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(*) The views in this paper are those of the author and do not represent the views of the Banco de España or the Eurosystem.

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Abstract

This paper analyzes the behaviour of the external adjustment path for the four main economies in the euro area. I find a structural break in the behaviour of the net external position at the time of the introduction of the euro for France, Italy and Spain, pointing out that the inception of the common currency changed their external adjustment process. Germany does not show this structural break, being its external position more affected by other events such as the country reunification in 1989. I also find that France and Italy will adjust the net external position mainly through the valuation component, while Germany and Spain will restore their external balance mostly through the trade component. The common currency area could have exacerbated Germany's net creditor position as the evolution of the euro has reacted to the external adjustment needs of debtor countries such as Italy and Spain.

Keywords: external adjustment, exchange rate regime, structural breaks, valuation adjustment.

JEL classification: F31, F33.

Resumen

Este trabajo analiza el comportamiento de la posición financiera externa de las cuatro principales economías de la zona del euro, y si la introducción de la moneda única ha modificado su evolución. Se documenta una ruptura estructural en el comportamiento de la posición externa neta de Francia, Italia y España en el momento de la introducción del euro, que señala que la creación de la moneda única cambió el proceso de ajuste externo en estos países. Alemania, sin embargo, no experimentó esta ruptura estructural y su posición externa se ha visto más afectada por otros eventos, como la reunificación del país en 1989. Los resultados empíricos muestran que Francia e Italia ajustarán sus desequilibrios externos principalmente por medio del componente de valoración, mientras que en Alemania y España primará el componente de comercio. El área monetaria común puede haber fomentado el incremento en la posición acreedora de Alemania, ya que el comportamiento de la moneda única ha estado condicionado por las necesidades de ajuste externo de países deudores como Italia y España.

Palabras clave: ajuste externo, régimen de tipo de cambio, cambio estructural, componente de valoración.

Códigos JEL: F31, F33.

1 Introduction

The process of external adjustment within a common currency area has received little attention in the literature, despite the fact that an important mechanism of correction of imbalances, the nominal exchange rate, has been partially cancelled. The lack of nominal exchange rate adjustment for the bilateral transactions and external positions among the countries of the currency area may difficult the reduction of large net external liability positions. As an alternative, the more complicated and slower process of adjustment in product prices and wages (internal devaluation) may operate in the absence of the nominal foreign exchange. Keeping the net external position under control is crucial given that economies with large net liability positions are more vulnerable to capital markets disruptions and growing imbalances may trigger sustainability problems. These vulnerabilities were evident during the global financial crisis and the subsequent euro area crisis, as several economies experienced sudden stops, sovereign debt problems, or both. Moreover, recent research by Gadea et al. (2018) shows how external imbalances also affect the business cycle, as economies with large external imbalances experience slower recoveries.

At the end of 2017 the international investment position (IIP) of the euro area, the largest common currency union in the world, recorded a net liability position of 388 billion euros, representing 3.5% of its GDP. Even though this is almost a balanced position[1] there are large differences among countries, which have become even larger after the inception the euro in 1999. For instance Germany amounts a net external creditor position representing 59% of its GDP at the end of 2017 while Spain shows a net debtor position representing 81% of its GDP[2]. Peripheral countries face the largest net liabilities positions in the euro area, with Portugal, Greece and Ireland showing net external positions representing 105.8%, 140.9% and 148.3% of its GDP respectively (see Chart 1).

The process of external adjustment for the countries within the euro area is different because these economies share a common currency. Gourinchas and Rey (2007) show that the dynamics of the exchange rate play a major role in the external adjustment process of the US since it has the dual role of changing the differential in rates of return between assets and liabilities denominated in different currencies (valuation component) and also of affecting future net exports (trade component). Lane and Shambaugh (2010) do also emphasize the impact of currency movements on the external positions for a large sample of countries. They find that the wealth effects associated with exchange rate changes are substantial and can explain a sizeable share of the overall valuation shocks that hit the net foreign asset position. Moreover, Fuertes (2019) shows the importance of the nominal exchange rate regime for the process of external adjustment in the US. He finds that the collapse of the Bretton Woods

[1]The U.S., for instance, had a negative IIP representing 39% of its GDP at the end of 2017.

[2]In absolute terms Spain holds the second largest net external debtor position in the world amounting 941.507 billion euros (1.108.386 billion dollars). The US is the country with the largest negative net external position totaling 7.725.002 billion dollars.

system of fixed exchange rates in 1973 affected the behaviour of the US net external position, implying an increase in the importance of the valuation component during the floating period. Given all the previous empirical evidence, it is expected that the inception of the common currency may have affected the external adjustment process for the countries of the euro area.

The introduction of the euro made the effects of nominal exchange rate changes to disappear among the countries in the currency area. First, a net debtor country could not rely anymore on foreign exchange depreciations to reduce the relative value of the local currency external debt held with other countries of the currency union. Similarly, a currency depreciation will not have any direct impact on the bilateral trade among the countries with the same currency [3]. Second, the behaviour of the exchange rate may not favour the external adjustment of all countries in the currency area, as foreign exchange movements will respond to the macroeconomic and monetary conditions of the whole currency union. For instance, a debtor country within the union that would benefit from an exchange rate depreciation to improve its external position may face an appreciating currency due to the macroeconomic situation of the other countries and the current monetary policy of the central bank. Because of these two reasons, changing from a floating to a fixed exchange rate regime within a common currency area may difficult the external adjustment and could be potentially dangerous for countries with large negative external positions. Understanding how the external adjustment process has evolved over time for the countries of the euro area and the implications of the introduction of the euro for that process are the main research questions of the paper.

This work is related to the studies analyzing the external adjustment process, with an emphasis on the relevance of valuation effects and the nominal exchange rate regime. Friedman (1953) initiated the debate arguing that flexible exchange rates facilitate the correction of external imbalances by allowing an automatic adjustment in a context of nominal rigidities. Following this idea several studies have analyzed empirically the validity of this assumption by investigating how current account imbalances are corrected depending on the exchange rate regime. Gosh et al. (2014) find a robust relationship between the exchange rate regime and the speed of external adjustment confirming Friedman´s hypothesis. Similarly, Eguren-Martin (2016) finds evidence that flexible exchange rate arrangements deliver faster current account adjustment among non-industrial countries. Fuertes (2019) focuses on the consequences of a change in the exchange rate regime for the behaviour of the net external position, being the first study to analyze the adjustment of the net external imbalance instead of only focusing on the current account. He finds that the behaviour of the U.S. net external position changed at the end of the Bretton Woods system of fixed exchange rates in 1973, with the U.S. external imbalance increasing its variance and turning into a debtor position during the floating period. He also finds that the exchange rate regime affects the U.S. external

[3] There may be second order effects as the depreciation could affect the terms of trade with the countries outside the currency area.

adjustment process mainly through the valuation channel, which increased its relevance over the floating period. Previously, Gourinchas and Rey (2007) had already documented the importance of the valuation component for the external adjustment process, finding that this component explained 27% of the variance for the cyclical part of the US net external position. Further analysis by Evans and Fuertes (2011) and Evans (2012) show that the contribution to the external adjustment of the valuation component is larger than that of the trade component when analyzing the whole U.S. external imbalance and not only its cyclical part. Theoretical models have also emphasized the role of valuation effects on the dynamics of the net external position. Devereux and Sutherland (2010) present a DSGE model with portfolio choice capable to reproduce the dynamics of the valuation channel of external adjustment. The model can only generate unexpected valuation effects, being the anticipated ones small and reproduced at higher orders of approximation. Ghironi et al. (2015) also examine the valuation channel of external adjustment theoretically in a DSGE model, being able to separate asset prices and quantities in the definition of net foreign assets. This is more consistent with previous empirical work that has documented the relevance of expected valuation effects (see Gourinchas and Rey (2007), Evans and Fuertes (2011) and Evans (2012)).

In this paper I analyze the external adjustment path of the four main economies of the euro area, covering both the period before and after the introduction of the euro, to understand how the currency area affected the external adjustment process. In principle, the inception of the euro should have limited the capacity of the nominal exchange rate to correct external imbalances. This is evident as most of the research related to the correction of external imbalances in euro area countries has focused on the process of internal devaluation and its consequences, acknowledging the limited role of the nominal exchange rate. Different studies have analyzed theoretically and empirically how current account deficits should be transformed into surpluses by a combination of a decrease in domestic spending, real exchange rate depreciation and a reduction in unit labor costs[4].

