established in the literature but there is limited empirical analysis with up-to-date data. Furthermore, little has been said about how this causal direction has been affected by membership in a common currency area. Below, we review the literature that suggests how the Euro may have provided a mechanism that fuels transmission from CA imbalances (capital inflows) to cost competitiveness, and we also present a preliminary look at some indicators that support this view.

2.3 Capital Inflows effects on Competitiveness: the role of the Euro

The main point of our paper is to explore whether the introduction of the Euro has intensified the relationship between capital inflows and cost competitiveness. At least two mechanisms can be identified as capable of affecting this relationship: the lack of external adjustment due to the absence of nominal exchange rates, and the limited scope of the monetary policy to compensate for inflation differentials in particular countries due to the asymmetric demand shocks for the Eurozone members.

Pérez-Caldenty and Vernengo (2012) argue that the financial deregulation that took place in the EU during the 90s led to a sharp increase in capital movements, which in turn had a detrimental effect on the real exchange rate of periphery countries due to the absence of nominal exchange rate adjustment. This first mechanism has historically led to internal imbalances in the countries involved in European monetary integration. In fact, it is worth reviewing the history of the European monetary integration, as the turbulence experienced in the 90s partly resembles the current problems. The exchange rate mechanism (ERM), launched in 1979, was a fixed exchange rate agreement in which the central banks of the participating European currencies would have to intervene in the markets in order to hold the central parity around the European Currency Unit (ECU), based on a weighted basket of currencies. Although realignments took place in order to allow some flexibility to compensate for inflation differentials among countries, the system proved incapable of offsetting inflation differentials of countries such as Italy, which also exhibited persistent current account deficits. Interestingly, while there were capital controls, the system worked smoothly; once capital controls were abolished with the creation of the internal market in 1991, the system collapsed. Thus, the lack of nominal exchange rate adjustment, along with free capital movements, may account for the prevalence of inflation differentials, partly explained by absence of external adjustment relative to the other currency union members.

The second mechanism is the neutrality of the ECB policy, or its ineffectiveness in correcting inflation divergences in a particular country, given the asymmetric demand shocks facing Eurozone members. The underlying explanation is that some economies may be below the inflation target (2%), while others might be above it; however, when the ECB weights the aggregate level of inflation, the Eurozone target may be achieved, leaving the monetary policy paralyzed (De Grauwe, 2016). Thus, the policy rate might not be appropriate for some economies, as they might be going through different phases of the business cycle. This is one of the reasons why Mundell (1972) emphasised the degree of symmetry that members of a currency area should share, given that the lower the level of symmetry, the less effective the monetary policy becomes as a stabilisation tool, and the more costly the monetary union becomes for its members. As an example, during the period 2000-2005, Germany experienced low economic growth and a low inflation rate, whereas Spain was experiencing historical maximums in terms of economic growth, with an inflation rate above the 2% target of the Eurozone; the ECB, however, followed a low interest rate policy. It seems logical to assume that the very design of the Euro itself played a major role - via the channels through which the monetary policy is implemented by the ECB - in fostering the economic expansion of some economies. By the same token, this mechanism could have potentially fuelled the deteriorating effect that capital inflows exert on cost competitiveness, as the monetary environment facilitated the persistence of inflation differentials in the Eurozone, and the transmission mechanism from capital inflows to cost competitiveness could have been affected by the monetary policy tools.

These two factors combined prompt further investigation into whether the Euro has played an influential role in the relationship between capital inflows and cost competitiveness. However, to our knowledge, no study directly addresses the role of the Euro in the relationship between capital inflows and cost competitiveness, which is the main novelty of this paper.[4]

To further support the view that the Euro may have intensified the transmission of capital inflows to cost competitiveness, we take a first look at the data. As mentioned above, we have collected the data from the OECD and the IMF World Economic Outlook Database (WEO), for a sample of 26 industrialised economies during the period 1980-2014 (further details of the data are provided in Section 3 and 4). Following Gabrisch and Staehr (2015), Figure 1 represents the relationship between the lagged capital inflows - measured as the first differences of the ratio of the current account over GDP times (-1) - and changes in competitiveness. In the top panels of the figure, changes in competitiveness are measured as the growth rate of real unit labour costs, whereas in the bottom panels they are measured as the growth rate of labour compensation per unit of input (labour hours).[5] The graphs on the left-hand side depict the relationship for those countries that have not adopted the Euro, while the right-hand-side ones show the relationship for those that share the common currency. It can be observed, first, that there is a positive relationship between capital inflows and competitiveness for both group of countries, and second, that this is slightly more pronounced for Euro members. Next, Figure 2 represents the same relationship for the sub-sample of Eurozone countries, distinguishing between the period before and after the introduction and physical adoption of the Euro in 2002. The period

[4]Previous literature investigating the Euro effect focuses on trade, starting with the seminal paper of Rose (2000), who estimated a 20% increase in trade flows owing to the Euro. This literature investigates the gross effect of currency unions on trade and capital flows. Jaumotte and Sodriswboon (2010) and Kang and Shambaugh (2013) discuss how current account imbalances in periphery countries were facilitated by the Euro. Households and firms financed their consumption and investment through external borrowing, enabled by access to a bigger international savings pool.

[5]We look at the growth rates rather than the levels for both the capital inflow and cost competitiveness measures since, for reasons further explained in the following sections, this is how they enter into our estimation equations below.

after the introduction of the Euro exhibits a steeper slope, denoting that the positive relationship between capital inflows and deterioration of cost competitiveness seems to have intensified.

Thus, to what extent has the relationship between capital inflows and cost competitiveness been affected by the introduction of the Euro? This question is addressed in the following sections.

(Figure 1 about here)

(Figure 2 about here)

3 Data and Variables

In order to investigate the impact that the introduction of the Euro may have had on the relationship between capital inflows and cost competitiveness, we employ a difference-in-differences (DID) methodology to identify the policy or treatment effect - in this case, the Euro effect. The DID approach, as we will explain further in the next section, requires a sample made up of both Euro countries, which act as a treated group, and non-Euro countries (those that have kept their national currencies at all times), which act as a control group.[6] Additionally, we need a time period that contains data from both before and after the year 2002, in order to identify the treatment or Euro effect occurring when the physical introduction of the Euro took place for all the EA12.[7]

Thus, we employ a panel made up of 26 countries spanning the period 1980-2014, and covering four different regions (Europe, North America, Asia and the Pacific), with most of the sample being located in Western Europe. Due to the data requirements, the databases used are the OECD and WEO database from the IMF. Additionally, for the sake of comparison, we employ the Eurostat database used by Gabrisch and Staehr (2014). Although this database enables robustness checks of some results and also permits the use of additional variables, it comes at the cost of a more reduced sample coverage, since it only contains data for 19 EU countries and the time period is shortened to 1995-2013.

3.1 Cost Competitiveness

Cost competitiveness is commonly measured in terms of the unit labour costs of an economy. The two main cost competitiveness variables used in this paper are labour costs

[6]Treated Group (the Euro Area 12, EA12): Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. Control Group: Australia, Canada, the Czech Republic, Denmark, Hungary, Japan, Korea, New Zealand, Norway, Poland, Sweden, Switzerland, the UK and the US. The Balkan and Eastern European countries (Bulgaria, Estonia, Latvia, Lithuania, Romania, Slovakia and Slovenia) have been dropped from the sample since their classification as treated or control countries does not remain constant throughout the period.

[7]Although the electronic adoption of the Euro took place in 1999, in our analysis, the post-Euro period starts in 2002 when the Euro becomes legal tender. Furthermore, Greece does not enter the system until the 1st of January of 2001 and transaction costs in goods and capital markets are not eliminated until 2002.

per unit of real output and labour compensation per unit of input, both retrieved from the OECD. As an extension and robustness check of the main results obtained with the abovementioned measures, the real effective exchange rate relative to the EA12 has been retrieved from Eurostat, also used in growth rates.

More specifically, throughout the rest of the paper ULC is used to denote the annual growth rate of the ratio of total nominal labour cost to real production. This ratio can be viewed as the nominal cost per employee divided by the employee's productivity. Thus, the variable ULC measures the extent to which compensation grows beyond productivity.

The variable denoted as ULCOM measures, in growth terms, employee compensation per unit of input. This measure represents the average compensation per hour that employees receive, or in other words, the nominal cost per employee. Thus, ULCOM can be viewed as the increase in the numerator of the unit labour cost measure.

Finally, REER12 refers to the growth rate of unit labour costs in the individual EU country relative to the growth rate of unit labour costs in the EA12, with the unit labour costs expressed in European Currency Units (ECU/EUR)[8].

Table 1 displays a brief summary of the descriptives of all the variables, split by period and Euro membership. Though differences in the data at different periods cannot be yet attributed to the Euro or to capital inflows, we can observe that, on average, Euro countries register worse competitiveness (i.e., higher cost growth) than non-Euro countries in terms of ULC, but better cost competitiveness in terms of ULCOM. Furthermore, the post-Euro period is characterised by deceleration of growth in costs for all countries.

(Table 1 about here)

3.2 Capital Inflows

The current account data has been retrieved from the IMF WEO database and it is expressed in percentage points of GDP. Following Calvo et al. (1993), Gabrisch and Staehr (2014), and Gabrisch (2014), the current account is used as a proxy for capital inflows since it proxies for changes in an economy's net foreign position in the capital markets. We acknowledge the caveats of using the current account as a measure of capital inflows, as it simply measures the gross of capital inflows; nevertheless, in this paper we follow the practice adopted by the above mentioned authors and use CA imbalances as our indicator of capital inflows.

For interpretation purposes, we define the capital inflows variable as the current account times (-1), and denote it by KINF. More specifically, we also use the first differences of this variable (denoted by DKINF) in the econometric section below, as we do with the cost competitiveness variables. We find two reasons to use them in first differences. On the one hand, first differences may capture more successfully the short-term relationship between cost competitiveness and capital inflows, which we believe is akin to be driven by

[8]The ECU was the common currency unit employed as unit of account before 1999 in the European Monetary Union.

causality in the direction proposed in this paper. On the other hand, we do so because the time-series properties of the variables, which we explore in Section 4 below, indicate the appropriateness of using the variables in first differences to avoid concerns of unit roots in the series (denoted by DKINF).

Further, in the main econometric analysis in Section 5, and to allow for dynamics in the effects of capital inflows on cost competitiveness, we use two additional variables constructed as transformations of the capital inflows variable. First, we compute for each country and year the average growth of its CA over the previous four years:

$$A4DKINF_{i,t} = \sum_{j=1}^{4} \frac{DKINF_{i,t-j}}{4}.$$

Finally, we define a binary variable that takes the value of 1 when the average over the previous four years is a positive value, and 0 otherwise. Thus, this discretised variable identifies those countries with negative current imbalances, on average, over the previous four years:

$$CUM4_{i,t} = \begin{cases} 1 & \text{if } A4DKINF_{i,t} > 0 \\ 0 & \text{otherwise} \end{cases}$$

Figures 3 and 4 show the average capital inflows, as proxied by the current account imbalances, for Euro and non-Euro countries, and for the pre- and post-Euro periods. It can be observed that, among the Euro countries, current account imbalances have been amplified, while for non-Euro countries these imbalances have remained appreciably more stable, with the exception of Norway, Switzerland, Sweden and Denmark, which all experienced a rise in their capital outflows. The increase in capital inflows in the post-Euro period is particularly marked in the case of those countries in the so-called European periphery (Ireland, Italy, Spain, Portugal and Greece). This provides us some evidence that these countries, some of which also experienced price bubbles in the last decade, may have been particularly affected by the entry of capital inflows coming from the northern core countries. As an extension to our main econometric results, we will look at this sub-sample of countries separately from the rest to highlight possible differentials in the estimated effects.

The variable CUM4, when averaged over the same periods, provides a fairly clear picture of each country's position in terms of net capital inflows. Figures 5 and 6 show the percentage of times the variable CUM4 takes the value of 1 in each period, that is, the percentage of times a country registers a positive capital inflow over a four-year period. Figure 5 shows that before the Euro only Austria experienced a capital inflow during more than 60 percent of this time period. In the Euro period, eight countries experienced a capital inflow for 60 percent of the period, and four of these did so for 80 percent of the period. As in the previous figures, the data shows an increase in imbalances after the implementation of the Euro[9]. For non-Euro countries, Figure 6 shows a more stable pattern and a decrease in the persistence of imbalances.

[9] Note that the European debt crisis after 2009 is included in the sample, over the course of which a significant correction of imbalances took place.

(Figure 3 about here)

(Figure 4 about here)

(Figure 5 about here)

(Figure 6 about here)

3.3 Control Variables

Labour markets and other institutions, as well as different productivity levels across countries, may explain a good portion of the total variation in our cost competitiveness measures. To control for these effects, we include later in our final econometric estimations available data for real labour productivity, unemployment and union density.

Data for the labour productivity variable (RPROD), which represents the units of real output per hour worked, have been retrieved from the OECD database. Labour costs should not grow faster than labour productivity if competitiveness is to remain constant in an economy. Thus, we need to control for the component of the dependent variable that is connected with productivity. Once this has been controlled for, the variation in the dependent (or costs) variable beyond the variation in productivity will more accurately reflect the inflationary or deflationary evolution of cost competitiveness. Also, the omission of a productivity measure would very likely bias the estimation results due to the possible correlation between the CA imbalances and productivity in an economy.

Divergences across countries in their labour markets are mainly reflected in their different unemployment levels and varying degrees of institutionalisation. On the one hand, to control for the different levels of unemployment across the different countries and years, we use information on country-year unemployment rates (UNEMP) also retrieved from the WEO. On the other hand, we include in the estimation the variable union density (UNIOND), retrieved from the OECD, which represents the percentage of unionised wages and salary earners.

Table 1 displays a summary of descriptive statistics of all the variables defined above.

4 Time Series Properties

Prior to the main econometric exercise of this paper, and given the length of the time period under study, we carry out a time-series analysis of the main variables. The purpose of this section is twofold. First, we provide evidence that the first differenced capital inflows and cost competitiveness variables are stationary, so that we can rule out any possibility of spurious regressions caused by the presence of unit roots in these series. Second, we aim to provide evidence on the causality direction proposed in this paper, that is, from capital inflows to cost competitiveness.

As the panel is not fully balanced, the unit root tests applied are the Im-Pesaran-Shin, Dickey-Fuller and Phillips-Perron tests. The three of them follow the Augmented Dickey Fuller procedure and the tests are based on statistics averaged across countries, where the null hypothesis states that all panels are non-stationary and the alternative is that at least one panel is stationary. A constant and a trend have been incorporated to avoid nuisance parameters distortions.

Table 2 summarises the results of the panel unit root tests, where it can be observed that the variable KINF, as suspected, is not panel stationary, but stationarity is achieved by taking one difference, hence removing the long-term memory of the series. Competitiveness dependent variables, already in growth rates, are panel stationary at conventional levels. Therefore, for consistent estimation purposes, capital inflows need to enter the equation in first differences (DKINF).

(Table 2 about here)

Following Gabrisch and Staehr (2014), Granger causality tests have been applied in order to corroborate that the data supports the hypothesis of causality from capital inflows to cost competitiveness. The tests are performed after estimating two dynamic equations in which the two variables of interest enter as lagged explanatory variables for each other. The null hypothesis of the Granger causality test is that the lagged values of the independent variable do not Granger cause the dependent variable. That is, the test checks if the γ coefficients in the following two dynamic equations are equal to zero:

$$ULC_{i,t} = \delta + \alpha_i + \sum_{j=1}^{J} \beta ULC_{i,t-j} + \sum_{j=1}^{J} \gamma DKINF_{i,t-j} + \varepsilon_{i,t} \tag{6}$$

$$DKINF_{i,t} = \delta + \alpha_i + \sum_{j=1}^{J} \beta DKINF_{i,t-j} + \sum_{j=1}^{J} \gamma ULC_{i,t-j} + \varepsilon_{i,t} \tag{7}$$

where i denotes the country, t the time period, j the lags included, and δ and α_i represent the constant and country individual effects, respectively. The estimations have been performed including one, two and three lags, and given that the introduction of the Euro constitutes a potential structural break, they have additionally been performed for the pre-Euro period (1980-2001) and the post-Euro period (2002-2014).[10]

Since both series enter the equation in their stationary form, standard Wald tests are applied to test if the coefficients of the independent explanatory variable, and its lags, are

[10]The dynamic structure of the above equations can potentially bias the estimation of the lagged dependent variable coefficient (β) due to its correlation with the country effects (α_i). Hence, in addition to fixed effects and OLS, the estimations have been performed using the System GMM estimator proposed by Arellando and Bover (1995) and Blundell and Bond (1998), in which the lagged endogenous component is instrumented with its own past differences. However, the System GMM is designed to be employed with samples in which the dimension of the groups, in this case the countries, is far larger than the time span. These dimension requirements are not met with the sample used in this study, in which 26 countries are followed for 34 years. However, for the sake of thoroughness, exploratory work has been performed with this estimator.

zero ($\gamma = 0$ when only one lag is considered, and jointly equal zero when more than one lag is included $\gamma_1 = \gamma_2 = ... = \gamma_j = 0$). The statistics reported for the Granger causality test follow an F-distribution.

Table 3 shows the results for the causality from DKINF to ULC. The coefficients obtained are statistically significant for the first lagged value of DKINF when using the whole sample period (Columns 1 to 6) and highly significant for the post-Euro period (Columns 13 to 18). The coefficients have the expected positive sign, meaning that increments in DKINF of one percentage point of GDP are associated with a percentage increase that ranges from 0.11 to 0.33 in the growth of ULC the following year. However, for the estimations for the pre-Euro period (Columns 7 to 12) the Granger causality test never rejects the null of no explanatory power of DKINF over ULC. The causal direction is captured for the entire period at conventional levels, although it is particularly strong for the post-Euro period, where the test rejects the null of no explanatory power at significance levels lower than 1 percent for all the specifications. These results therefore indicate a potential structural break in the causal relationship between the two series coinciding with the introduction of the Euro.

Contrasting results are found in Table 4, where the inverse causality direction is tested: from ULC to DKINF. The estimates obtained are not constant across specifications and estimators, with either marginally significant or non-significant coefficients. Additionally, they do not enter the equation with the expected sign, which turns out to be negative when the coefficients are statistically significant: a one-percent increase in ULC yields an increase in capital outflows the following year of 0.032 to 0.073 (a deterioration of cost competitiveness produces an improvement in the CA). Granger causality tests only reject the null at only 5% and 10% for the one lag specification, implying that ULC does not appear to have a clear explanatory power over DKINF, especially after the introduction of the Euro, where the null is never rejected. Furthermore, extremely low R^2 denote the poor goodness of fit for the inverse relationship.

All these tests have also been performed for the variable ULCOM, and are reported in Tables 5 and 6. In this case we find also some evidence of the variable DKINF causing ULCOM, although the significance is much weaker and also less clearly located in the post-Euro-introduction period. The evidence of causality in the inverse direction, that is, from ULCOM to DKINF is even weaker and heterogeneously located across periods. Few lags appear to have explanatory power over DKINF, illustrated again with notorious low R^2 values.

The above results show that DKINF Granger causes ULC, indicating that the data captures the expected causality direction, and more strongly after the introduction of the Euro.

(Table 3 around here)

(Table 4 around here)

(Table 5 around here)

(Table 6 around here)

5 Econometric Analysis

In this section we develop, first, the empirical strategy used to determine whether the Euro has intensified the relationship of capital inflows and cost competitiveness. Second, we define and explain the setting of the econometric model, and finally, we report the results.

5.1 Diff-in-Diff Regression and the Constant Pre-Treatment Paths Assumption

The core hypothesis that this paper formulates is that the deteriorating effect of capital inflows on cost competitiveness has been amplified by the introduction of the Euro, an effect that the subject literature has not yet quantified. Our strategy to quantify this policy intervention or treatment effect of the Euro is based on a difference-in-differences (DID) approach. Under this approach, there is a treated group, made up of the 12 Euro Area (EA) countries, and a control group, comprising those countries that have kept their national currencies at all times. In order to capture the Euro or treatment effect, one would ideally want to observe the counterfactual, which in the context of this paper is: what kind of link would there have been between capital inflows and cost competitiveness in the absence of the Euro?

Although the counterfactual cannot be observed, the DID regression assumes that, in the absence of the Euro or treatment effect, the treated countries would have behaved the same as those in the control group, once the idiosyncratic time-constant differences between them have been controlled for. Thus, the treatment effect is identified according to the changes in the differences between the treated and control countries before and after the introduction of the Euro in 2002, that is, by means of a difference-in-differences estimator. In the context of this study, the effect that capital inflows have on cost competitiveness may (or may not) differ because of idiosyncratic (time-constant) differences between Euro and non-Euro countries, other than Euro membership itself. Once these time-constant differences have been accounted for, the treatment effect is determined as how the different effect of capital inflows for Euro and non-Euro countries has diverged after the introduction of the Euro.

Our DID regression takes the following form:

$$\begin{aligned} C_{i,t} = \alpha + \delta^{EA} EUR_i + \theta Post_t + \theta^{EA} Post_t EUR_i \\ + \delta_k K_{i,t} + \delta_k^{EA} EUR_i K_{i,t} + \theta_k Post_t K_{i,t} + \theta_k^{EA} Post_t EUR_i K_{i,t} \\ + \sum_c \beta_c X_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{8}$$

where $i = 1, 2, ..., 26$ and $t = 1980, ..., 2014$ denote the country and the year, respectively. $C_{i,t}$ represents the cost competitiveness variable, alternatively measured by ULC, ULCOM and REER12. The capital inflows variable, denoted by $K_{i,t}$, will be alternately replaced in the estimation by the three variables DKINF, A4DKINF and CUM4. EUR_i is a binary variable identifying the treated countries, the Euro countries, at all times. $Post_t$ is a step binary variable identifying the treatment period 2002-2014, leaving the period 1980-2001 in the constant as the reference period. The constant, α, represents the average value of $C_{i,t}$ for zero values of the rest of the regressors, that is, the average $C_{i,t}$ for non-Euro countries with zero imbalances during the reference period 1980-2001. $X_{i,t}$ is the vector of control variables UNEMP, PROD, UNIOND (unemployment rate, productivity and union density, respectively), whose effects are captured by the vector of β_c coefficients. Finally, $\varepsilon_{i,t}$ represents the error term, assumed to be $\sim$iid.

In Equation (8) we cross the dummy variable EUR_i, identifying the Euro countries, with the time variable $Post_t$, which identifies the treatment period. Note that coefficients δ^{EA}, θ and θ^{EA} capture the differential evolution of $C_{i,t}$ for the treatment period and for Euro countries as compared to the non-Euro countries, regardless of the impact of capital inflows. In particular, δ^{EA} captures the differential value of $C_{i,t}$ for Euro countries as compared to non-Euro countries in the reference period 1980-2001; θ captures the differential evolution of $C_{i,t}$ during the treatment or Euro period with respect to non-Euro countries in the reference period; and θ^{EA} captures the differential evolution of $C_{i,t}$ for Euro countries during the treatment period with respect to the non-Euro countries.

In the simplest, and most common, specification of a DID regression, the estimation equation could be written as $C_{i,t} = \alpha + \delta^{EA} EUR_i + \theta Post_t + \theta^{EA} Post_t EUR_i + \sum_c \beta_c X_{i,t} + \varepsilon_{i,t}$. In this case, we would be interested in checking whether the Euro has caused the $C_{i,t}$ variable to change. However, the main focus of this paper is not on this sort of analysis but rather on disentangling the extent to which the Euro has had an impact on the link between $K_{i,t}$ and $C_{i,t}$. To this end, we build the second set of variables in Equation (8) by crossing the Euro dummy and time dummy variables with the capital inflows variable. This allows coefficients δ_k, δ_k^{EA} and θ_k, θ_k^{EA} to capture the differential effect that $K_{i,t}$ has on $C_{i,t}$ for Euro as compared to non-Euro countries, and its differential evolution during the treatment period. In particular, parameter δ_k captures the effect of $K_{i,t}$ for non-Euro countries in the reference period, while δ_k^{EA} represents the time-constant, or idiosyncratic, differential effect that $K_{i,t}$ has for Euro countries as compared to non-Euro countries at all times. θ_k captures the differential effect of $K_{i,t}$ during the treatment period for non-Euro countries, while θ_k^{EA} captures the differential effect of $K_{i,t}$ throughout the treatment period for the Euro countries with respect to the non-Euro countries. Algebraically, the first derivative of Equation (8) with respect to capital inflows can be written as:

$$\frac{\partial C_{i,t}}{\partial K_{i,t}} = \delta_k + \delta_k^{EA} EUR_i + \theta_k Post_t + \theta_k^{EA} Post_t EUR_i$$

Thus, it becomes clear that the parameter that represents the Euro or treatment effect is θ_k^{EA} since it captures how the effect of $K_{i,t}$ on $C_{i,t}$ has changed after the Euro becomes legal tender in 2002 ($Post_t = 1$) for Euro countries ($EUR_i = 1$) beyond the normal differences already observed between the two groups of countries. That is, given that the idiosyncratic differences between the Euro and non-Euro countries in the relationship between $K_{i,t}$ and $C_{i,t}$ are captured by δ_k^{EA}, and the time differential effect in each period is captured by θ_k, any additional difference observed during the treatment period is attributable to the Euro effect, captured by θ_k^{EA}. If the hypothesis proposed in this paper holds, this parameter will be positive and statistically significant. That is, the impact of the Euro on the relationship between $K_{i,t}$ and $C_{i,t}$ is expected to be positive, meaning that it intensifies the deteriorating effect that capital inflows have on cost competitiveness.