To the best of my knowledge this is the first attempt to study the behaviour of the net external position for a set of euro area countries, including debtor and creditor countries, and analyzing the implications of the common currency area for their external adjustment paths. Within this framework the main contributions of the paper are the following: First I build a novel data set of quarterly positions on assets and liabilities for the categories of equity, fixed income, direct investment and other assets/liabilities for France, Germany, Italy and Spain. The data set also includes estimates of quarterly total returns and capital gains for each of those categories. Second, I find a structural break in the behaviour of the net external position for France, Italy and Spain at the time of the introduction of the euro, pointing out that the inception of the common currency changed the external adjustment

[4]See for example Atoyan et al. (2013), Kang and Shambaugh (2014), Eggertsson et al. (2013) or Andrés et al. (2018).

process. The fact that Germany does not show this structural break is consistent with the exchange rate regime mainly affecting the valuation channel of external adjustment, given that the variance of Germany's net external position is almost completely explained by the trade channel. I also find a structural break for the external imbalances of Spain and Italy during the crisis of the European Exchange Mechanism (ERM) in 1992. Over this period the Italian lira and the Spanish peseta were devaluated and Italy abandoned the ERM. The importance of the valuation component of external adjustment increases after the introduction of the euro for France and Italy, and decreases for Germany and Spain. Third, I also find that France and Italy will adjust the net external position mainly through the valuation component of external adjustment, while Germany and Spain will restore their external balance mostly through the trade component. Both the valuation and trade components have supported the evolution of the net external position in France, Italy and Spain. In the case of Germany the valuation component has limited the overall trend towards a larger creditor position, which has been driven by the trade component. Fourth, in the absence of unexpected shocks, the half-live of the external imbalances is relatively short as Germany and Spain, the two countries with the largest imbalances, will be able to reduce their creditor and debtor positions by half in 7 and 3 years respectively. Finally, I documented asset pricing implications as the net external position has explanatory power over the future evolution of the exchange rate. A deterioration in the external imbalance of France, Italy and Spain implies a future depreciation of the euro, facilitating the external adjustment through the trade component. On the contrary, for Germany, the behaviour of the common currency has hindered the external adjustment as it has supported the increase in its creditor position.

The paper proceeds as follows: Section 2 presents the data set. Section 3 includes most of the empirical analysis, including the structural break tests, the estimation of the valuation and trade components and asset pricing implications. Section 4 develops robustness checks regarding the calculation of the portfolio returns and Section 5 concludes.

2 Data

The data set includes information for France, Germany, Italy and Spain about their international investment position (IIP) as well as the external portfolio returns for assets and liabilities each period. The IIP data comes from the Balance of Payments Statistics (BOPS) of the IMF. Using the original data I obtain asset and liabilities positions for different categories: equity, direct investment, fixed income and other assets/liabilities. The data set is constructed following the same methodology employed by Gourinchas and Rey (2007). The IIP data from the BOPS comes on a quarterly frequency only for the more recent years and I estimate quarterly positions using portfolio flows and total returns to increase the sample period [5] . It is important that the data set include the years before and after the inception of the euro in order to fully characterise the changes triggered by the introduction of the common currency.

The other important part of the data set are the portfolio returns. The returns are computed from market prices for each of the asset/liabilities classes: equity, direct investment, fixed income and other assets/liabilities. In order to identify the market weights within the categories of equity, direct investment and fixed income[6] I use the Coordinated Direct Investment Survey (CDIS) and the Coordinated Portfolio Investment Survey (CPIS), both from the IMF. Once I have the market weights for each quarter and asset category I calculate total returns and capital gains for each market and compute the total portfolio return for the different categories using the market weights. For example, for the equity assets category, I get from the CPIS the value of equity assets held in each foreign country to obtain geographical weights that will be used together with the returns of the corresponding benchmark equity index to compute the total return. The information contained in the market weights is also important because we can assess the portfolio value of the positions held with the other countries of the currency area. Chart 2 shows the percentage of foreign equity assets held in euro area countries for the four countries of analysis. As we can see all of them hold a relevant share of their equity assets portfolio in the euro area. Even though there is no information about euro area equity weights before 2001 it is reasonable to think that the introduction of the common currency may have changed the behaviour of capital gains. Before the introduction of the euro capital gains were determined both by asset prices and foreign exchange movements. After the introduction of the euro much of the capital gains coming from the equity assets portfolio were not affected by nominal exchange rate changes, being mainly determined by asset price changes[7]. This may have also affected the size and direction of external wealth effects, modifying the behaviour of the valuation channel of external adjustment.

I complete the data set with information on imports and exports for each country[8]. We can asses the relevance of the commercial ties the four countries of analysis have with the rest of the euro area members. Chart 3 shows the share of imports plus exports traded with the rest of euro area countries. The four countries show shares over 40%, with a slightly declining trend over the last years. It is noticeable the large increase experienced by Spanish imports and exports since 1986, the year Spain joined the European Union. The large share

[5] The data availability of the IIP at the quarterly and yearly frequency is different for each country, with the final estimated quarterly samples spanning from 1980: IV to 2017: I for Germany, Italy and Spain. For France the sample begins on 1989:III.

[6] For "other assets" I use the same market weights as those computed for short-term fixed income assets. For "other liabilities" I assume the total value is denominated in local currency using the same returns as those from short term fixed income liabilities.

[7] The other asset classes (FDI, fixed income and other assets) do also show a large share of euro area positions after the introduction of the common currency.

[8] The data sources are the NSEE France, ISTAT Italy, and the central banks of Germany and Spain

of bilateral trade of the four countries with the rest of the euro area shows the potential impact that the common currency may have induced to the evolution of the net external imbalance, in this case through the trade channel of external adjustment.

Finally, Table 1 shows the estimates of real portfolio returns for assets and liabilities as well as the return differentials. The table includes real returns for the complete sample as well as for the periods before and after the introduction of the euro. The only country able to obtain an average positive return differential over the whole period was Germany, with the other countries experiencing, on average, larger returns on their foreign liabilities than on their foreign assets. During the period after the introduction of the euro Spain was able to generate positive return differentials on average, while the other countries presented negative return differentials. The reduction of financing costs due to joining the euro area may have influenced the positive return differential obtained by Spain.

3 Empirical analysis

In order to analyze the external adjustment process of a country Evans and Fuertes (2011) derive the present value relation for the net external position using several log-linearizations that include assumptions about the behaviour of different financial ratios[9]. I will next summarize the main steps to obtain this present value equation, which will be used as the starting point for the empirical analysis.

I start with the following equation:[10]

$$FA_t - FL_t \equiv X_t - M_t + R_t^{FA} FA_{t-1} - R_t^{FL} FL_{t-1} \tag{1}$$

Where FA_t and FL_t are gross foreign assets and liabilities at the end of period t, X_t and M_t are exports and imports during period t, all measured in terms of the consumption index. R_t^{FA} and R_t^{FL} represent gross real returns on foreign assets and liabilities between the end of periods $t-1$ and t. After several log-linearizations and some algebra I obtain the following relation:

$$nfa_t \approx r_t^{NFA} + \frac{1-\rho}{\rho} nx_{t-1} + \frac{1}{\rho} nfa_{t-1} \tag{2}$$

Where nfa_t is the log of the ratio of foreign assets to liabilities at the beginning of period t. r_t^{NFA} is the log of the return differential of foreign assets and liabilities and nx_t is the difference of the log of exports minus imports. ρ is a discount factor. Defining $nxa_t = nfa_t + nx_t$ and $\Delta nx_t = nx_t - nx_{t-1}$ I obtain the following expression:

$$nxa_t \approx r_t^{NFA} + \Delta nx_t + \frac{1}{\rho} nxa_{t-1} \tag{3}$$

[9] See Evans and Fuertes (2011) and Fuertes (2019)

[10] The analysis does not include the secondary income which has been historically low for the four countries.

Iterating forward equation (3) and taking expectations conditioned on period t information, which includes de value of nxa_t , I obtain:

$$nxa_t \approx -E_t \sum_{i=1}^{\infty} \rho^i (r^{NFA}_{t+i} + \Delta nx_{t+i}) + E_t \lim_{i\to\infty} \rho^i (nxa_{t+i})$$

I impose the no-Ponzi game condition $E_t \lim_{i\to\infty} \rho^i(nxa_{t+i}) = 0$ on the equation above to rule out the possibility that a country defaults on its foreign claims. The next equation shows the present value relation between the variable nxa_t and future expected portfolio return differentials and net exports growth,[11]

$$nxa_t \approx -E_t \sum_{i=1}^{\infty} \rho^i (r^{NFA}_{t+i} + \Delta nx_{t+i}) \tag{4}$$

I will use nxa_t as the variable of interest that measures external imbalances, being the two terms at the right hand side of the equation the valuation component and the trade component respectively. This equation shows how current imbalances will be corrected in the future. Equation (4) implies that the net external position can only vary if it forecasts changes in portfolio returns or if it forecasts changes in net exports growth. If $E_t \sum_{i=1}^{\infty} \rho^i r^{NFA}_{t+i} = 0$, any adjustment of the net external position will come from future changes in net exports growth (trade component). On the other hand, if $E_t \sum_{i=1}^{\infty} \rho^i \Delta nx_{t+i} = 0$, any adjustment will come from future changes in portfolio returns (valuation component).