Figure 7 illustrates the intuition behind the DID methodology. For interpretation purposes, both time and capital inflows are represented on the horizontal axis. Thus, the graph illustrates the linear effect of capital inflows on cost competitiveness, for both Euro and non-Euro countries, during the different periods. In the figure, we plot a case where we set $\delta_k^{EA} = \theta = \theta^{EA} = \theta_k = 0$ for simplicity in the illustration and without loss of generality.[11] After controlling for idiosyncratic differences and time effects, the counterfactual, represented by the dashed line, is built by adding the average changes of the control countries to the last pre-treatment changes of the treated countries, assuming that differences between both groups are constant through the pre-treatment period or, in other words, the linear effect of $K_{i,t}$ on $C_{i,t}$ has been constant (constant pre-treatment paths). This is the keystone assumption that allows us to observe the treatment effect as the difference between the counterfactual (the group of Euro countries if untreated) and the Euro countries after the year 2001. It can be observed in Figure 7 that, in the case plotted, the distance between the non-Euro countries and the counterfactual is simply the idiosyncratic differences between the Euro and non-Euro countries.

(Figure 7 about here)

The Constant Pre-Treatment Paths Assumption

The main weakness of the DID regression in Equation (8) is that it relies on the Constant Paths or Trends assumption for a proper identification of the treatment effect through the coefficient θ_k^{EA}. That is, treated and control countries cannot exhibit changes in their respective trends during the pre-treatment period, otherwise observed differences between Euro and non-Euro countries after the implementation of the Euro could be the result of changes in their trends that began before the treatment. If the trends displayed by the two groups change during the pre-treatment period, the difference-in-differences coefficient θ_k^{EA} would not identify the treatment effect, since it would be capturing not only the treatment effect but also the previous change in trends.

Mora and Reggio (2013) propose introducing, in a standard DID regression, individual dummy variables for all the years under analysis to test for possible changes already underway during the pre-treatment period. Given the length of our sample period, instead of introducing individual year binary variables we employ a more parsimonious approach, dividing the pre-treatment period into two sub-periods: 1980-1994 and 1995-2001. That is, we allow variables in the second pre- treatment sub-period (1995-2001) to have different coefficients than they do in the first (1980-1994). If significant, these differences would imply that, prior to the introduction of the Euro, there were already divergences between Euro and non-Euro countries in terms of the way in which capital inflows affected cost competitiveness levels. The years 1990-1994 are left out in the reference period since

[11] Different slopes are allowed for the linear effect of $K_{i,t}$ on $C_{i,t}$ by means of parameter δ_k^{EA}. Additionally, any differential linear effect of $K_{i,t}$ on $C_{i,t}$ for non-Euro countries during the treatment period would be captured by θ_k, thus allowing different slopes during the treatment period. Although set equal to zero for illustrative purposes in Figure 7, these parameters are included in subsequent estimations.

the Maastricht Treaty signature takes place in 1992, with its later implementation in the years 1993-1994; therefore, any differing paths are expected to take place from 1995 onwards during the convergence process.[12] This more flexible DID approach gives rise to an estimation equation that can be written as follows:

$$\begin{aligned} C_{i,t} = \alpha + \delta^{EA} EUR_i + \gamma Pre_t + \theta Post_t + \gamma^{EA} Pre_t EUR_i + \theta^{EA} Post_t EUR_i \\ \delta_k K_{i,t} + \delta_k^{EA} EUR_i K_{i,t} + \gamma_k Pre_t K_{i,t} + \theta_k Post_t K_{i,t} + \\ \gamma_k^{EA} Pre_t EUR_i K_{i,t} + \theta_k^{EA} Post_t EUR_i K_{i,t} + \sum_c \beta_c X_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{9}$$

where Pre_t is the step binary variable identifying the pre-treatment sub-period 1995-2001, with the period 1980-1994 left out now in the constant as the reference period.

In Equation (9) there are now two coefficients of interest. The first coefficient is γ_k^{EA}, allows us to confirm whether we can rule out the concern of non constant paths (the null hypothesis to test is $H_0 : \gamma_k^{EA} = 0$). Second, if the constant paths assumption holds, then θ_k^{EA} in Equation (9) would be capturing the treatment or Euro effect; namely, how the implementation of the Euro in 2002 has amplified the deteriorating effect that capital inflows have on cost competitiveness.

Figure 8 illustrates the consequences of disregarding a possible change in the pre-treatment slopes.[13] In the figure, we allow the slopes of the Euro countries to start diverging from those of the non-Euro countries before the Euro, with this divergence captured by coefficient γ_k^{EA}. If the linear effect of $K_{i,t}$ on $C_{i,t}$ for Euro countries experienced that change during the pre-treatment period, say from 1995 onwards, the counterfactual, now denoted by the dashed line, could no longer be constructed as $\alpha + \delta^{EA} + \delta_k K_{i,t}$. The valid counterfactual corresponds instead to expression $\alpha + \delta^{EA} + (\delta_k + \gamma_k^{EA}) K_{i,t}$. Therefore, the coefficient θ_k^{EA} in our estimation equation would not longer identify the treatment effect, as it would instead be capturing the true treatment effect, denoted by θ_k^{*EA} in Figure 8, plus the change in the linear effect of $K_{i,t}$ on $C_{i,t}$ that is already underway. Thus, confirming that the constant paths assumption holds ($\gamma_k^{EA} \neq 0$) is a prior condition in our estimation setting below to identify the coefficient of interest.

(Figure 8 about here)

5.2 Estimation results

Equation (9) has been estimated and reported in Tables 7 and 8 under the different definitions of $C_{i,t}$ and $K_{i,t}$. Each table reports the results for each measure of the dependent variable, $C_{i,t}$, and within the table, each measure employed for capital inflows, $K_{i,t}$ is denoted at the top. The estimated coefficients in each specification are reported in five

[12]In preliminary work, we allowed all years before 2002 to capture differences in trends with respect to the initial years. Although not a stable change emerged from this analysis over the pre-treatment period, some years after 1994 showed punctual differences which are jointly not significant. We finally decided to establish the cut at 1994 but other alternatives allowed us to obtain similar results to the ones we present here.

[13]In Figure 8 we set $\gamma = \gamma^{EA} = \theta = \theta_k = \theta^{EA} = \delta_k^{EA} = 0$ for illustration purposes.

groups: the first two groups are the constant and time effects on $C_{i,t}$, the next two groups are the coefficients for the capital inflows, and the fifth group comprises estimated coefficients for the control variables.

Before moving on to the main results, we turn our attention to those coefficients that check for the constant paths assumption. To this end, and for each definition of the capital inflow variable in the tables, we estimate two columns: in the first one, all the pre-treatment related gamma coefficients are reported; in the second column, the non-significant pre-treatment coefficients have been dropped, although the ones that enter the equation significantly have been kept to avoid bias in the rest of the coefficients. It can be observed that γ_k^{EA} does not enter the equation with statistical significance for any of the specifications in Tables 7 and 8. This implies that $K_{i,t}$ did not have a differential effect for Euro countries before the year 2002 and, therefore, the observed difference in the differences - that is, coefficient θ_k^{EA}-, can be attributed to the treatment effect.

In the first group of estimated coefficients, the constant, α, denotes the average unit labour cost growth for the sample of non-Euro countries in the reference period, and the coefficient δ^{EA} captures the average differential in this measure for Euro countries. This differential for Euro countries appears to be non-significant for both ULC and ULCOM, as shown in Tables 7 and 8, respectively. Thus, it seems that, for equal values of $K_{i,t}$, cost competitiveness growth rates were similar for Euro and non-Euro countries in the first sub-period, 1980-1994.

The second set of coefficients capture the time effects on $C_{i,t}$. The coefficient for the pre-treatment sub-period, γ, is not significantly estimated in any specification, thus it is dropped in each corresponding second column. For the period after the implementation of the Euro, the estimation of θ yields a negative and highly significant value above -2 for both ULC and UCLOM, capturing the deceleration in the growth of costs observed after 2002 in all the countries in our sample as compared to the reference periods 1980-1994 and 1980-2001. This result is in line with the before-after differences reported in Table 1.

The differential values of $C_{i,t}$ for the Euro countries in the second pre-treatment period and in the post-treatment period are captured by γ^{EA} and θ^{EA}, respectively. The estimation of the first of these coefficients is negative and highly significant, especially in the equations for ULC in Table 7, with estimated values ranging between -3.3 and -4.5. These results may well capture the response to the convergence criterion imposed by the Maastricht Treaty during the 90s, whereby costs and inflation had to be adjusted downwards in those countries seeking to adopt the Euro. As this estimated coefficient seems to be capturing a strong differential effect for Euro countries in the period (1995-2001), it has been kept in the second column. The second coefficient, θ^{EA}, is only significantly estimated at the 10 and 5 percent levels for specifications (5) and (6) in Table 7, pointing to a further moderation of costs for all Euro countries from 2002 onwards as compared to the reference period.

The third group of coefficients represent the baseline effect of $K_{i,t}$ on $C_{i,t}$ in the first sub-period (1980-1994) for non-Euro countries and its differential effect for Euro countries. In the reference period, the estimated impact, as measured by δ_k, is positive and, in general, significant in Tables 7 and 8, thus supporting the hypothesis that capital inflows have a deteriorating effect on cost competitiveness in these baseline years. In the one year lag specification, a one percent increment in DKINF yields to a deterioration of 0.5 to 0.6 percent for ULC, as reported in Table 7, and a 0.7 percent for ULCOM, as shown in Table 8. The magnitude of the estimated coefficients increase in the specifications that employ A4DKINF and CUM4, capturing the effect of persistent imbalances. The estimated results indicate that, for non-Euro countries, a one-percent increase in the previous-four-year average of capital inflows, as measured by A4DKINF, leads to around a 1.6 percent deterioration of ULC and ULCOM, although the estimates are much more imprecise in the case of the ULC variable. When the variable CUM4 is used, we find that, whenever there is a positive four-year average of capital inflows, it generates an increase that ranges from 2.4 to 2.6 percent in ULC, and from 2.5 to 3.2 percent in ULCOM. Finally, δ_k^{EA} is only significantly estimated at the 10 percent level in the A4DKINF specification for ULC in Table 7 and CUM4 specification for ULCOM in Table 8, indicating that, in general, $K_{i,t}$ did not have a differential effect for Euro countries with respect to the non-Euro countries in the pre-Euro period.

(Table 7 about here)

(Table 8 about here)

The first two coefficients in the fourth group capture the time differential effects of $K_{i,t}$ on $C_{i,t}$ for non-Euro countries during the different periods considered. The estimated γ_k is, in general, not significant across specifications, meaning that $K_{i,t}$ in these countries did not have a differential effect during the second pre-treatment period with respect to the baseline period. As an exception, it is significant at the 10 percent level for the specification DKINF in column (1) of Table 7, and then it has been kept in the specification of the second column. The estimation for θ_k is negative and highly significant for nearly all specifications in both tables, indicating a smaller effect of $K_{i,t}$ on $C_{i,t}$ during the post-treatment period in non-Euro countries compared to the baseline effect in the reference period, δ_k.[14] However, this is not the case for Euro countries after the introduction of the Euro. This becomes clear if we turn to the next two coefficients, which constitute the main results of this paper. As previously highlighted, the constant paths assumption is tested through γ_k^{EA}, which is not significant for any specification, indicating that $K_{i,t}$ did not have a differential effect for Euro countries during the pre-treatment period with respect to non-Euro countries. Thus, in the second column of each specification, γ_k^{EA} has been dropped, and the estimation of coefficient θ_k^{EA} is interpreted as the treatment effect.

The estimated treatment effect is positive and highly significant across most of the specifications, although its magnitude varies depending on both the dependent variable employed and the measure for capital inflows used in each case. These results give support to the hypothesis raised in this paper, that is, the adoption of the Euro has amplified the effect of capital inflows on cost competitiveness for Euro countries as compared to non-

[14] In fact, Tables 7 and 8 show that, for non-Euro countries and for the specification where DKINF is employed, the estimated net effect $(\delta_k + \gamma_k + \theta_k)$ of $K_{i,t}$ is unclear, while for A4DKINF and CUM4, the net effect of $K_{i,t}$ would be around 0.3.