Next we need to characterise the joint behaviour of the variables involved in equation (4) in order to estimate the valuation and the trade components. This will allow us to test if there are any changes in the net external position due to the introduction of the common currency and it will also provide evidence on the different contributions of the valuation and trade components depending on the foreign exchange regime. I follow the methods developed by Campbell and Shiller (1987) (see also Evans and Fuertes (2011) and Fuertes (2019)). In order to estimate the valuation and trade components I use a VAR formulation. First, I set a VAR(p) representation with $z_t = (r^{NFA}_t, \Delta nx_t, nxa_t)'$. All variables are demeaned.

$$z_t = A(L) z_{t-1} + \epsilon_t$$

where ϵ_t is a vector of zero mean errors. The VAR has the following first order companion representation:

$$Z_t = \bar{A} Z_{t-1} + \bar{\epsilon}_t$$

[11]In deriving equation (4) I have performed several first order approximations. To assess the accuracy of those approximations we can compute the error term from equation (3) which also includes any measurement errors from the original data. The error term is small and stationary for the four countries under analysis

where $Z_t = (z_t^{'}, ..., z_{t-p+1}^{'})$ and $\bar{\epsilon}_t = (\epsilon_t, 0)$. Next, I define the vectors $e_r, e_{\Delta nx}, e_{nxa}$ such that they select the different elements of Z_t (for example $e_r^{'} Z_t = r_t^{NFA}$). I can express equation (4) in terms of the VAR formulation.

$$e_{nxa}^{'} Z_t = -(e_r^{'} + e_{\Delta nx}^{'}) \sum_{i=1}^{\infty} \rho^i E_t Z_{t+i}$$

The valuation and trade components can be computed as follow:

$$nxa_t^r = e_r^{'} \rho \bar{A}(I - \rho \bar{A})^{-1} Z_t = \sum_{i=1}^{\infty} \rho^i \bar{A}^i E(r_{t+i}^{NFA} | \Omega_t^*)$$

$$nxa_t^{\Delta nx} = e_{\Delta nx}^{'} \rho \bar{A}(I - \rho \bar{A})^{-1} Z_t = \sum_{i=1}^{\infty} \rho^i \bar{A}^i E(\Delta nx_{t+i} | \Omega_t^*)$$

In the next sections I will exploit the relations derived from the present value equation (4) for the joint dynamics of r_t^{NFA}, Δnx_t, and nxa_t, as well as the estimates of the valuation and trade components to analyze the external adjustment process of France, Germany, Italy and Spain.

3.1 Testing for Structural Breaks

First of all I am going to test if we can identify any changes in the behaviour of the variables included in the VAR specification at the time of the introduction of the euro. I will do so by running structural break tests at unknown dates for a system of equations using the VAR developed in the previous section [12]. The results of the tests will provide evidence in favor or against the potential role that the foreign exchange rate regime may have on the external adjustment process. Qu and Perron (2007) provide a framework to analyze series with multiple structural changes that occur at unknown dates in linear multivariate regression models, such as VARs. The breaks may happen in the parameters of the conditional mean, in the covariance matrix of the errors, or both, and the distribution of the regressors is also allowed to change across regimes. This is important because the tests determine whether or not the breaks in mean and variance happen at the same time. The framework used by these authors is the following:

$$y_t = (I \otimes z_t^{'}) S \beta_t + u_t$$

[12] Dickey-Fuller augmented unit root tests are performed to the three variables introduced in the VAR. As it is expected, the tests for Δnx and r^{NFA} reject the null of unit root at the 1 % level for all samples. The tests for nxa cannot reject the null of unit root in the case of France and Germany. For Spain and Italy the null is rejected at the 10 % level. There are several reasons to believe that the nxa variables are not unit root processes though. First, nxa is by definition a linear combination of stationary variables given that Δnx and r^{NFA} are stationary. Second, the unit root tests lack of power when the alternative hypothesis is a very persistence process with high ρ as it is the case. Third, being nxa a non-stationary process implies that the non-ponzi game condition could be violated, meaning that Germany and France, with some probability, may not repay their external debt, something very unlikely over the last 40 years.

There are n equations and T observations, excluding the initial conditions if lagged dependent variables are used as the regressors. The total number of structural changes in the system is m and the break dates are denoted by the vectors $(T_1, \ldots\ldots, T_m)$ with the convention of $T_0 = 1$ and $T_{(m+1)} = T$. A subscript j indexes a regime ($j = 1, ..., m+1$), a subscript t indexes a temporal observation ($t = 1, ..., T$), and a subscript i indexes the equation ($i = 1, ..., n$) to which a scalar dependent variable y_i, is associated. The parameter q is the number of regressors and z, is the set that includes the regressors from all equations $z_t, = (z_{1t}, ..., z_{qt})'$. Finally, u has zero mean and covariance matrix Σ_j for $T_{j-1} + 1 \leq t \leq T_j (j = 1, ..., m + 1)$. When using a VAR model as in this case we have that $z_t = (y_{t-1}, ..., y_{t-q})$, which contains the lagged dependent variables. I use a VAR(1) following the results from the Akaike and the Schwarz criteria that select the optimal number of lags.

In order to construct the test of the null hypothesis of no break versus the alternative hypothesis of some unknown number of breaks between 1 and some upper bound M, I first use the $UDmaxLRT(M)$ and $WDmaxLRT(M)$ double maximum tests to see if at least one break is present. Then, if the test rejects this hypothesis, I consider a $SEQ_T(l+1|l)$ sequential procedure obtained from a global maximization of the likelihood function and based on a test of l versus $l + 1$ changes.[13]. The covariance matrix of the errors is allowed to change and normality is assumed when testing for changes in the covariance matrix. We correct for serial correlation in the residuals and construct the robust covariance matrix by the method of Andrews (1991). No pre-whitening technique is applied. Finally, the distribution of the regressors is allowed to change in order to construct the confidence intervals.

Table 2 shows the results for France. The test identifies a structural break in the behaviour of the series that happen at the end of 1998. This is consistent with the introduction of the euro having modified the behaviour of the net external position and the adjustment process, potentially changing the relevance of the valuation and trade components as well. The test identifies another two breaks for France, the next one in 2004 and the last one in 2009. These two breaks seem to be more related to the real economy although the first one is more difficult to identify. After 2004 France began to experience negative current account and trade balances, which may have crucially affected the external adjustment process. The last break in 2009 should be related to the global financial crisis and the recession France suffered over that time. The global financial crisis produced important disruptions both on the financial and the real side of the economy and it is expected that these effects could have affected the adjustment process both for the valuation and trade components.

Table 3 presents the results for Italy. In this case the test only identifies two breaks, one in 1992 and another one in 1999. Similarly to France there is a structural break at the time of the introduction of the euro, providing further evidence on the change in the behaviour of

[13] I carried out the procedure with a maximum number of breaks $m = 3$ and a trimming of 0.2, which means that the minimal length required is 50 observations.

the external imbalance due to the establishment of the common currency area. The break in 1992 could be related to another event affecting the nominal exchange rate as the Italian lira was devaluated by 7% in September of 1992 and abandoned the exchange rate mechanism (ERM) of the European Monetary System at that time[14] . After this devaluation the Italian economy experienced a large period of current account and trade surpluses.

Table 4 shows the result of the structural break test for Spain. There are three structural breaks identified: one in 1993, another one in 1999 and the last one in 2007. The test identifies again a structural break at the time on the inception of the euro. It identifies another break in 1993 which, similarly to the case of Italy, should be related to events affecting the exchange rate. Even though Spain did not abandon the ERM in 1992, the currency disruptions in the European monetary system did also affect Spain, as the Spanish government devalued the peseta by 5% in September of 1992. After that there were another two devaluations during 1992 and 1993: a 6% devaluation in November of 1992 and a 8% devaluation in May of 1993. This period do also coincide with a recession of the Spanish economy in 1993, with the GDP growth reaching -1% that year.

Finally, table 5 shows the results for Germany. The test identifies two structural breaks, one in 1989 and another one in 2006. The case for Germany is relevant as it is the only country that does not show a structural break at the time of the introduction of the euro. There could be several reasons. First, we have to consider that Germany's external imbalance can almost be completely explained by the trade component, a result that will be documented in the next section. Fuertes (2019) showed that the break in the US external position documented at the end of fixed exchange rate regime was mainly driven by the valuation component. It could be that Germany's net external position was not affected by the introduction of the euro as much as the ones from the other countries because the trade component almost completely explains the behaviour of Germany's external imbalance. Second, Germany is the largest economy within the euro area and it is reasonable to think that the euro has been behaving more similarly to the Deutsche mark than any other currency and this may have produced a less impact on the external position. Moreover, the monetary policy of the euro zone has also been implemented to a large extent according to needs of the German economy, specially before the global financial crisis, which may have reduced the impact of the common currency. Germany's external imbalance seems to have been more affected by the reunification of the country in 1989 and by the global financial crisis. Both events are detected as structural breaks in the test although the one related with the global financial crisis is stablished a little bit early at the end of 2006.

[14]The exchange rate mechanism established that currency fluctuations had to be contained within a margin of 2.25% on either side of the bilateral rates (with the exception of the Italian lira, the Spanish peseta, the Portuguese escudo and the pound sterling, which were allowed to fluctuate by ±6%). The United Kingdom did also abandon the exchange rate mechanism in 1992.