Euro countries during the same period. In fact, the net effect for Euro-countries turns out to be positive, and above the 0.3 percent obtained for non-Euro countries: for Euro countries there is an additional increase as indicated by $\hat{\theta}_k^{EA}$ ranging from 1.4 to near 2.4 for A4DKINF, and from 2.7 to 3.7 percent for CUM4 stemming from the Euro effect.

Overall, it can be observed in all specifications that $K_{i,t}$ had a positive differential effect for Euro countries after the year 2002. Depending on the specification, the effect is captured at different significance levels, but in any case, there is an additional effect that produces a positive net effect of $K_{i,t}$ on $C_{i,t}$.

Finally, the coefficients in the fifth group capture the effect of the control variables. The variables UNEMP and UNIOND do not exhibit statistical significance. Only PROD enters with a negative sign and significantly at the 10 percent level for ULC in Table 7, while ULCOM displays a positive sign and is highly significant in Table 8. On the one hand, the positive sign when ULCOM is employed as a measure of cost competitiveness can be explained by the effect that productivity has on employee compensation: when productivity increases, it may partly translate into higher wages. On the other hand, given how the variable is built, a negative sign for productivity in the case of the ULC measure could indicate that productivity grows at a faster rate than employee compensation.

5.3 Results with Eurostat

A second estimation sample has been constructed from the data available at Eurostat, which enables us to employ as measure of competitiveness the real effective exchange rate (adjusted by unit labour costs) relative to the EA12 (denoted by REER12). The real exchange rate is extensively used in the literature as measure of international competitiveness (see, for instance, Gabrisch and Staehr, 2015). Thus, we believe that checking the robustness of our main results with this data source may be of interest for the sake of comparison. The data on current accounts can also be retrieved from Eurostat, while the control variables are those from the IMF database used in the main analysis. However, there is a trade-off in terms of sample size, as there are only 19 EU countries in the Eurostat sample and the time period only spans 1995-2013. As a result, the reference pre-treatment period in our DID regressions is shortened to 1995-2001.

Table 9 displays the DID estimation results in two columns. In the first, all the variables other than the real exchange rate are the same as those used in the main analysis above, that is, the current account and control variables sourced from the IMF database. In the second column, we also use the current account information from Eurostat. In this table, we only use the one-lag measure of capital inflows, DKINF, as the length of the time period constrains the computation of the four-year moving averages. The short pre-treatment period also makes it difficult to check for pre-treatment non-constant paths in the relationship between $K_{i,t}$ and $C_{i,t}$. We rely, instead, on the checks carried out in the previous analysis.[15]

[15] We performed some checks of constant pre-treatment paths following the procedure of splitting the pre-treatment period in two, with the second pre-treatment sub-period reduced to four years 1998-2001. No evidence of differing paths before treatment were found in these exploratory estimations.

The results in Table 9 indicate that the Euro effect is positive and statistically significant in this case as well; that is, following the implementation of the Euro, capital inflows seem to have had a deteriorating effect on competitiveness in terms of the real effective exchange rate. The results with both current account data shows that positive changes in capital inflows translate into a deterioration of cost competitiveness to a lesser extent in Euro countries than in non-Euro countries. However, after 2002 the effect for non-Euro countries is canceled out, while for Euro countries there is a greater positive impact of capital inflows on the REEA12 variable with this sample. In fact, the net the effect of capital inflows for Euro countries is $\hat{\delta}_k + \hat{\delta}_k^{EA} + \hat{\theta}_k + \hat{\theta}_k^{EA} \simeq 0.3$, in line with the previous estimations for the DKINF specification.[16]

The effects of the control variables maintain the same signs, with UNEMP entering the equation highly significant. As the sample has been trimmed to European countries solely, the unemployment control might be capturing the labor market adjustments that many economies with high unemployment rates have gone through.

(Table 9 about here)

5.4 Extensions: Periphery vs. Northern core.

As an extension to our main results above, we perform the DID regressions for two separate groups of Euro countries: the group of countries in the periphery (Ireland, Spain, Greece, Portugal and Italy), and all the rest. The reason for doing so lies in the observation in Figure 3 that the first group of countries seems to have experienced larger current account imbalances during the post-Euro-implementation period, and thus larger capital inflows entering their economies during this period. This, together with the lack of cost competitiveness and recent financial bubbles in some of these peripheral European countries, suggests that the link investigated in this paper may have been more pronounced in some countries than in others.

In Table 10 and Table 11, the main DID results have been repeated for the peripheral countries and northern core countries separately. After checking for non-significance of the parameters capturing possible non-constant pre-Euro trends, we present in the tables only the most parsimonious specifications showing the effects of interest. Within each region, the three different measures for capital inflows has been employed (DKINF, A4DKINF and CUM4).

Both tables show quite clearly that the estimated treatment effect is both larger and more strongly significant in the case of the peripheral countries. For periphery countries, the Euro effect is captured at 1% significance for all specifications. Furthermore, the net effect of capital inflows in periphery economies appears to be quite larger than in the north core; for instance, the net effect for the specifications CUM4 in column (3) of Tables 10 and 11 is $\hat{\delta}_k + \hat{\delta}_k^{EA} + \hat{\theta}_k + \hat{\theta}_k^{EA} \simeq 5$, while for northern core economies in column (6) it is

[16] Gabrisch and Staehr (2015) and Garbisch (2015) report in their Granger Causality tests that a unit increase in the first differences of the current account causes an increase of between 0.3 and 1 percent in unit labour cost growth.

around 3 percent.

Hence, these results not only confirm the main hypothesis we test in this paper - that changes in capital inflows may impact cost competitiveness - but also that imbalances in the net foreign capital position of countries in the Eurozone may accentuate the already existing divergences in cost competitiveness, specially for those economies in the periphery.

(Table 10 about here)

(Table 11 about here)

6 Conclusions

In this paper, we have examined the impact of the Euro on the relationship between capital inflows and cost competitiveness across 26 countries in the period spanning 1980-2014. To our knowledge, this paper constitutes the first attempt in the literature to quantify this impact.

The results we present in this paper are twofold. First, the Granger causality tests indicate that the short-term dynamics between the two variables also run from capital inflows to cost competitiveness, finding that is robust to different samples and variables. Changes in capital inflows have been quantified as having an increasing net effect on labour cost growth, thus corroborating that they may produce a deterioration of competitiveness in an economy. The estimated baseline effect of capital inflows in the DID analysis provides further evidence in this direction, although the effects seem to be heterogeneous throughout the analysed period, 1980-2014. Furthermore, as is to be expected, the effect becomes stronger the longer the economy has been accumulating a current account imbalance.

Second, the difference-in-differences analysis indicates an increase in the deteriorating effect that capital inflows exert on cost competitiveness after 2002 for Euro countries as compared to non-Euro ones. These findings provide evidence that supports the hypothesis raised in this paper, that is, that the adoption of the Euro intensifies this relationship. The DID methodology employed to identify this effect provides clear results that are robust to different specifications and samples. Our analysis also shows that the Euro effect has been particularly clear in the case of countries in the periphery, thus accentuating the already existing asymmetries in costs competitiveness across Euro area countries.

These conclusions allow us to draw a number of policy implications. On the one hand, our results may contribute to the current policy debate in Europe focused on closing divergences in competitiveness among Eurozone countries through the supply side of the economy. Even though improving the flexibility of goods and labour markets may very likely contribute to reducing competitiveness differentials among countries, more attention should be paid to the possible impact of capital inflows on the demand side of the economy, since this could be partly responsible for the observed divergences. An example of this can be found in some economies in Europe, especially those in the periphery, which have experienced some sort of bubble in the last decade, partly financed by capital inflows coming in the form of external debt.

On the other hand, if the Euro has amplified the effects of capital inflows on cost competitiveness, then common currency members could perhaps incorporate more macroprudential policies that help stabilise financial markets, particularly in response to sharp increases in volumes of capital inflows, as their economies have proven to be more vulnerable to the possible damaging effects of these inflows. In addition, not only common inflation indicators but also asset prices should be closely monitored by the monetary authority in question, since they could result in macroeconomic imbalances with delayed effects on inflation differentials.

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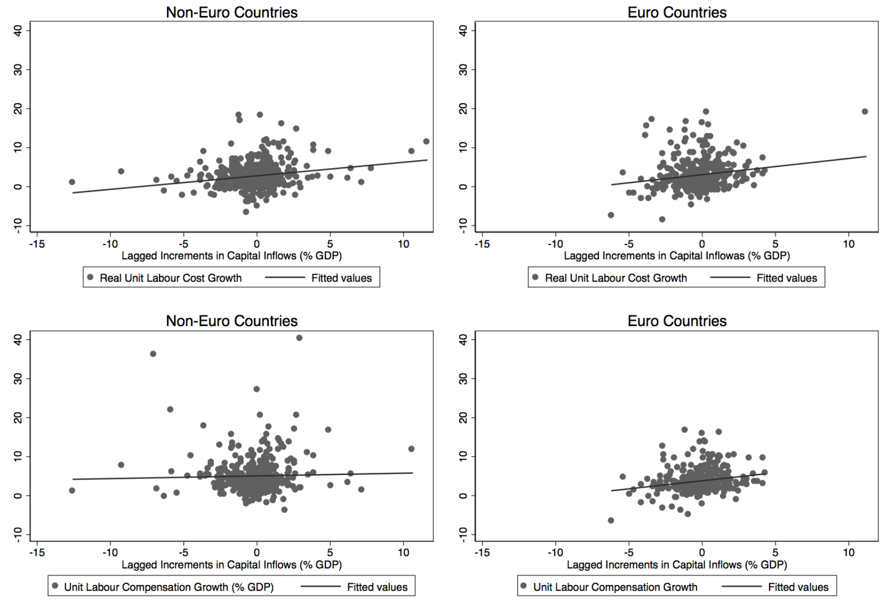
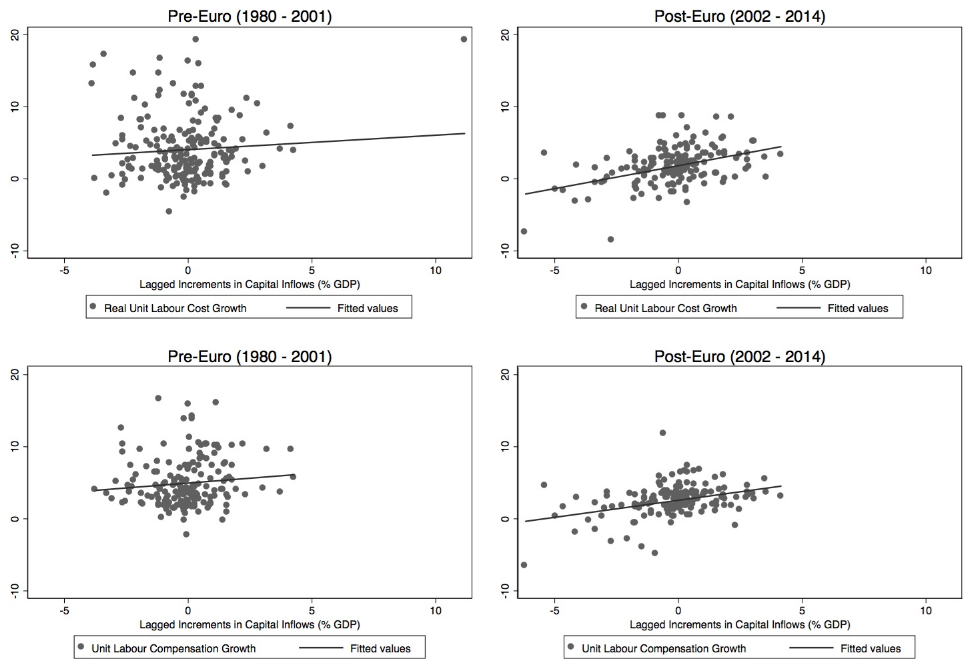
Figure 1: Euro vs non-Euro Countries Comparison



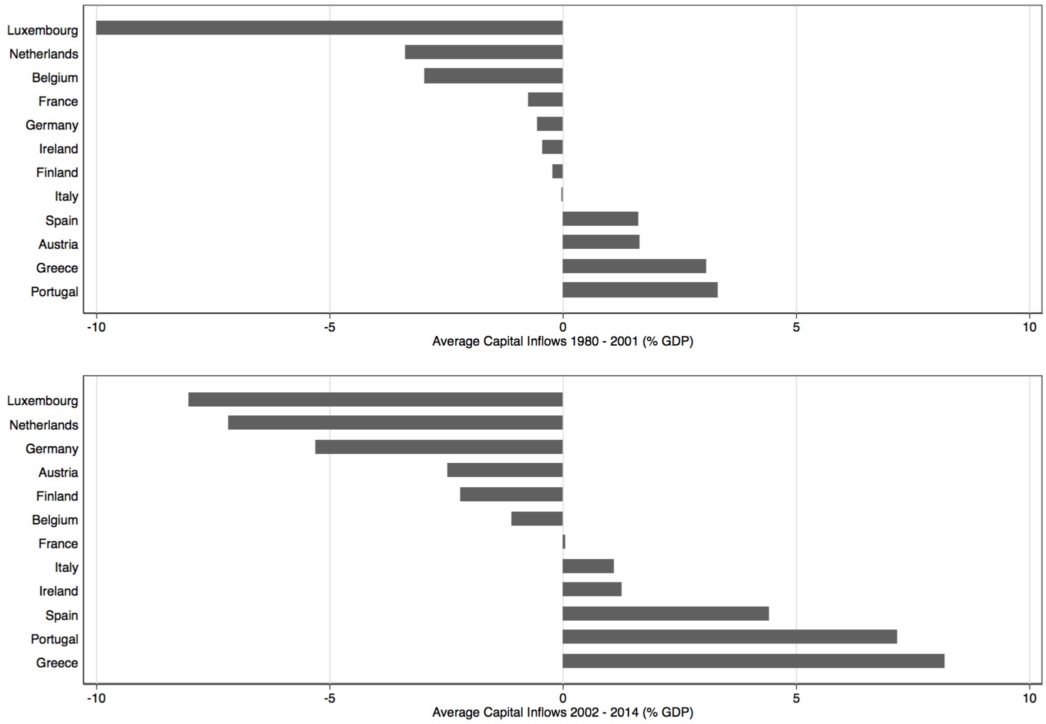
Own elaboration based on data from IMF and OECD.

Figure 2: Pre-Euro vs Post-Euro Comparison for Euro Countries



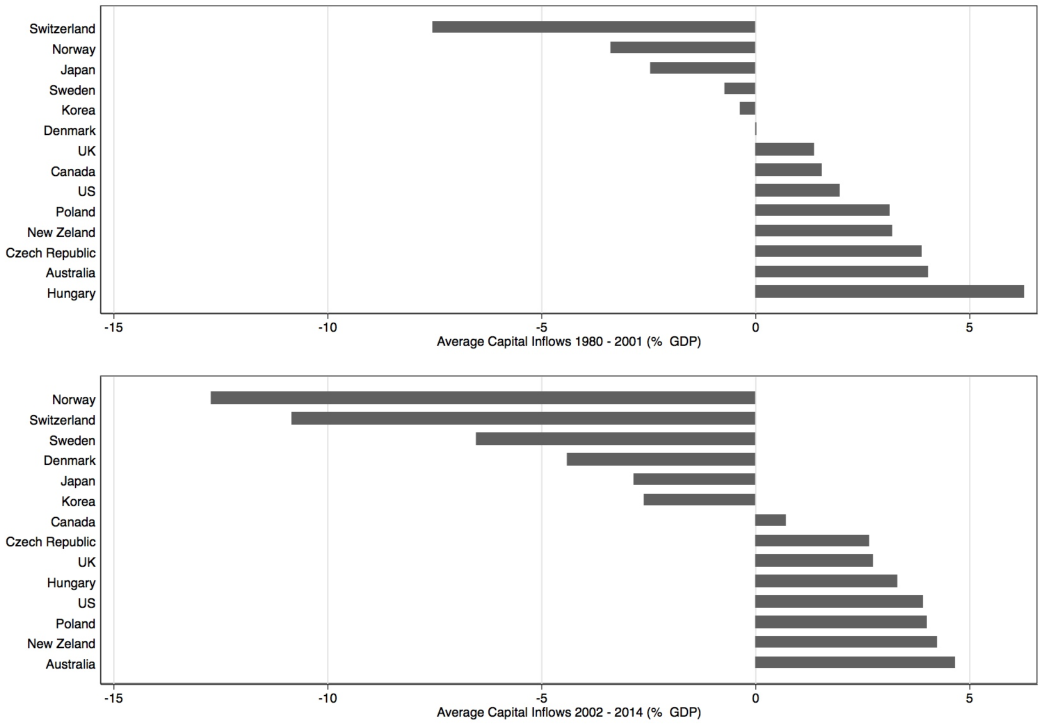
Own elaboration based on data from IMF and OECD.

Figure 3: Capital Inflows (KINF) Euro Countries



Own elaboration based on data from IMF.

Figure 4: Capital Inflows (KINF) Non-Euro Countries



Own elaboration based on data from IMF.

Figure 5: Frequency of past Four-Year Capital Inflows (CUM4) Euro Countries

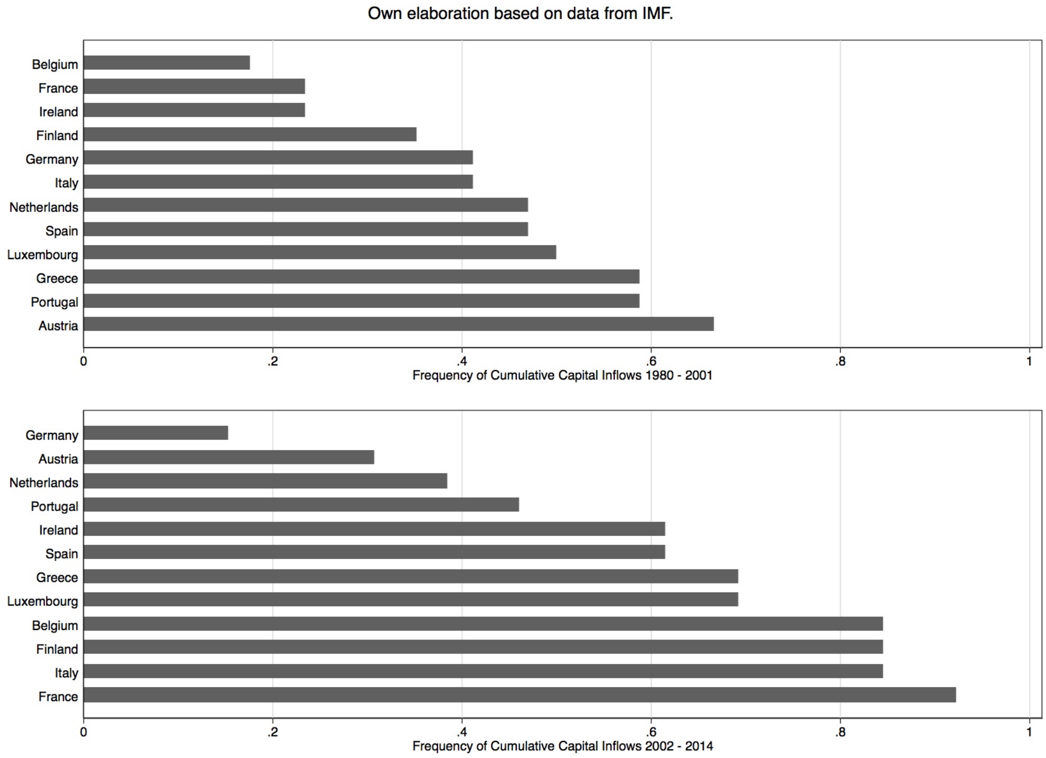
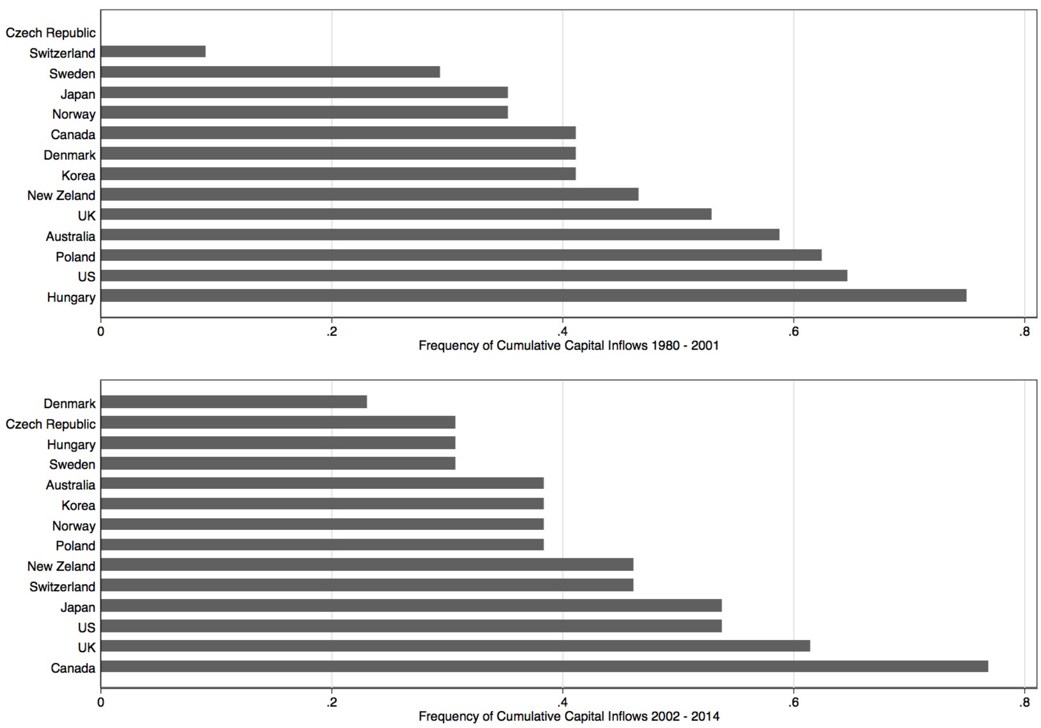


Figure 6: Frequency of past Four-Year Capital Inflows (CUM4) Non-Euro Countries



Own elaboration based on data from IMF.