3.2 Valuation and Trade Effects

The results of the tests in the previous section show that the introduction of the common currency did change the external adjustment process, at least for France, ItaIy and Spain. Now I will use the estimates of the valuation and trade components in order to quantify the contribution of each of them to the variance of the net external position. By doing so with different sample periods I can assess how the external adjustment process have changed after the introduction of the common currency. In order to find out the contribution of the valuation and trade components to the external adjustment, I perform the following variance decomposition:

$$\begin{aligned} 1 =& \frac{Cov(nxa, nxa)}{Var(nxa)} = \frac{Cov(nxa^r, nxa)}{Var(nxa)} + \frac{Cov(nxa^{\Delta nx}, nxa)}{Var(nxa)} \\ =& \beta_r + \beta_{\Delta nx} \end{aligned} \tag{5}$$

The regression coefficients β_r and $\beta_{\Delta nx}$ represent the share on the unconditional variance of nxa explained by the valuation component nxa^r and the trade component $nxa^{\Delta nx}$. I can empirically estimate nxa, the valuation and trade components as well as the regression coefficients β_r and $\beta_{\Delta nx}$ using the VAR estimates. Let $\hat{A}$ denote the estimated companion matrix from the VAR. The predicted value for the nxa_t based on our VAR estimates will be:

$$\begin{aligned} \widehat{nxa}_t &= -(e_r^{'} + e_{\Delta nx}^{'})\rho\hat{A}(I - \rho\hat{A})^{-1}Z_t \\ &= \widehat{nxa_t^r} + \widehat{nxa_t^{\Delta nx}} \end{aligned} \tag{6}$$

From the OLS regressions of $\widehat{nxa_t^r}$ and $\widehat{nxa_t^{\Delta nx}}$ on nxa_t, I can compute the variance contribution of the estimated valuation and trade components. From this variance decomposition of the net external position we can obtain the relative importance of the valuation and trade components over the external adjustment process for each of the countries under analysis. Table 6 shows this information for the period including both the years before and after the introduction of the euro. For Germany and Spain the trade component has been more important for the external adjustment. For France, the relevance of the valuation and trade components has been almost the same and for Italy the valuation component has been capable to explain a larger share of the variance of the net external position. We have to keep in mind that the results are not completely comparable as the sample period is not exactly the same due to data availability. The results for Germany are striking as the trade component almost explains all the historical variance of the external position, being the contribution of the valuation component negligible. Moreover, the valuation component for Germany has moved in the opposite direction of the external imbalance, showing a negative covariance. For France, Italy and Spain both the valuation and the trade components have moved in the same direction as the external position. From these results we have to expect that if the behaviour of Germany's external imbalance remains similar to its historical trends, the reduction of its creditor position will come from a reduction in net exports. On the other hand, France, Italy and Spain will reduce their debtor positions by a combination of increasing net exports and positive return differentials, being the relative important of these two forces different for each country. As I already mentioned, Spain will restore its balanced position mainly through increasing net exports and Italy by positive return differentials. For France both components of external adjustment will play a similar role.

Next I analyze the changes that the introduction of the euro may have induced into the external adjustment process. Fuertes (2019) finds for the US that the valuation component increased its relative importance after the end of the Bretton Woods system of fixed exchange rate in 1973. A floating exchange rate regime made the valuation channel to play a more prominent role on the external adjustment process. With a floating exchange rate the valuation component not only was affected by asset price changes but also by exchange rate changes, adding an additional source of adjustment. Under the same rationale, the valuation component may have decreased its relative importance in the external adjustment process of the euro area countries once the euro was in place as the bilateral external portfolio positions among the countries of the union would only change due to asset price movements. In any case, the Bretton Woods system is not completely equivalent to the introduction of the euro as the change for the US was from a fixed to a floating exchange rate system while euro area countries remain with a floating exchange rates against third currencies. We have also to take into account that there have been other events that may have affected the relative importance of the valuation and trade channels. For instance, the global financial crisis triggered large asset price changes that may have affected the dynamics of the external adjustment, increasing the role of valuation effects.

Table 7 shows the variance decomposition of the net external position between the valuation and trade components since 1999. The results show that for Germany and Spain there is an increase in the importance of the trade component over this period. For Spain, since the introduction of the common currency, 80% of the variance of the external imbalance is explained by the trade component, being this number 61% if we use the whole sample. After the introduction of the common currency Spain will have to rely more on the trade channel in order to restore its debtor position. Similarly, for Germany the introduction of the euro has made the country to depend even more on decreases in net exports to reduce its creditor position. The valuation channel has increased its negative covariance with Germany's external imbalance during this period, making even more difficult the future external adjustment of its creditor position. France and Italy on the contrary have experienced an increase in the percentage of the variance of its external imbalance explained by the valuation component during the currency area period. This could be the result of larger asset price changes or that exchange rate movements within the euro area countries before the introduction of the euro were against the adjustment of the external positions of France and Italy, making the common currency to facilitate the adjustment of the external imbalance.

Even though the results on tables 6 and 7 show that the contribution of the valuation and trade components have indeed changed since 1999, those changes can be related to other factors not affected by the foreign exchange regime. In order to identify, at least to some extent, the contribution of the exchange rate regime to the external adjustment process I have calculated a *exchange rate valuation component* and a *exchange rate trade component*. I use a trade weighted and financial weighted real exchange rates[15] to obtain the part of the return differentials and the net exports growth that is contemporaneously related to these two real exchange rates. Then I include these exchange rate variables in the VAR specification and compute the *exchange rate trade and valuation components*. These two components will be used to compute the percentage of the variance of nxa that is explained by the part of the valuation and trade components contemporaneously related to the real exchange rate.

Tables 8 and 9 present the variance of nxa explained by the *exchange rate valuation component* and a *exchange rate trade component* before and after the introduction of the euro[16]. The most important conclusions from these two tables are that the exchange rates do contribute to the valuation and trade components of external adjustment and also that after 1999 those contributions have changed. We should also notice that the *exchange rate valuation component* has more relevance in the external adjustment process than the *exchange rate trade component* , consistent with the fact that the exchange rate may affect net exports with some time lags[17].

For Spain and Italy there has been a large decrease in the variance of nxa explained by the *exchange rate valuation component* after the introduction of the euro. In the case of the *exchange rate trade component* , it has negatively affected the external adjustment process after 1999 in both cases. We can then conclude that for these two countries the common currency area has implied a less important role of the exchange rate in the external adjustment and the need to rely in other mechanisms to restore the external balance. For Germany, consistent with the tests of structural breaks that do not find any break in 1999, it seems that there are not important changes on the contribution of the exchange rate components between the two periods. For France, the most striking result is the large and negative contribution of the *exchange rate trade component* during the euro period. Overall it is evident that the reliance on the exchange rate as a tool to facilitate the external adjustment process has largely diminished after the introduction of the euro.

[15]The trade weighted exchange rates are OECD real effective exchange rates. I calculated the financial weighted real exchange rates using the country portfolio weights that I used to calculate the portfolio returns for each of the different asset classes.

[16]In the case of France in table 8, due to the small sample available before 1999 I provide the results for the whole sample instead

[17]Recall that I obtain the exchange rate components by including in the VAR estimation the part of the return differentials and net exports growth contemporaneously related with the trade weighted and financial weighted real exchange rates

3.3 Future Adjustment Path

We can also make an assessment of the future adjustment paths of the external positions for each country by computing the future expected values of nxa and the valuation and trade components. These paths should be consistent with the relative relevance of the valuation and trade components for each country. We can also learn how long will take to restore the external balance for each of the economies from their current debtor or creditor positions. We can compute the future expected adjustment path for nxa using the following equation:

$$E_T nxa_{T+k} = E_T \Delta^k nxa_{T+k} + nxa_T$$

We can also compute the future adjustment path of nxa if only the valuation or the trade components would operate:

$$E_T nxa^v_{T+k} = E_T \Delta^k nxa^v_{T+k} + nxa_T$$
$$E_T nxa^t_{T+k} = E_T \Delta^k nxa^t_{T+k} + nxa_T$$

Chart 4 shows the future adjustment path for Germany, being the horizontal axes the number of quarters ahead. The red line shows the future evolution of nxa while the blue and green lines show the evolution of nxa if only the valuation or the trade component would operate, respectively. As we have already documented previously almost all the adjustment will be made through the trade channel. The green line evolves very closely to the adjustment path for nxa. Given that the valuation component hinders the restoration of Germany's external balance, if the trade component would not play any role the external imbalance would result in a slightly larger creditor position than the current one, as the blue line shows. If there are not unexpected shocks affecting the future external adjustment, Germany will restore its balanced position in 40 years. The convergence process will be much faster over the first years, being able to reduce in half its creditor position in only 7 years.

Chart 5 shows Spain's adjustment path. We can see again how it is consistent with previous results that showed how the trade channel is the main driver of the external adjustment. Spain would experience a fast convergence towards an external balanced position, taking around 19 years to reach that point. It would only take 3 years to reduce in half its debtor position. Chart 6 presents the adjustment path for France. In this case we can see how both the valuation and trade components almost contribute equally to the restoration of the external balance. For France it would take a long way to achieve the external balance although it is the country with the smallest external imbalance. It will restore its external balance in 25 years, being able to reduce it debtor position in half in 8 years. Finally chart 7 presents the future expected evolution of Italy's external position. The contribution of the valuation component to the external adjustment is larger than that of the trade component.

Italy will restore the external balance in around 18 years and it will reduce it by half in less than 5 years[18].

It is reasonable to think that, as it has happened in the past, there would be unexpected shocks that will make the expected future adjustment paths depicted in charts 4-7 differ from the future evolution of the external imbalances. There is relevant information we can obtain from this exercise though. For the two countries with the largest external imbalances, Germany and Spain, agents expect they will to be able to reduce their creditor and debtor positions by half in a relatively short period of time: 7 and 3 years respectively. The future adjustment paths also show how all countries but Germany will need both from the valuation and trade components to achieve their external balance. Only Germany could rely exclusively on the trade channel, with the valuation channel playing almost no role at all.

3.4 Exchange Rate Predictability

The results from previous sections document the relationship between the net external position and the exchange rate. It is then expected that the evolution of the external imbalance may have some forecasting power over the foreign exchange. This explanatory power has already been documented by Gourinchas and Rey (2007) and Evans and Fuertes (2011), although none of these papers study the implications of different exchange rates regimes. On the contrary, Fuertes (2019) analyse the forecasting power of the net external position of the U.S. over the dollar, taking into account the foreign exchange regime. The results show that the relationship between the U.S. external imbalance and the dollar changes at the end of the Bretton Woods system of fixed exchange rates. I will next analyse if the inception of the euro had a similar effect. I do check whether the exchange rate regime influences the external adjustment process by regressing the changes in the real exchange rate on the net external position, a dummy variable identifying the exchange rate regime and an interaction term between the external position and the dummy. This interaction term will be the main variable of interest given that a statistical significant coefficient will imply a different relation between the foreign exchange and the net external position depending on the nominal foreign exchange regime. I compute the OLS estimates of

$$\frac{1}{k}\Delta^k e_{t+k} = \alpha + \beta_1 nxa_t + \beta_2 FXd_t + \beta_3 nxa_t * FXd_t + \nu_{t+k} \tag{7}$$

for different horizons $k = \{1, 4, 8\}$. $\Delta^k e_{t+k}$ is the change in the real exchange rate (an increase implies an appreciation of the currency) and FXd_t is the dummy variable that

[18] The quick external adjustment expected for Italy and Spain is supported by projections from the International Monetary Fund released in the April 2019 World Economic Outlook. These projections establish that for a group of euro are debtor countries, including Italy and Spain, the net international investment position is expected to improve by more than 25 percentages points of their collective GDP over the period 2017-2024

identifies the foreign exchange regime (equals one before the introduction of the euro). I run the regressions separately for both the real trade weighted exchange rate and the real portfolio weighted exchange rate. For comparison purposes, I also compute the regression without the foreign exchange regime dummy and the interaction term.

Table 10 presents the results for Spain. The coefficient β_3 is significant both for the portfolio weighted and the trade weighted real exchange rates, implying that the inception of the euro affected the relationship between the net external position and the exchange rates. In particular, for the portfolio weighted real exchange rate, given that β_1 is not significant at any horizon in equation 7, we conclude that the forecasting power of nxa disappeared after 1999, consistent with the decreased role played by the exchange rate in the external adjustment process due to the common currency. As expected, the sign of the coefficients is positive, meaning that a deterioration in the external imbalance implies a future exchange rate depreciation. Finally, we should notice the large increase in the R^2 when we run the regression taking into account the different exchange rate regime. The R^2 increases with the exchange rate horizon, reaching a value of 0.26 when forecasting the evolution of the exchange rate over the next two years.

The results for Italy are presented on table 11. They are very similar to those obtained for Spain although there is an important difference. The external imbalance has a less forecasting power for the trade weighted real exchange rate than for the portfolio weighted one. This could be consistent with the fact that for Italy the valuation component has more relevance than the trade component. The R^2 for the evolution of the portfolio weighted real exchange rate over the next two years reaches 0.36 in the regression that takes into account the change in the foreign exchange regime. As it happened with Spain, the forecasting power of nxa over the portfolio weighted exchange rate disappears after the introduction of the euro.

Table 12 shows the results for Germany. It is the country where the R^2 are lower, implying the weakest forecasting power of the external imbalance over the exchange rate among the four countries. The coefficient β_3 is only significant at the two year horizon and the regression forecasting the trade weighted real exchange rate provides more significant coefficients and a larger R^2, consistent with the trade component having a more important role in the external adjustment of this country. The main difference with respect to previous results is the negative sign of the coefficient β_1 in the regression that takes into account the foreign exchange regime. The negative coefficient implies that after 1999 an improvement of Germany's external imbalance forecasts a depreciation of the euro. This result provides interesting insights about the external adjustment process within a currency union. After 1999 the net external position of Italy and Spain deteriorated while Germany's one improved. We have documented for Italy and Spain, since 1999, that a deterioration of the external imbalance implied a future depreciation of the trade weighted real exchange rate. During the same period Germany improved its external imbalance, what required a future appreciation of the currency in order to facilitate the external adjustment. The negative sign of

β_1 may indicate that the behaviour of the euro has been driven by the needs of external adjustment of deficit countries such as Italy and Spain, compromising the adjustment of Germany's external position as foreign exchange movements affect differently debtor and creditor countries.

Finally, table 13 present the results for France. The β_3 coefficients are significant and the R^2 increases significantly when running the regressions taking into account the foreign exchange rate regime. The main difference with previous results is the negative coefficient β_3 , implying that before 1999 a deterioration in France's external imbalance forecasts an appreciation of the french franc. After the introduction of the euro the forecasting power of nxa shows the expected relationship as β_3 coefficients are positive.

The results from tables 10 - 13 provide two important messages. First, the relationship between the external imbalance and the future evolution of exchange rates is affected by the foreign exchange regime. Second, this relationship could be different for each country within a currency union, helping or jeopardising the external adjustment process depending on holding a debtor or a creditor position.

4 Robustness Checks

The accuracy in estimating portfolio returns has been a topic of ample debate in the literature. In the case of the U.S. a first wave of studies calculated portfolio returns implied from U.S. NIIP data (see Lane and Milesi-Ferretti (2005); Meissner and Taylor (2006) and Obstfeld and Rogoff (2005)), obtaining large return differentials between portfolio assets and liabilities. Later, Curcuru et al (2008) argued that these implied returns were upward biased due to inconsistencies in the different sources of data for flows and positions. They calculate portfolio returns from market prices, as Gourinchas and Rey (2007) do, obtaining smaller return differentials. Recent research from the BEA, the compilers of the NIIP data, does also find lower estimates of portfolio return differentials than those obtained from the implied returns in the first wave of papers, pointing out that NIIP data should not be used to obtain returns (see Gohrband and Howell (2015)).

In this paper I computed returns from market prices in order to obtain quarterly return differentials for a period that includes both the years before and after the introduction of the euro. I do not claim that the implied returns may have any inconsistencies for the countries under analysis[19] as it is the case for the U.S., but I needed to construct a data set that includes the period before the introduction of the euro. Unfortunately I could not obtain quarterly implied returns for the yeas before 1999 due to data limitations and the only option was to estimate returns from market prices.

[19]Habib (2010) analyses the differential returns between gross foreign assets and liabilities for a sample of 49 countries, including France, Germany, Italy and Spain, using yearly implied returns

Then, a natural robustness check is to compute the implied returns for the years avaialble and compare the approximation accuracy of our different estimates using the market based returns and the implied ones. I will also assess if the main results and conclusions change when using implied returns. In section 3.2 we already showed that the estimates of the valuation and the trade component together are able to explain the whole variance of the actual nxa. This is a first proof of the quality of our approximation for the present value equation (4). Another way to asses the accuracy of our approximation is to compute the mean square error of the difference between the actual nxa and the predicted $\widehat{nxa}_t$, which is obtained as the sum of the estimates of the valuation and trade components. Finally, we can also assess the accuracy of the estimates by checking if the present value equation (4) holds using the forecasts from the VAR. In order to do we first obtain the following expression from the present value equation (4):

$$\begin{aligned} e'_{nxa} Z_t &= -\,(e'_r + e'_{\Delta nx}) \sum_{i=1}^{\infty} \rho^i A^i Z_t \\ &= -\,(e'_r + e'_{\Delta nx}) \rho A (I - \rho A)^{-1} Z_t \end{aligned} \tag{8}$$

This equation must hold for all possible values of Z_t, such that the companion matrix A from the VAR must satisfy

$$e'_{nxa} = -\,(e'_r + e'_{\Delta nx}) \rho A (I - \rho A)^{-1} \tag{9}$$

The equation above includes a set of restrictions on the coefficients of the VAR that represent constraints on the joint dynamics of r_t^{NFA}, Δnx_t, and nxa_t. They can be empirically examined by computing a Wald test from the estimates of the A matrix obtained as the OLS estimates of the VAR equations.

Table 14 present the results of the Wald test on the above equation as well as the mean square errors of the predicted $\widehat{nxa}_t$ using the market based derived returns (DR) and the implied returns (IR). For Germany, Italy and Spain the Wald test shows that using the implied returns we cannot reject the null that equation (9) holds. On the contrary, the Wald test rejects the null when using the market based returns. We should keep in mind that the mean square errors of $\widehat{nxa}_t$ are very low using either market based returns and derived returns. The results of the Wald test indicate that the market based returns may have incurred in some inconsistencies that may reduce the accuracy of our estimates of the valuation and trade component, being the implied returns more accurate to describe the joint behaviour of r_t^{NFA}, Δnx_t, and nxa_t. For the case of France the Wald test rejects the null that equation (9) holds, with the MSE being larger for the predicted $\widehat{nxa}_t$ when using the implied returns. In this case it seems that the market based returns are more accurate. We should keep in mind that even though the Wald test rejects that equation (9) holds when using the market based returns, the estimates of the valuation and trade component obtained produce very low approximation errors and they are capable to explain the whole variance of the actual nxa.