Figure 7: Capital Inflows Effect on Cost Competitiveness

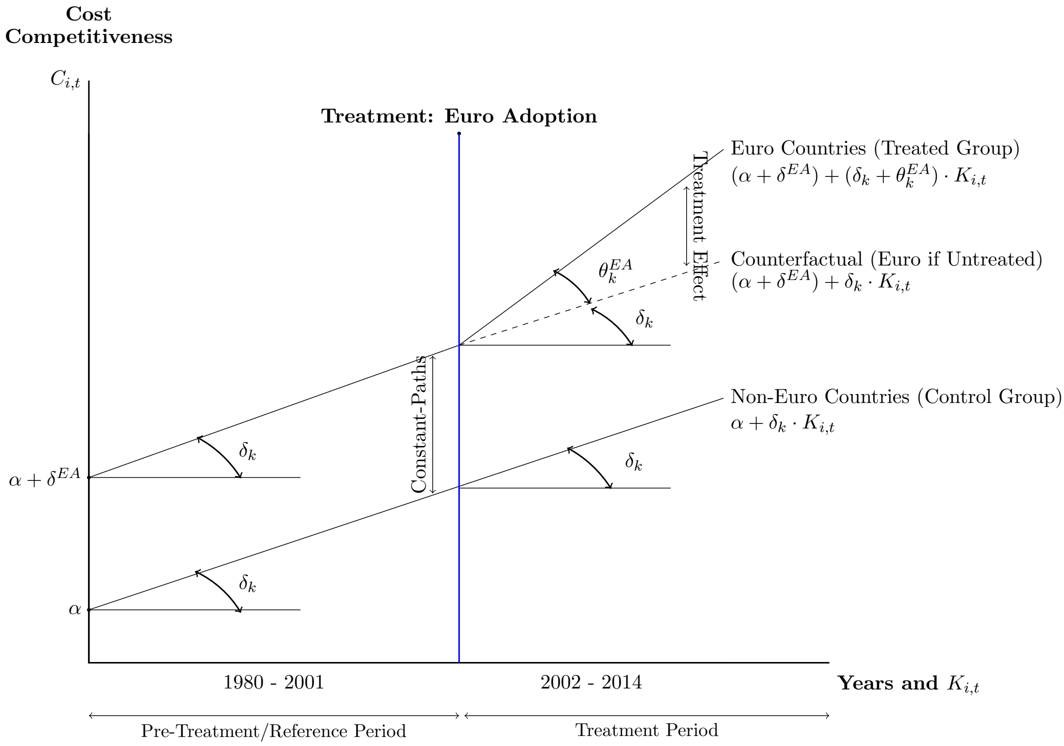


Figure 8: Pre-Treatment Trends on Capital Inflows' Effect

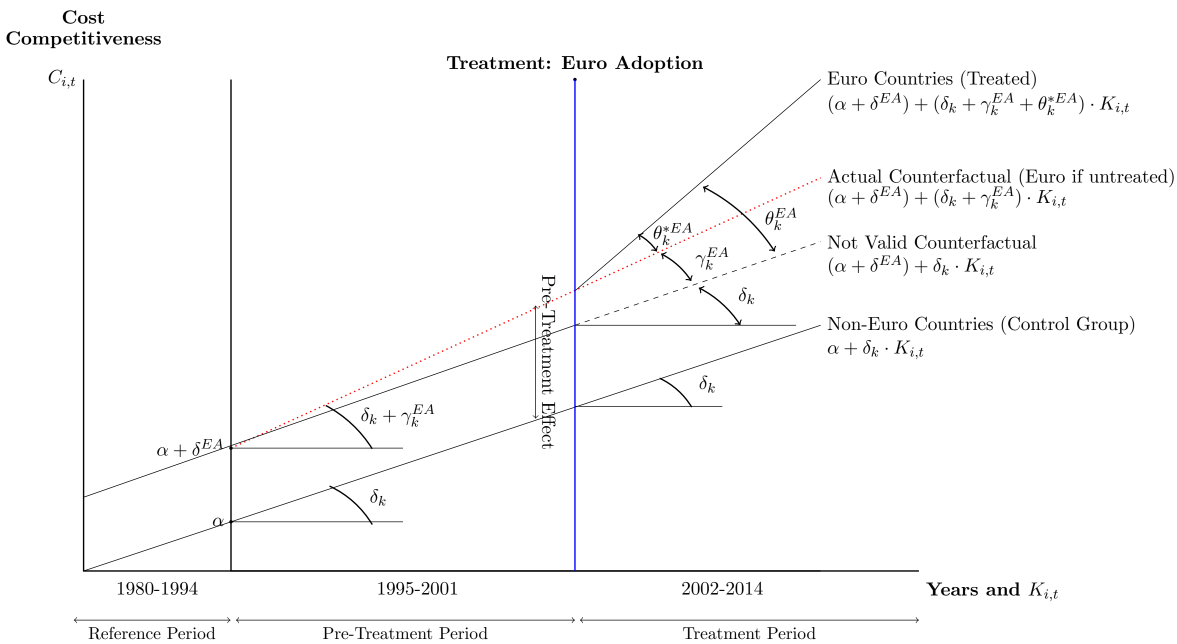


Table 1: Descriptive Statistics Cost Competitiveness

	Variable	All Countries Mean	All Countries s.d.	All Countries Obs	Euro Mean	Euro s.d.	Euro Obs	Non-Euro Mean	Non-Euro s.d.	Non-Euro Obs
All Years	ULC	3.12	4.31	771	3.28	4.47	362	2.98	4.16	409
	ULCOM	4.44	4.07	686	3.77	3.12	325	5.04	4.69	361
	REER12 (Eurostat)	-0.09	2.4	304	-0.15	2.32	194	-0.00	2.56	110
	KINF (IMF)	-0.23	4.82	771	-0.28	4.59	362	-0.18	5.03	409
	DKINF(IMF)	-0.15	1.82	771	-0.14	1.58	362	0.16	2.02	409
	KINF (Eurostat)	-0.90	6.07	304	-0.58	5.75	194	-1,46	6.59	110
	DKINF (Eurostat)	-0.13	1.87	304	-0.10	1.75	194	-0.2	2.07	110
	PROD	1.91	2.12	771	1.67	1.85	362	0.34	0.21	409
	UNEMP	7.65	4.07	771	9.13	4.61	362	6.33	2.96	409
	UNIOND	0.34	0.20	771	0.33	0.17	362	0.34	0.21	409
Pre-Euro	ULC	4.17	5.06	433	4.46	5.17	206	3.91	4.95	227
	ULCOM	5.81	4.71	362	4.94	3.39	169	6.56	5.52	193
	REER12 (Eurostat)	-0.28	2.35	80	-0.54	1.74	50	0.14	3.10	30
	KINF (IMF)	0.11	3.80	433	-0.24	3.60	206	0.44	3.96	227
	DKINF (IMF)	-0.19	1.86	433	0.14	1.49	206	-0.25	2.13	227
	KINF (Eurostat)	-1.10	5.38	80	-1.49	5.16	50	-0.47	5.75	30
	DKINF (Eurostat)	-0.01	2.00	80	0.17	1.39	50	-0.31	2.73	30
	PROD	2.40	2.05	433	2.25	1.74	206	2.55	2.30	227
	UNEMP	0.07	0.04	433	0.09	0.05	206	0.06	0.03	227
	UNIOND	0.37	0.20	433	0.36	0.17	206	0.39	0.22	227
Post-Euro	ULC	1.78	2.52	338	1.72	2.63	156	1.82	2.43	182
	ULCOM	2.91	2.44	324	2.50	2.20	156	3.30	2.59	168
	REER12 (Eurostat)	-0.03	2.43	224	-0.01	2.48	144	-0.06	2.35	80
	KINF (IMF)	-0.68	5.86	338	-0.33	5.65	156	-0.97	6.02	182
	DKINF (IMF)	-0.10	1.78	338	-0.15	1.69	156	-0.05	1.86	182
	KINF (Eurostat)	-0.82	6.3	224	-0.27	5.92	144	-1.83	6.87	80
	DKINF (Eurostat)	-0.18	1.82	224	-0.20	1.85	144	-0.15	1.77	80
	PROD	1.27	2.03	338	0.91	1.72	156	1.58	2.21	182
	UNEMP	0.07	0.04	338	0.08	0.04	156	0.06	0.02	182
	UNIOND	0.29	0.18	338	0.30	0.16	156	0.28	0.20	182

Table 2: Panel Unit Root Tests

	Deterministic Components	**Im, Pesaran & Shin**	**ADF-Fisher**	**PP-Fisher**
KINF	Constant and Trend	-0.79	-0.37	-1.58*
	Constant Only	-1.24	-0.92	-3.58***
DKINF	Constant and Trend	-5.59***	-6.02***	-22.39***
	Constant Only	-8.56***	-9.46***	-25.03***
ULC	Constant and Trend	-5.47***	-5.87***	-10.19***
	Constant Only	-7.40***	-8.09***	-12.32***
ULCOM	Constant and Trend	-3.15***	-5.01***	-9.21***
	Constant Only	-1.79**	-2.37***	-9.32***
REER12	Constant and Trend	-	-2.55***	-7.72***
	Constant Only[a]	-3.67***	-2.97***	-10.71***

Three lags selected. ***p<0.01 **p<0.05 *p<0.10.[a] Two lags selected.

Table 3: Panel Granger Causality Tests. Dependent Variable = ULC

	(All Period: 1980 - 2014)						(Before Euro: 1980 - 2001)						(After Euro: 2002 - 2014)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
$ULC_{i,t-1}$	0.735***	0.659***	0.639***	0.690***	0.632***	0.609***	0.774***	0.762***	0.780***	0.659***	0.684***	0.689***	0.370***	0.360***	0.359***	0.244***	0.244***	0.234***
	(0.036)	(0.052)	(0.053)	(0.051)	(0.045)	(0.047)	(0.040)	(0.066)	(0.074)	(0.051)	(0.070)	(0.070)	(0.059)	(0.066)	(0.066)	(0.049)	(0.053)	(0.059)
$ULC_{i,t-2}$		0.054	-0.070		0.033	-0.075		-0.016	-0.107		-0.071	-0.104		0.004	-0.089		-0.105*	-0.166***
		(0.037)	(0.045)		(0.032)	(0.052)		(0.049)	(0.068)		(0.042)	(0.064)		(0.055)	(0.058)		(0.053)	(0.058)
$ULC_{i,t-3}$			0.139***			0.125***			0.073			0.023			0.180***			0.069
			(0.036)			(0.040)			(0.045)			(0.042)			(0.051)			(0.052)
$DKINF_{i,t-1}$	0.109**	0.094	0.129**	0.115**	0.098*	0.141***	0.070	0.017	0.046	0.034	-0.024	0.034	0.279***	0.283***	0.286***	0.315***	0.324***	0.355***
	(0.055)	(0.058)	(0.054)	(0.049)	(0.051)	(0.050)	(0.069)	(0.071)	(0.068)	(0.085)	(0.092)	(0.083)	(0.074)	(0.074)	(0.075)	(0.077)	(0.082)	(0.085)
$DKINF_{i,t-2}$		0.025	-0.017		0.032	-0.015		0.092	-0.011		0.066	-0.042		0.044	0.074		0.135	0.163*
		(0.065)	(0.048)		(0.046)	(0.038)		(0.092)	(0.065)		(0.077)	(0.062)		(0.067)	(0.067)		(0.085)	(0.086)
$DKINF_{i,t-3}$			0.040			0.043			0.028			0.017			0.071			0.185***
			(0.062)			(0.055)			(0.091)			(0.072)			(0.064)			(0.063)
$\mathbf{R^2}$	0.647	0.618	0.587	0.572	0.533	0.495	0.720	0.711	0.686	0.528	0.505	0.459	0.219	0.220	0.251	0.149	0.167	0.195
Observations	788	762	736	788	762	736	398	372	346	398	372	346	390	390	390	390	390	390
Granger Causality	3.92**	1.39	2.25*	5.42**	2.34	4.61***	1.01	0.53	0.20	0.15	0.37	0.31	14.19***	7.42***	5.72***	16.70***	9.13***	7.14***
Test	[0.04]	[0.24]	[0.08]	[0.02]	[0.11]	[0.01]	[0.31]	[0.58]	[0.84]	[0.69]	[0.69]	[0.81]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Estimation	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**

Robust standard errors in brackets.
$P-values$ reported in square brackets
***p<0.01 **p<0.05 *p<0.10.

Table 4: Panel Granger Causality Tests. Dependent Variable = DKINF

	(All Period: 1980 - 2014)						(Before Euro: 1980 - 2001)						(After Euro: 2002 - 2014)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
$DKINF_{i,t-1}$	-0.003	0.022	0.017	-0.011	0.010	0.004	0.015	0.070	0.060	-0.004	0.039	0.025	-0.046	-0.053	-0.048	-0.095	-0.117	-0.119
	(0.054)	(0.057)	(0.061)	(0.030)	(0.047)	(0.049)	(0.071)	(0.082)	(0.094)	(0.026)	(0.032)	(0.038)	(0.088)	(0.084)	(0.083)	(0.064)	(0.078)	(0.084)
$DKINF_{i,t-2}$		-0.161***	-0.135***		-0.170***	-0.144**		-0.190***	-0.145**		-0.211***	-0.167**		-0.142**	-0.144**		-0.191**	-0.193**
		(0.047)	(0.049)		(0.052)	(0.068)		(0.061)	(0.066)		(0.049)	(0.073)		(0.069)	(0.070)		(0.090)	(0.086)
$DKINF_{i,t-3}$			-0.034			-0.043			-0.089			-0.112**			0.033			-0.010
			(0.045)			(0.047)			(0.056)			(0.048)			(0.066)			(0.069)
$ULC_{i,t-1}$	-0.031*	-0.003	-0.002	-0.032*	0.000	0.004	-0.037**	-0.002	-0.004	-0.063*	-0.019	-0.018	0.016	0.027	0.026	0.017	0.049	0.051
	(0.017)	(0.026)	(0.029)	(0.016)	(0.026)	(0.031)	(0.018)	(0.032)	(0.037)	(0.031)	(0.041)	(0.052)	(0.047)	(0.051)	(0.052)	(0.058)	(0.053)	(0.060)
$ULC_{i,t-2}$		-0.002	0.028		-0.002	0.028		-0.007	0.019		-0.026	0.014		0.033	0.037		0.047	0.048
		(0.023)	(0.029)		(0.025)	(0.028)		(0.030)	(0.039)		(0.025)	(0.036)		(0.044)	(0.046)		(0.030)	(0.034)
$ULC_{i,t-3}$			-0.016			-0.015			-0.008			-0.031			-0.019			0.003
			(0.022)			(0.018)			(0.027)			(0.019)			(0.045)			(0.048)
R^2	0.007	0.031	0.022	0.006	0.034	0.025	0.013	0.050	0.036	0.021	0.064	0.045	0.002	0.025	0.026	0.009	0.047	0.047
Observations	788	762	736	788	762	736	398	372	346	398	372	346	390	390	390	390	390	390
Granger Causality	3.33*	0.05	0.47	4.16**	0.01	0.68	3.92**	0.14	0.13	3.97**	0.98	1.02	0.11	0.72	0.46	0.09	2.67	1.30
Test	[0.07]	[0.95]	[0.70]	[0.05]	[0.99]	[0.56]	[0.05]	[0.86]	[0.94]	[0.05]	[0.39]	[0.40]	[0.73]	[0.48]	[0.71]	[0.77]	[0.14]	[0.29]
Estimation	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**

Robust standard errors in brackets.
$P - values$ reported in square brackets
***p<0.01 **p<0.05 *p<0.10.