Because of that and despite the fact that the market based returns show some degree of inconsistencies for Germany, Italy and Spain, our main concern is to asses if those inconsistencies spotted out in the results of the Wald tests are large enough to invalidate the conclusions documented in the previous sections. In particular we should be concerned about the capability of the valuation and trade components to accurately portrait the behaviour of the net external position. Given that we have already showed that using the implied returns we obtain estimates of the valuation and trade components that provide a good approximation of the present value equation (4), we next evaluate how different these estimates are when using the market based return.

Table 15 shows the correlation coefficients for different series obtained using market based returns and derived returns. The first two columns show the correlation of the estimates of the valuation and trade components obtained using the different return differentials. The correlation coefficients are very close to one, signalling that the behaviour of the series is almost the same no matter the returns used. The third column assess the correlation between the predicted $\widehat{nxa_t}$ using the two different series of return differentials, showing again that both are pretty similar. Finally, the last two column show the correlation between the actual nxa and the predicted $\widehat{nxa_t}$ using the implied returns and the market based returns respectively. Even though the correlations are larger for the series computed using implied returns, except for France, the correlations are also high when using market base returns. By these metrics we can conclude that the analysis using market based returns remains valid.

Finally, I have replicated the results from table 7 using the two types of returns. Table 16 presents the percentage of the variance of nxa explained by the valuation and trade components computed using implied returns and market based returns. The results remain qualitatively the same no matter the series of return used. The relative relevance of the valuation and trade components do not change and the percentage of variance explained is almost the same independently of the returns used. The only country that shows some differences is Italy although the valuation component remains as the main channel of adjustment.

Overall, even though for Germany, Italy and Spain the implied returns are more accurate to describe the joint dynamics of r_t^{NFA}, Δnx_t, and nxa_t embedded in the present value equation (4), using the market based returns provides the same conclusions about the external adjustment process and the estimates of the valuation and trade components are almost the same. We can then be pretty comfortable with the results obtained in the previous sections.

5 Conclusion

The process of external adjustment for a country within a common currency area has received little attention in the literature, despite the fact that an important mechanism of correction of imbalances, the nominal exchange rate, has been partially cancelled. Changing from a floating to a fixed exchange rate regime within a currency area may difficult the external adjustment and could be potentially dangerous for countries with large negative external positions. Understanding how the external adjustment process has evolved over time for the countries of the euro area and the implications of the introduction of the euro are the main research questions of the paper.

I analyze the external adjustment path of the four main economies of the euro area, covering both the period before and after the introduction of the euro, to understand if the currency area affected their external adjustment process. I find a structural break in the net external position for all countries but Germany at the time of the introduction of the euro, pointing out that the inception of the common currency changed the external adjustment process. The fact that Germany does not show this structural break is consistent with the exchange rate regime mainly affecting the valuation channel of external adjustment, given that the variance of Germany's net external position is almost completely explained by the trade channel. The importance of the valuation component of external adjustment increases after the introduction of the euro for France and Italy, and decreases for Germany and Spain. Third I also find that France and Italy will adjust the net external position mainly through the valuation component of external adjustment, while Germany and Spain will restore their external balance mostly through the trade component.

The results of the paper continue the debate for policy analysis on the benefits of a fixed or a floating exchange rate regime to correct external imbalances. I document adverse valuation effects that difficult the correction of external imbalances for the case of Germany. Even though this should not be a matter of concern as Germany enjoys a creditor position and reaching the external balance should not be crucial, adverse valuation affects could be dangerous in other situations. For example, emerging countries with a relevant share of foreign currency liabilities and large debtor positions, could be affected by a local currency depreciation as it may trigger large valuation effects that further increase their debtor positions. The findings in this paper do also reveal the need to change the mechanisms of external adjustment once a common currency is in place. Being the nominal exchange rate fixed among the countries of the currency union, other adjustment mechanisms such as internal devaluation and the change in the relative price levels. may operate. It is also important to notice that being part of a currency union may hinder the external adjustment process of a country as the adjustment needs are different for debtor and creditor countries. For instance, as it is documented in this paper, the real exchange rate have evolved according to the adjusting needs of debtor countries such as Italy and Spain, pushing towards larger external positions of creditor countries such as Germany.

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Figures

Figure 1: Net International Investment Position to GDP ratio

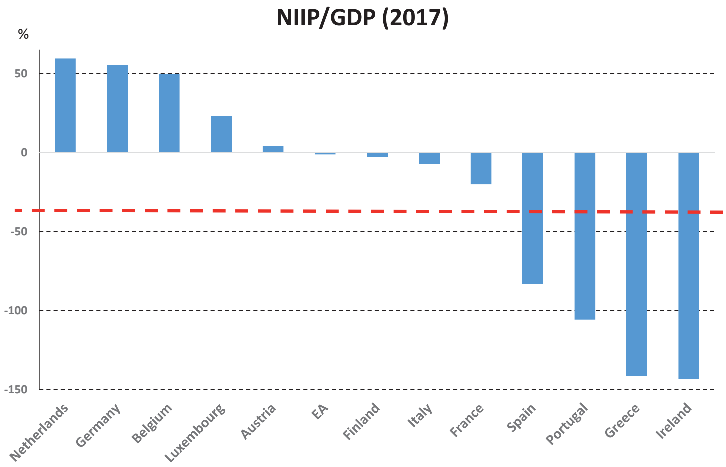


Figure 2: Portfolio Equity Weights for Euro Area Positions

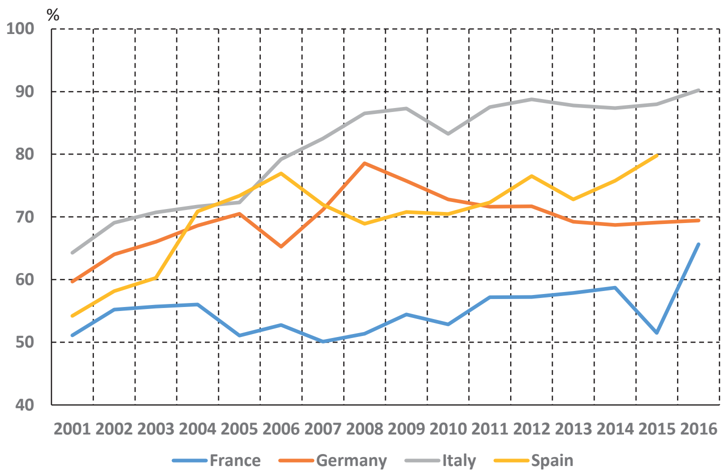


Figure 3: Exports plus Imports Weights for Euro Area Trade

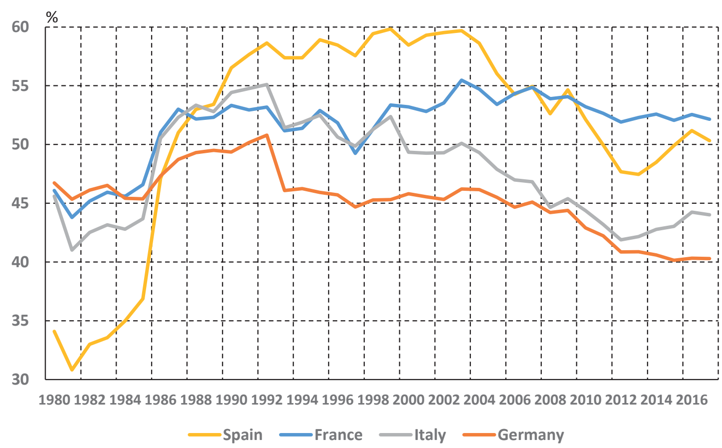


Figure 4: GERMANY: Future Adjustment Path

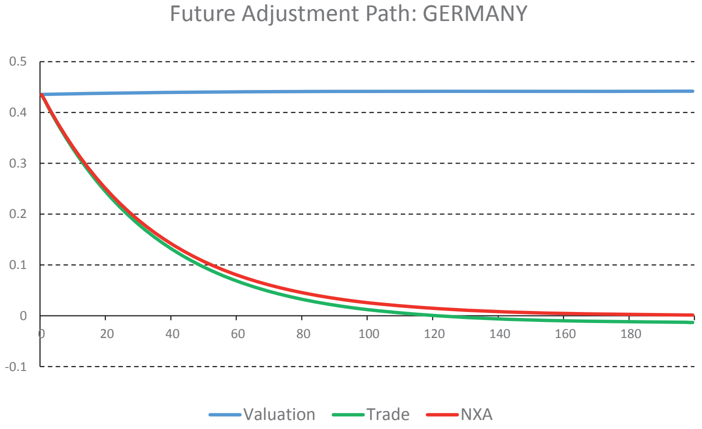


Figure 5: SPAIN: Future Adjustment Path

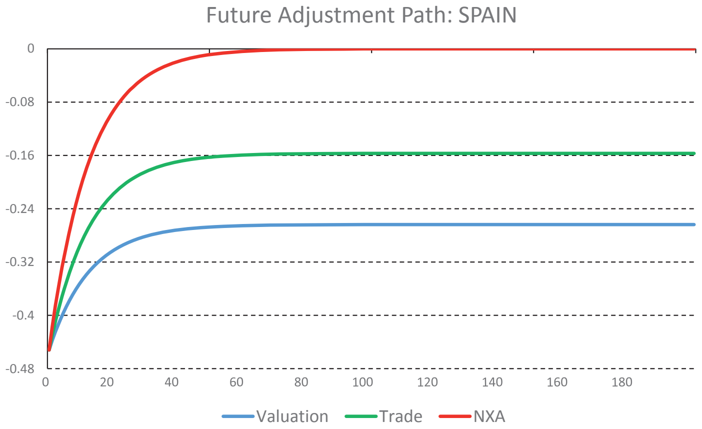


Figure 6: FRANCE: Future Adjustment Path

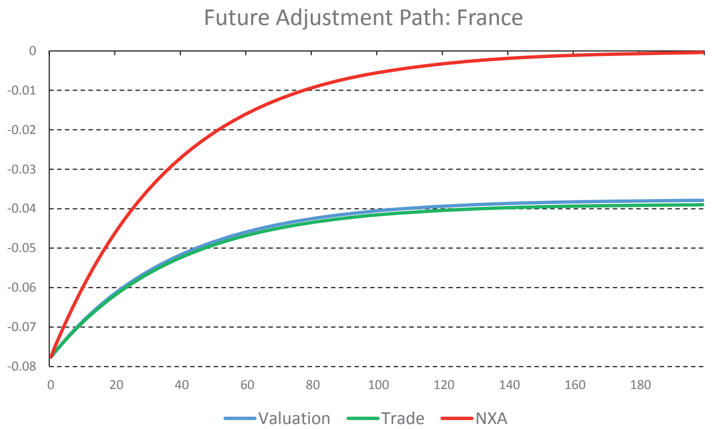
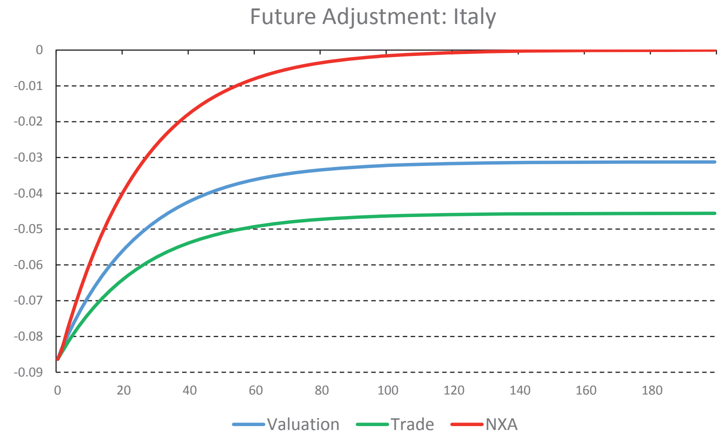


Figure 7: ITALY: Future Adjustment Path



Tables

TABLE 1: RETURN DIFFERENTIALS COMPARISON (%)

	All Sample			Pre-euro period			Euro period		
	Difference	Claims	Liabilities	Difference	Claims	Liabilities	Difference	Claims	Liabilities
France	-0.76	2.87	3.63	-1.22	5.65	6.87	-0.56	1.43	1.99
Germany	0.38	4.04	3.65	1.26	6.53	5.28	-0.49	1.54	2.03
Italy	-1.18	2.99	4.17	-2.20	4.94	7.14	-0.15	1.04	1.19
Spain	-0.36	4.09	4.45	-1.58	6.03	7.61	0.92	2.03	1.11

Note: The data shows the average of quarterly returns annualized.

TABLE 2 - FRANCE: Analysis of Structural Breaks (Qu and Perron Methodology)

	Sequential test (l+1/l)		
Wdmax	l=1	l=2	Number of Breaks
58.578***	30.565***	36.170***	3

	Date	CI (90%)	
Break I	1998:IV	1998:I	2001:III
Break II	2004:I	2003:I	2004:II
Break III	2009:II	2008:III	2010:IV

Notes: Maximun number of breaks M = 3 and trimming = 0.2; The covariance matrix of the erros is allowed to change and normality is assumed when testing for changes in the covariance matrix; serial correlation in the residuals and robust covariance matrix is constructed by the method of Andrews (1991); No pre whitening technique is applied; The distribution is allowed to change in order to construct the confidence intervals. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

TABLE 3 - ITALY: Analysis of Structural Breaks (Qu and Perron Methodology)

	Sequential test (l+1/l)		
Wdmax	l=1	l=2	Number of Breaks
122.679***	68.714***	25.019	2

	Date	CI (90%)	
Break I	1992:II	1992:I	1994:II
Break II	1999:IV	1995:III	2000:I

Notes: Maximun number of breaks M = 3 and trimming = 0.2; The covariance matrix of the erros is allowed to change and normality is assumed when testing for changes in the covariance matrix; serial correlation in the residuals and robust covariance matrix is constructed by the method of Andrews (1991); No pre whitening technique is applied; The distribution is allowed to change in order to construct the confidence intervals. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

TABLE 4 - SPAIN: Analysis of Structural Breaks (Qu and Perron Methodology)

	Sequential test (l+1/l)		
Wdmax	l=1	l=2	Number of Breaks
88.711***	36.509***	29.914*	3

	Date	CI (90%)	
Break I	1993:I	1992:I	1994:I
Break II	1999:II	1998:II	1999:III
Break III	2007:IV	2007:I	2010:I

Notes: Maximun number of breaks M = 3 and trimming = 0.2; The covariance matrix of the erros is allowed to change and normality is assumed when testing for changes in the covariance matrix; serial correlation in the residuals and robust covariance matrix is constructed by the method of Andrews (1991); No pre whitening technique is applied; The distribution is allowed to change in order to construct the confidence intervals. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

TABLE 5- GERMANY: Analysis of Structural Breaks (Qu and Perron Methodology)

	Sequential test (l+1/l)		
Wd_{max}	l=1	l=2	Number of Breaks
75.006***	35.081***	25.623	2

	Date	CI (90%)	
Break I	1989:II	1987:II	1990:III
Break II	2006:III	2005:II	2006:IV

Notes: Maximun number of breaks M = 3 and trimming = 0.2; The covariance matrix of the erros is allowed to change and normality is assumed when testing for changes in the covariance matrix; serial correlation in the residuals and robust covariance matrix is constructed by the method of Andrews (1991); No pre whitening technique is applied; The distribution is allowed to change in order to construct the confidence intervals. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

TABLE 6: UNCONDITIONAL VARIANCE DECOMPOSITION OF NET EXTERNAL POSITION

Country	Sample	Valuation Component	Trade Component
France	1990 - 2016	50.81	49.18
Germany	1980 - 2016	-1.67	101.66
Italy	1980 - 2016	56.32	43.67
Spain	1985 - 2016	39.06	60.93

The unconditional variance decomposition of nxa is obtained from the the coefficients β_r and $\beta_{\Delta nx}$ of OLS regressions of $\widehat{nxa_t^r}$ and $\widehat{nxa_t^{\Delta nx}}$ on nxa.

TABLE 7: UNCONDITIONAL VARIANCE DECOMPOSITION OF NET EXTERNAL POSITION

Country	Sample	Valuation Component	Trade Component
France	1999 - 2016	54.60	45.39
Germany	1999 - 2016	-21.86	121.85
Italy	1999 - 2016	65.87	34.12
Spain	1999 - 2016	19.48	80.51

The unconditional variance decomposition of nxa is obtained from the the coefficients β_r and $\beta_{\Delta nx}$ of OLS regressions of $\widehat{nxa_t^r}$ and $\widehat{nxa_t^{\Delta nx}}$ on nxa.

TABLE 8: UNCONDITIONAL VARIANCE OF NXA EXPLAINED BY EXCHANGE RATES (BEFORE 1999)

Country	Sample	FX Valuation Component	FX Trade Component
France	1990 - 2016	-5.71	3.37
Germany	1980 - 1998	15.56	-2.95
Italy	1980 - 1998	15.27	3.01
Spain	1985 - 1998	11.28	11.02

The numbers represent the unconditional variance of nxa explained by the part of the valuation and trade components that is contemporaneoulsy related to the foreign exchange. Due to the small sample size before 1999 the figures for France are computed using the whole sample.

TABLE 9: UNCONDITIONAL VARIANCE OF NXA EXPLAINED BY EXCHANGE RATES (SINCE 1999)

Country	Sample	FX Valuation Component	FX Trade Component
France	1999 - 2016	14.09	-20.06
Germany	1999 - 2016	15.63	2.33
Italy	1999 - 2016	3.77	-2.12
Spain	1999 - 2016	3.59	-6.49

The numbers represent the unconditional variance of nxa explained by the part of the valuation and trade components that is contemporaneoulsy related to the foreign exchange.