Table 5: Panel Granger Causality Tests. Dependent Variable = ULCOM

	(All Period: 1980 - 2014)						(Before Euro: 1980 - 2001)						(After Euro: 2002 - 2014)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
$ULCOM_{i,t-1}$	0.667***	0.530***	0.548***	0.619***	0.495***	0.514***	0.649***	0.557***	0.623***	0.512***	0.479***	0.566***	0.591***	0.424***	0.409***	0.475***	0.363***	0.352***
	(0.075)	(0.066)	(0.056)	(0.022)	(0.048)	(0.062)	(0.090)	(0.088)	(0.074)	(0.044)	(0.050)	(0.070)	(0.051)	(0.083)	(0.084)	(0.077)	(0.077)	(0.088)
$ULCOM_{i,t-2}$		0.221***	0.044		0.217***	0.023		0.197***	-0.025		0.172**	-0.050		0.215***	0.141*		0.159**	0.109*
		(0.055)	(0.058)		(0.043)	(0.068)		(0.072)	(0.077)		(0.066)	(0.073)		(0.075)	(0.084)		(0.063)	(0.064)
$ULCOM_{i,t-3}$			0.139***			0.153***			0.127**			0.120**			0.118**			0.089
			(0.042)			(0.023)			(0.057)			(0.046)			(0.057)			(0.055)
$DKINF_{i,t-1}$	0.134**	0.140**	0.156**	0.156***	0.150***	0.170***	0.188*	0.173*	0.204**	0.181**	0.180**	0.213**	0.081	0.130*	0.134*	0.125	0.158*	0.162*
	(0.067)	(0.064)	(0.062)	(0.050)	(0.051)	(0.052)	(0.102)	(0.089)	(0.091)	(0.085)	(0.087)	(0.077)	(0.070)	(0.071)	(0.071)	(0.084)	(0.092)	(0.091)
$DKINF_{i,t-2}$		0.062	0.085		0.081*	0.097**		0.065	0.071		0.092	0.089		0.080	0.097		0.118*	0.122*
		(0.052)	(0.054)		(0.043)	(0.041)		(0.083)	(0.082)		(0.073)	(0.072)		(0.059)	(0.062)		(0.060)	(0.062)
$DKINF_{i,t-3}$			-0.027			0.003			-0.031			0.008			0.012			0.056
			(0.053)			(0.035)			(0.081)			(0.064)			(0.066)			(0.074)
R^2	0.685	0.707	0.682	0.601	0.620	0.593	0.706	0.739	0.725	0.456	0.492	0.486	0.431	0.464	0.472	0.292	0.323	0.330
Observations	694	668	642	694	668	642	321	296	271	321	296	271	373	372	371	373	372	371
Granger Causality	3.97**	2.65*	2.30*	9.69***	4.80***	3.71**	3.39*	1.92	1.72	4.61**	2.42	3.5**	1.33	2.32*	1.92	2.22	2.09	1.40
Test	[0.04]	[0.07]	[0.07]	[0.00]	[0.01]	[0.02]	[0.06]	[0.14]	[0.16]	[0.04]	[0.11]	[0.03]	[0.24]	[0.09]	[0.12]	[0.14]	[0.14]	[0.26]
Estimation	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**

Robust standard errors in brackets.
$P-values$ reported in square brackets
***p<0.01 **p<0.05 *p<0.10.

Table 6: Panel Granger Causality Tests. Dependent Variable = DKINF

	(All Period: 1980 - 2014)						(Before Euro: 1980 - 2001)						(After Euro: 2002 - 2014)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
$DKINF_{i,t-1}$	0.011	0.019	0.022	0.001	0.010	0.006	0.041	0.059	0.051	0.008	0.022	-0.000	-0.041	-0.025	-0.025	-0.120	-0.110	-0.121
	(0.060)	(0.061)	(0.063)	(0.036)	(0.037)	(0.043)	(0.097)	(0.098)	(0.107)	(0.026)	(0.029)	(0.038)	(0.058)	(0.061)	(0.061)	(0.073)	(0.087)	(0.087)
$DKINF_{i,t-2}$		-0.122**	-0.124**		-0.136**	-0.134**		-0.204***	-0.206**		-0.244***	-0.238***		-0.046	-0.038		-0.109**	-0.091*
		(0.047)	(0.049)		(0.059)	(0.064)		(0.075)	(0.080)		(0.062)	(0.080)		(0.054)	(0.059)		(0.049)	(0.049)
$DKINF_{i,t-3}$			-0.060			-0.085*			-0.119*			-0.182**			-0.008			-0.073*
			(0.045)			(0.043)			(0.066)			(0.066)			(0.058)			(0.041)
$ULCOM_{i,t-1}$	0.010	0.082**	0.054	0.018*	0.092***	0.068	0.006	0.105**	0.066	0.013	0.101*	0.091	0.051	0.063	0.059	0.103*	0.105	0.105
	(0.018)	(0.037)	(0.040)	(0.010)	(0.031)	(0.048)	(0.022)	(0.049)	(0.058)	(0.022)	(0.056)	(0.076)	(0.039)	(0.049)	(0.054)	(0.055)	(0.065)	(0.067)
$ULCOM_{i,t-2}$		-0.077**	-0.015		-0.077**	-0.004		-0.099**	-0.022		-0.111**	-0.008		-0.017	-0.033		0.021	-0.007
		(0.037)	(0.034)		(0.032)	(0.040)		(0.043)	(0.053)		(0.043)	(0.045)		(0.038)	(0.048)		(0.039)	(0.046)
$ULCOM_{i,t-3}$			-0.006			-0.008			-0.007			-0.023			0.027			0.070*
			(0.025)			(0.013)			(0.029)			(0.024)			(0.055)			(0.040)
$\mathbf{R^2}$	0.001	0.031	0.025	0.002	0.034	0.034	0.002	0.068	0.062	0.001	0.084	0.084	0.008	0.009	0.010	0.028	0.037	0.047
Observations	697	671	645	697	671	645	321	296	271	321	296	271	376	375	374	376	375	374
Granger Causality	0.29	2.57*	1.48	2.45*	4.37**	2.83*	0.09	2.65*	1.50	0.35	3.66**	0.87	1.68	0.91	1.00	3.55*	2.72*	4.13**
Test	[0.58]	[0.07]	[0.21]	[0.07]	[0.02]	[0.06]	[0.76]	[0.07]	[0.21]	[0.55]	[0.04]	[0.47]	[0.19]	[0.40]	[0.39]	[0.07]	[0.08]	[0.02]
Estimation	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**	**OLS**	**OLS**	**OLS**	**FE**	**FE**	**FE**

Robust standard errors in brackets.
$P - values$ reported in square brackets
***p<0.01 **p<0.05 *p<0.10.

Table 7: DID regression of cost competitiveness on capital inflows. Dependent variable: real unit labor costs growth (ULC).

$K_{i,t}$ Measure	$DKINF_{i,t-1}$		$A4DKINF_{i,t}$		$CUM4_{i,t}$	
	(1)	(2)	(3)	(4)	(5)	(6)
α	5.462***	5.344***	5.186***	5.231***	3.934**	4.052***
	(1.335)	(1.297)	(1.260)	(1.273)	(1.429)	(1.256)
δ^{EA} (EUR_i)	2.306	2.549	1.508	1.643	2.754	2.640
	(1.611)	(1.691)	(1.608)	(1.741)	(1.701)	(1.733)
γ (Pre_t)	-0.477		-0.054		0.052	
	(1.070)		(0.982)		(1.056)	
θ $(Post_t)$	-2.648***	-2.452***	-2.430***	-2.386***	-1.242*	-1.265**
	(0.577)	(0.614)	(0.660)	(0.722)	(0.663)	(0.613)
γ^{EA} (Pre_tEUR_i)	-4.116**	-4.555***	-3.369**	-3.557***	-3.877**	-3.601***
	(1.491)	(1.038)	(1.396)	(1.001)	(1.477)	(1.074)
θ^{EA} $(Post_tEUR_i)$	-2.346	-2.595	-1.622	-1.742	-3.754**	-3.635**
	(1.505)	(1.537)	(1.521)	(1.586)	(1.655)	(1.647)
δ_k $(K_{i,t})$	0.642**	0.516***	1.163	1.593*	2.627**	2.473**
	(0.246)	(0.183)	(0.696)	(0.798)	(1.102)	(1.027)
δ_k^{EA} $(EUR_iK_{i,t})$	-0.441	-0.156	-1.475	-1.579*	-2.164	-1.765
	(0.297)	(0.183)	(0.910)	(0.853)	(1.353)	(1.088)
γ_k $(Pre_tK_{i,t})$	-0.896*	-0.655*	1.104		-0.341	
	(0.465)	(0.360)	(0.990)		(1.720)	
θ_k $(Post_tK_{i,t})$	-0.508**	-0.383***	-0.858	-1.288*	-2.387**	-2.233**
	(0.192)	(0.137)	(0.590)	(0.735)	(0.978)	(1.000)
γ_k^{EA} $(Pre_tEUR_iK_{i,t})$	0.828		-0.294		0.889	
	(0.521)		(1.187)		(1.961)	
θ_k^{EA} $(Post_tEUR_iK_{i,t})$	0.813**	0.529***	2.265**	2.371***	3.626**	3.224***
	(0.295)	(0.173)	(0.852)	(0.846)	(1.336)	(1.155)
$UNEMP_{i,t}$	-8.112	-8.030	-9.160	-9.304	-9.246	-9.340
	(9.381)	(9.366)	(9.330)	(9.451)	(9.295)	(9.293)
$PROD_{i,t}$	-0.330**	-0.334**	-0.291	-0.278	-0.306*	-0.306*
	(0.153)	(0.151)	(0.171)	(0.172)	(0.168)	(0.166)
$UNIOND_{i,t}$	-0.155	-0.120	-0.151	-0.231	-0.117	-0.099
	(1.299)	(1.360)	(1.279)	(1.275)	(1.239)	(1.251)
$\mathbf{R^2}$	0.210	0.206	0.195	0.189	0.178	0.178
Observations	771	771	713	713	713	713
Sample	26 Countries	26 Countries	26 Countries	26 Countries	26 Countries	26 Countries
Time Period	1980-2014	1980-2014	1980-2014	1980-2014	1980-2014	1980-2014

Robust country-clustered standard errors reported in parentheses. ***p<0.01 **p<0.05 *p<0.10. This table presents the results of the DID estimation for the sample of 26 countries over the 1980-2014 period. Reference period: 1980-1994. Pre-treatment period: 1995-2001. Post-treatment period: 2002-2014. The dependent variable is ULC. Three specifications are estimated: one using capital inflows in lags (DKINF, Columns (1) and (2)), another using the 4 year moving average (A4DKINF, columns (3) and (4)) and a third one using the discrete cumulative variable (CUM4, columns (5) and (6)). In each specification, the first column tests the Constant Paths assumption, under the null hypothesis of 'common pre-trends before the year 2002': $H_0 : \gamma_k^{EA} = 0$. The main hypothesis of this paper is tested through θ_k^{EA} as: $H_0 : \theta_k^{EA} > 0$

Table 8: DID regression of cost competitiveness on capital inflows. Dependent variable: unit labor compensation per unit of input growth (ULCOM).