TABLE 10: FORECASTING EXCHANGE RATES WITH NET EXTERNAL POSITION. SPAIN

	$\frac{1}{k}\Delta^k \epsilon_{t+k} = \alpha + \beta_1 nxa_t + \upsilon_{t+k}$ (1)			$\frac{1}{k}\Delta^k \epsilon_{t+k} = \alpha + \beta_1 nxa_t + \beta_2 \, FXd_t + \beta_3 \, (nxa_t * FXd_t) + \upsilon_{t+k}$ (2)		
	Trade Weighted			**Trade Weighted**		
HORIZON	1	4	8	1	4	8
β_1	0.0098	0.0198***	0.0219***	0.0014	0.0128*	0.0165***
	(0.0116)	(0.0052)	(0.0041)	(0.0160)	(0.0071)	(0.0064)
β_3				0.0153	0.0163	0.0168*
				(0.0248)	(0.0120)	(0.0094)
R^2	0.0071	0.0862	0.1749	0.0120	0.1166	0.2619
	Portfolio Weighted			**Portfolio Weighted**		
HORIZON	1	4	8	1	4	8
β_1	0.0117	0.0174***	0.0184***	-0.0039	-0.0008	0.0068
	(0.0135)	(0.0063)	(0.0043)	(0.0192)	(0.0077)	(0.0064)
β_3				0.0282	0.0340***	0.0274***
				(0.0282)	(0.0124)	(0.0088)
R^2	0.0073	0.0603	0.1205	0.0187	0.1328	0.2675

Notes: Left (right) hand panel shows the results of the regression in equation 1 (2). $\Delta^\kappa \epsilon_{t+k}$ is the apreciation rate of the dollar for different horizons k={1, 4, 8}. FXd_t is a dummy variable equal to 1 during the period before the introduction of the euro. nxa_t is the net external position. Standard errors in parenthesis.
*, ** and *** denote significance at the 10, 5 and 1% levels, respectively.

TABLE 11: FORECASTING EXCHANGE RATES WITH NET EXTERNAL POSITION. ITALY

	$\frac{1}{k}\Delta^k \epsilon_{t+k} = \alpha + \beta_1 nxa_t + \upsilon_{t+k}$ (1)			$\frac{1}{k}\Delta^k \epsilon_{t+k} = \alpha + \beta_1 nxa_t + \beta_2\, FXd_t + \beta_3\, (nxa_t * FXd_t) + \upsilon_{t+k}$ (2)		
	Trade Weighted			**Trade Weighted**		
HORIZON	1	4	8	1	4	8
β_1	0.0070	0.0196	0.0241***	-0.0042	0.0126	0.0232**
	(0.0225)	(0.0141)	(0.0087)	(0.0188)	(0.0128)	(0.0098)
β_3				0.0176	0.0106	0.0013
				(0.0374)	(0.0232)	(0.0151)
R^2	0.0012	0.0241	0.0708	0.0035	0.0269	0.0710
	Portfolio Weighted			**Portfolio Weighted**		
HORIZON	1	4	8	1	4	8
β_1	0.0378	0.0404***	0.0397***	-0.0020	0.0021	0.0071
	(0.0242)	(0.0147)	(0.0092)	(0.0096)	(0.0067)	(0.0065)
β_3				0.0554	0.0526**	0.0444***
				(0.0376)	(0.0213)	(0.0130)
R^2	0.0237	0.0872	0.1621	0.0560	0.1925	0.3605

Notes: Left (right) hand panel shows the results of the regression in equation 1 (2). $\Delta^k \epsilon_{t+k}$ is the apreciation rate of the dollar for different horizons k={1, 4, 8}. FXd_t is a dummy variable equal to 1 during the period before the introduction of the euro. nxa_t is the net external position. Standard errors in parenthesis.
*, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

TABLE 12: FORECASTING EXCHANGE RATES WITH NET EXTERNAL POSITION. GERMANY

	$\frac{1}{k}\Delta^k \epsilon_{t+k} = \alpha + \beta_1 nxa_t + \upsilon_{t+k}$ (1)			$\frac{1}{k}\Delta^k \epsilon_{t+k} = \alpha + \beta_1 nxa_t + \beta_2\, FXd_t + \beta_3\, (nxa_t * FXd_t) + \upsilon_{t+k}$ (2)		
	Trade Weighted			**Trade Weighted**		
HORIZON	1	4	8	1	4	8
β_1	-0.0012	0.0054	0.0075**	-0.0100	-0.0038	-0.0232***
	(0.0107)	(0.0056)	(0.0035)	(0.0211)	(0.0118)	(0.0082)
β_3				0.0091	0.0096	0.0359***
				(0.0247)	(0.0136)	(0.0092)
R^2	0.0001	0.0052	0.0209	0.0070	0.0136	0.0826
	Portfolio Weighted			**Portfolio Weighted**		
HORIZON	1	4	8	1	4	8
β_1	0.0102	0.0102*	0.0108**	0.0077	0.0086	-0.0025
	(0.0147)	(0.0060)	(0.0043)	(0.0147)	(0.0082)	(0.0067)
β_3				0.0026	0.0012	0.0158*
				(0.0243)	(0.0113)	(0.0086)
R^2	0.0040	0.0161	0.0325	0.0043	0.0173	0.0412

Notes: Left (right) hand panel shows the results of the regression in equation 1 (2). $\Delta^k \epsilon_{t+k}$ is the apreciation rate of the dollar for different horizons k={1, 4, 8}. FXd_t is a dummy variable equal to 1 during the period before the introduction of the euro. nxa_t is the net external position. Standard errors in parenthesis.
*, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

TABLE 13: FORECASTING EXCHANGE RATES WITH NET EXTERNAL POSITION. FRANCE

	$\frac{1}{k}\Delta^k \epsilon_{t+k} = \alpha + \beta_1 nxa_t + \upsilon_{t+k}$ (1)			$\frac{1}{k}\Delta^k \epsilon_{t+k} = \alpha + \beta_1 nxa_t + \beta_2\, FXd_t + \beta_3\,(nxa_t * FXd_t) + \upsilon_{t+k}$ (2)		
	Trade Weighted			**Trade Weighted**		
HORIZON	1	4	8	1	4	8
β_1	-0.0082	0.0075	0.0009	0.0282	0.0303**	0.0334***
	(0.0138)	(0.0084)	(0.0060)	(0.0184)	(0.0146)	(0.0095)
β_3				-0.0364	-0.0374*	-0.0567***
				(0.0314)	(0.0198)	(0.0113)
R^2	0.0042	0.0089	0.0003	0.0221	0.0669	0.2673
	Portfolio Weighted			**Portfolio Weighted**		
HORIZON	1	4	8	1	4	8
β_1	-0.0030	-0.0066	-0.0102***	0.0055	0.0078	0.0095*
	(0.0098)	(0.0055)	(0.0037)	(0.0149)	(0.0086)	(0.0058)
β_3				-0.0192	-0.0285**	-0.0388***
				(0.0243)	(0.0129)	(0.0069)
R^2	0.0006	0.0123	0.0687	0.0059	0.0599	0.2746

Notes: Left (right) hand panel shows the results of the regression in equation 1 (2). $\Delta^k \epsilon_{t+k}$ is the apreciation rate of the dollar for different horizons k={1, 4, 8}. FXd_t is a dummy variable equal to 1 during the period before the introduction of the euro. nxa_t is the net external position. Standard errors in parenthesis.
*, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

TABLE 14: ESPECIFICATION TEST AND APPROXIMATION ERROR

Country	Sample	Wald Test (p-value)	MSE
France			
DR	1999-2016	0.0084	3.86E-05
IR	1999-2016	0	9.00E-05
Germany			
DR	2004-2016	0	6.91E-05
IR	2004-2016	0.9520	3.23E-07
Italy			
DR	1999-2016	0	1.62E-04
IR	1999-2016	0.1454	1.90E-06
Spain			
DR	1999-2016	0	4.89E-04
IR	1999-2016	0.7266	1.04E-06

The tabel shows the results of a Wald test on $e'_{nxa} = -(e'_r + e'_{\Delta nx})\rho A(I-\rho A)^{-1}$, *which asseses if the present value relation of equation (4) holds; and the mean square approximation error of* $\widehat{nxa}$, *using the derived returns (DR) and the implied returns (IR).*

TABLE 15: CORRELATIONS BETWEEN SERIES OBTAINED USING IMPLIED AND DERIVED RETURNS

Country	Valuation Component	Trade Component	$\widehat{nxa}$	$nxa \mid \widehat{nxa}(IR)$	$nxa \mid \widehat{nxa}(DR)$
France	0.96325	0.99608	0.98128	0.99127	0.99582
Germany	0.99228	0.99574	0.99278	0.99996	0.99182
Italy	0.96689	0.99459	0.99036	0.99986	0.98880
Spain	0.98830	0.99115	0.99216	0.99995	0.97925

The first (second) column represent the correlation between the valuation component $\widehat{nxa}_t^{r}$ *(trade component* $\widehat{nxa}_t^{\Delta nx}$*) computed using the derived returns and the implied returns for the period when the latter are available.The third column shows the correlation between the predicted* $\widehat{nxa}$ *using derived and implied returns. Finally, the two last columns show the correlation between the actual nxa and predicted* $\widehat{nxa}$ *using implied returns and derives returns respectively.*

TABLE 16: UNCONDITIONAL VARIANCE OF NXA EXPLAINED BY EXCHANGE RATES DERIVED RETURNS (IMPLIED RETURNS)

Country	Sample	FX Valuation Component	FX Trade Component
France	1999 - 2016	54.6 (58.8)	45.4 (41.2)
Germany	1999 - 2016	-21.9 (-23.6)	121.8 (123.6)
Italy	1999 - 2016	65.9 (51.2)	34.1 (48.8)
Spain	1999 - 2016	19.5 (16.2)	80.5 (83.8)

The numbers represent the unconditional variance of nxa explained by the part of the valuation and trade components that is contemporaneoulsy related to the foreign exchange.

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