$K_{i,t}$ Measure	$DKINF_{i,t-1}$		$A4DKINF_{i,t}$		$CUM4_{i,t}$	
	(1)	(2)	(3)	(4)	(5)	(6)
α	5.114***	4.883***	4.843***	4.812***	3.416**	3.847***
	(1.385)	(1.349)	(1.390)	(1.371)	(1.385)	(1.271)
δ^{EA} (EUR_i)	-0.251	-1.341	-0.793	-1.651	0.396	-0.140
	(1.156)	(1.009)	(1.080)	(1.048)	(0.855)	(1.054)
γ (Pre_t)	-0.201		0.146		0.806	
	(1.013)		(0.997)		(1.185)	
θ $(Post_t)$	-2.686***	-2.560***	-2.440***	-2.481***	-1.019*	-1.445*
	(0.607)	(0.697)	(0.740)	(0.817)	(0.556)	(0.704)
γ^{EA} (Pre_tEUR_i)	-2.262		-1.662		-2.545*	-1.518*
	(1.342)		(1.234)		(1.298)	(0.767)
θ^{EA} $(Post_tEUR_i)$	-0.013	1.056	0.402	1.253	-1.649	-1.113
	(1.137)	(0.930)	(1.140)	(1.012)	(1.042)	(1.172)
δ_k $(K_{i,t})$	0.736**	0.220	1.334*	1.621***	3.244***	2.507***
	(0.334)	(0.133)	(0.691)	(0.572)	(1.003)	(0.760)
δ_k^{EA} $(EUR_iK_{i,t})$	-0.157	0.088	-0.089	-0.589	-2.281*	-1.276
	(0.348)	(0.208)	(0.739)	(0.565)	(1.288)	(0.864)
γ_k $(Pre_tK_{i,t})$	-0.821		0.743		-1.454	
	(0.601)		(0.997)		(1.722)	
θ_k $(Post_tK_{i,t})$	-0.567**	-0.047	-0.900	-1.180***	-2.891***	-2.153***
	(0.265)	(0.257)	(0.617)	(0.413)	(0.904)	(0.661)
γ_k^{EA} $(Pre_tEUR_iK_{i,t})$	0.540		-1.112		1.969	
	(0.633)		(1.144)		(2.006)	
θ_k^{EA} $(Post_tEUR_iK_{i,t})$	0.558	0.319	0.867	1.378**	3.758***	2.749***
	(0.348)	(0.270)	(0.768)	(0.504)	(1.321)	(0.855)
$UNEMP_{i,t}$	-0.162	0.848	-0.323	0.335	-2.088	-2.140
	(8.778)	(9.192)	(8.747)	(8.948)	(8.904)	(8.983)
$PROD_{i,t}$	0.652***	0.658***	0.677***	0.693***	0.649***	0.643***
	(0.150)	(0.143)	(0.162)	(0.161)	(0.157)	(0.153)
$UNIOND_{i,t}$	-0.509	-0.403	-0.435	-0.410	-0.576	-0.554
	(1.183)	(1.188)	(1.149)	(1.114)	(1.098)	(1.097)
$\mathbf{R^2}$	0.301	0.265	0.315	0.305	0.298	0.296
Observations	686	686	635	635	635	635
Sample	26 Countries	26 Countries	26 Countries	26 Countries	26 Countries	26 Countries
Time Period	1980-2014	1980-2014	1980-2014	1980-2014	1980-2014	1980-2014

Robust country-clustered standard errors reported in parentheses. ***p<0.01 **p<0.05 *p<0.10. This table presents the results of the DID estimation for the sample of 26 countries over the 1980-2014 period. Reference period: 1980-1994. Pre-treatment period: 1995-2001. Post-treatment period: 2002-2014. The dependent variable is ULC. Three specifications are estimated: one using capital inflows in lags (DKINF, Columns (1) and (2)), another using the 4 year moving average (A4DKINF, columns (3) and (4)) and a third one using the discrete cumulative variable (CUM4, columns (5) and (6)). In each specification, the first column tests the Constant Paths assumption, under the null hypothesis of 'common pre-trends before the year 2002': $H_0 : \gamma_k^{EA} = 0$. The main hypothesis of this paper is tested through θ_k^{EA} as: $H_0 : \theta_k^{EA} > 0$

Table 9: DID regression of cost competitiveness on capital inflows. Dependent variable: real exchange rate relative to the EA12 (REER12).

	IMF	Eurostat
α	2.308***	2.561***
	(0.474)	(0.481)
δ^{EA} (EUR_i)	-0.580	-0.714*
	(0.381)	(0.387)
θ $(Post_t)$	-0.442	-0.651
	(0.344)	(0.403)
θ^{EA} $(Post_t EUR_i)$	0.468	0.609
	(0.418)	(0.464)
δ_k $(K_{i,t})$	0.170***	0.198***
	(0.053)	(0.056)
δ_k^{EA} $(EUR_i K_{i,t})$	-0.400**	-0.562***
	(0.180)	(0.162)
θ_k $(Post_t K_{i,t})$	-0.515***	-0.553***
	(0.175)	(0.170)
θ_k^{EA} $(Post_t EUR_i K_{i,t})$	1.006***	1.216***
	(0.262)	(0.282)
$UNEMP_{i,t}$	-12.292***	-12.110**
	(4.239)	(4.619)
$PROD_{i,t}$	-0.504***	-0.511***
	(0.118)	(0.121)
$UNIOND_{i,t}$	-0.700	-0.898
	(0.528)	(0.526)
$\mathbf{R^2}$	0.268	0.294
Observations	325	304
Sample	19 Countries	19 Countries
Time Period	1995-2013	1995-2013

Robust country-clustered standard errors reported in parentheses. ***p<0.01 **p<0.05 *p<0.10. This table presents the results of the DID estimation for the sample of 19 EU countries over the 1995-2013 period. Reference period: 1995-2001. The dependent variable is REER12. The main hypothesis of this paper is tested through θ_k^{EA} as $H_0 : \theta_k^{EA} > 0$

Table 10: DID regression of cost competitiveness on capital inflows. Dependent variable: real unit labour costs growth (ULC). Periphery and North-core.

	Periphery			North-Core		
$K_{i,t}$ Measure	$DKINF_{i,t-1}$	$A4DKINF_{i,t}$	$CUM4_{i,t}$	$DKINF_{i,t-1}$	$A4DKINF_{i,t}$	$CUM4_{i,t}$
	(1)	(2)	(3)	(4)	(5)	(6)
α	5.338***	5.404***	3.972**	4.235***	4.380***	3.143**
	(1.555)	(1.576)	(1.596)	(1.270)	(1.237)	(1.306)
δ^{EA} (EUR_i)	3.781*	2.774	4.253	-1.689*	-2.060**	-1.015
	(1.929)	(1.955)	(2.694)	(0.853)	(0.913)	(0.736)
θ $(Post_t)$	-2.342***	-2.300***	-1.118*	-2.226***	-2.174***	-1.095*
	(0.630)	(0.730)	(0.630)	(0.589)	(0.690)	(0.614)
θ^{EA} $(Post_t EUR_i)$	-3.264**	-2.447*	-5.624***	1.561*	1.947*	0.656
	(1.436)	(1.391)	(1.635)	(0.882)	(0.944)	(0.915)
δ_k $(K_{i,t})$	0.180**	1.664*	2.534**	0.191**	1.628**	2.516**
	(0.073)	(0.802)	(1.029)	(0.072)	(0.747)	(0.968)
δ_k^{EA} $(EUR_i K_{i,t})$	-0.469***	-2.447**	-2.834	-0.015	-1.017	-2.262**
	(0.146)	(1.056)	(1.825)	(0.201)	(0.669)	(0.933)
θ_k $(Post_t K_{i,t})$	-0.047	-1.373*	-2.321**	-0.018	-1.256*	-2.198**
	(0.124)	(0.744)	(0.999)	(0.140)	(0.668)	(0.934)
θ_k^{EA} $(Post_t EUR_i K_{i,t})$	0.937***	3.243***	5.296***	0.108	1.275*	2.657**
	(0.124)	(1.057)	(1.604)	(0.244)	(0.683)	(0.971)
$UNEMP_{i,t}$	-14.788	-15.882	-14.013	-0.664	-4.458	-3.730
	(12.609)	(12.760)	(13.993)	(15.184)	(14.309)	(15.520)
$PROD_{i,t}$	-0.260	-0.195	-0.216	-0.208	-0.169	-0.206
	(0.181)	(0.211)	(0.205)	(0.154)	(0.175)	(0.164)
$UNIOND_{i,t}$	0.583	0.141	0.293	0.722	0.716	0.686
	(1.751)	(1.585)	(1.567)	(1.028)	(0.994)	(0.996)
$\mathbf{R^2}$	0.211	0.215	0.198	0.095	0.144	0.126
Observations	569	529	529	611	563	563
Sample	19 Countries	19 Countries	19 Countries	21 Countries	21 Countries	21 Countries
Time Period	1980-2014	1980-2014	1980-2014	1980-2014	1980-2014	1980-2014

Robust country-clustered standard errors reported in parentheses. ***p<0.01 **p<0.05 *p<0.10. This table presents the results of the DID estimation for the sample of 26 countries over the 1980-2014 period. Reference period: 1980-1994. Pre-treatment period: 1995-2001. Post-treatment period: 2002-2014. The dependent variable is ULC. Three specifications are estimated: one using capital inflows in lags (DKINF, Columns (1) and (2)), another using the 4 year moving average (A4DKINF, columns (3) and (4)) and a third one using the discrete cumulative variable (CUM4, columns (5) and (6)). In each specification, the first column tests the Constant Paths assumption, under the null hypothesis of 'common pre-trends before the year 2002': $H_0 : \gamma_k^{EA} = 0$. The main hypothesis of this paper is tested through θ_k^{EA} as: $H_0 : \theta_k^{EA} > 0$

Table 11: DID regression of cost competitiveness on capital inflows. Dependent variable: unit labor compensation per unit of input growth (ULCOM). Periphery and North-Core.

	Periphery			North-Core		
$K_{i,t}$ Measure	$DKINF_{i,t-1}$	$A4DKINF_{i,t}$	$CUM4_{i,t}$	$DKINF_{i,t-1}$	$A4DKINF_{i,t}$	$CUM4_{i,t}$
	(1)	(2)	(3)	(4)	(5)	(6)
α	4.881**	4.537**	3.304*	4.429***	4.445**	3.224**
	(1.759)	(1.776)	(1.672)	(1.548)	(1.569)	(1.510)
δ^{EA} (EUR_i)	0.479	-0.482	0.130	-2.204**	-2.335**	-1.400
	(1.241)	(1.237)	(1.280)	(0.910)	(0.986)	(0.830)
θ $(Post_t)$	-2.520***	-2.403**	-1.338*	-2.457***	-2.379***	-1.310*
	(0.731)	(0.847)	(0.766)	(0.685)	(0.801)	(0.718)
θ^{EA} $(Post_t EUR_i)$	-0.604	-0.126	-3.057***	1.965**	2.099*	1.012
	(0.945)	(1.010)	(0.865)	(0.917)	(1.007)	(0.999)
δ_k $(K_{i,t})$	0.227	1.650***	2.539***	0.232*	1.662***	2.571***
	(0.138)	(0.548)	(0.730)	(0.134)	(0.544)	(0.730)
δ_k^{EA} $(EUR_i K_{i,t})$	-0.313	-0.969	-1.184	0.062	-0.826	-1.996**
	(0.280)	(0.580)	(0.746)	(0.261)	(0.505)	(0.837)
θ_k $(Post_t K_{i,t})$	-0.046	-1.194***	-2.149***	-0.048	-1.202***	-2.165***
	(0.269)	(0.368)	(0.629)	(0.271)	(0.356)	(0.614)
θ_k^{EA} $(Post_t EUR_i K_{i,t})$	1.012***	2.175***	4.691***	-0.072	0.897*	2.229**
	(0.268)	(0.480)	(0.991)	(0.337)	(0.473)	(0.783)
$UNEMP_{i,t}$	-0.392	1.949	2.302	2.911	0.671	0.759
	(11.852)	(11.632)	(12.085)	(16.151)	(15.695)	(16.529)
$PROD_{i,t}$	0.706***	0.770***	0.733***	0.705***	0.752***	0.713***
	(0.165)	(0.184)	(0.171)	(0.159)	(0.177)	(0.165)
$UNIOND_{i,t}$	-0.528	-0.514	-0.576	0.105	0.100	0.032
	(1.718)	(1.615)	(1.550)	(1.193)	(1.070)	(1.046)
$\mathbf{R^2}$	0.286	0.317	0.307	0.274	0.308	0.294
Observations	484	451	451	563	518	518
Sample	19 Countries	19 Countries	19 Countries	21 Countries	21 Countries	21 Countries
Time Period	1980-2014	1980-2014	1980-2014	1980-2014	1980-2014	1980-2014

Robust country-clustered standard errors reported in parentheses. ***p<0.01 **p<0.05 *p<0.10. This table presents the results of the DID estimation for the sample of 26 countries over the 1980-2014 period. Reference period: 1980-1994. Pre-treatment period: 1995-2001. Post-treatment period: 2002-2014. The dependent variable is ULC. Three specifications are estimated: one using capital inflows in lags (DKINF, Columns (1) and (2)), another using the 4 year moving average (A4DKINF, columns (3) and (4)) and a third one using the discrete cumulative variable (CUM4, columns (5) and (6)). In each specification, the first column tests the Constant Paths assumption, under the null hypothesis of 'common pre-trends before the year 2002': $H_0 : \gamma_k^{EA} = 0$. The main hypothesis of this paper is tested through θ_k^{EA} as: $H_0 : \theta_k^{EA} > 0$.