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Expansionary Appreciation

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Expansionary appreciation

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Abstract

We identify exogenous effects of shifts in exchange rates using an external instrument for euro area countries between 1999 and 2015. The identification strategy is based on an external instrument built on the assumption that movements in the euro nominal effective exchange rate are largely exogenous for individual euro area countries once we control for euro area aggregates. We find that a real appreciation creates a trade-off between expenditure switching (contractionary) and terms of trade (expansionary) effects, with the latter prevailing in most countries; on balance, therefore, appreciation is expansionary. We also find some heterogeneity in the way movements in the euro exchange rate are transmitted within the euro area, in particular between "core" and "peripheral" countries. This also implies that movements in the external value of the common currency have significant repercussions for euro area internal imbalances.

Keywords: Exchange rates, distribution, appreciation, Dutch disease.
JEL: .

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1 Introduction

The economics literature is riddled with puzzles concerning exchange rates. First, real exchange rates are more volatile and more persistent than implied by most models, especially in floating regimes (Mussa 1986). Second, the Backus-Smith puzzle postulates that real exchange rates are less positively correlated with consumption than predicted by most structural models, with the consequence that they also do not appear to play a role in international risk sharing (Backus and Smith 1993). Finally, there is also a literature on exchange rate disconnect, whereby exchange rates and fundamentals appear to be largely independent of each other (Obstfeld and Rogoff 2000).

Exchange rates are highly endogenous and forward looking variables, which constitutes a formidable challenge for empirical analysis. In general, it is difficult to learn much from reduced form evidence without making restrictive assumptions on the shocks driving the variables. In this paper, we use the unique situation of countries in a monetary union to achieve a clean identification and hence make progress in the understanding of the effects of movements in exchange rates on fundamentals (we do not deal with the opposite direction of causation, i.e. from fundamentals to exchange rates).

The intuition behind our identification strategy is that individual euro area countries, especially the smaller ones, do not exert an independent influence on the European Central Bank's monetary policy and on other determinants of the euro exchange rate, especially after controlling for euro area aggregate variables. A rise in, say, Austrian inflation should not affect, say, the euro dollar exchange rate as long as it does not lead to a rise in euro area inflation, which we control for. At the same time, movements in the euro-dollar exchange rate affect the Austrian real effective exchange rate, to an extent that depends on Austria's composition of trade, notably the share of intra- versus extra- euro area trade. We build on differences in the exposure to intra- versus extra euro area trade of member countries to build an external instrument that is able to capture largely exogenous effects of movements in the external value of the euro on the real exchange rate.

Armed with this identification strategy, we regress a number of country-level variables on real exchange rate movements, using annual data for euro area countries between 1999 and 2015. In order to evaluate the effect of real appreciation and depreciation we apply the local projections approach of Jorda (2005), which is a flexible method that also allows instrumental variables (IV) estimation. In all our specifications, the instrument turns out to be very strong.

We consider not only standard macroeconomic variables, but also variables aimed at capturing the distributional effects of exchange rate movements ("who gains, who loses" from exchange rate swings), which may also be important to understand the welfare implications of exchange rates. As argued by Frieden (2009, 2014), movements in exchange rates imply redistribution within societies and are therefore highly political. We ask ourselves whether it is true, for example, that real appreciation harms exporters but benefits consumers. We also take a look at sectoral variables, with the aim of identifying the effects of exchange rate movements on the composition of value added and production between manufacturing and services, and between tradables and non-tradables. Partly, this question relates to the "Dutch Disease" question, namely whether appreciation harms the more efficient tradables sector to the benefit of the more sheltered, less productive non-tradables sector (Rodrik 2008; Benigno and Fornaro 2014).

Our work is related to previous literature in four ways. First, there is a literature on the role of exchange rates as shock absorbers versus sources of shocks, which includes among others Edwards and Levy Yeyati (2005), Artis and Ehrmann (2006) and Farrant and Peersman (2006). Second, since we look at the effect of appreciation on prices and wages, our work is also relevant for the literature on exchange rate pass-through, see for example Campa and Goldberg (2005) and Gopinath (2015). Third, there is a small literature on the distributional effects of exchange rates. On the theoretical side, Tille (2006) proposes a model with differentiated sectors and incomplete asset markets where depreciation is harmful for the country as a whole, but a minority of households benefit. Cravino and Levchenko (2015) is an empirical analysis of the Mexican devaluation in the mid-1990s, showing that devaluation hurts low-income households more than high-income ones, because they consume more tradables.[1] Gourinchas (1999) looks at the effects of exchange rates on employment flows. Fourth, the heterogeneous impact of shifts in the external value of the euro on individual member countries has also been studied by Honohan and Lane (2003), which focuses on the implications for divergent inflation rates across the euro area. Fifth, there is also an earlier literature on the contractionary effects of

[1] An older important reference is Romer (1993), who shows that the harmful effects of real depreciation after inflation are larger in more open economies.

devaluation, which recognises that terms of trade losses can dominate the expansionary mechanisms typically associated with devaluation (Diaz-Alejandro 1963, Cooper 1971, Krugman and Taylor 1978). Finally, the recent literature on the valuation impact of currency movements on external and sectoral balance sheets recognises that a country which runs a net short position in foreign currency may suffer from devaluation events (see, amongst many others, Lane and Shambaugh 2010).

Apart from the identification strategy, we depart from previous literature in other significant ways. First, we look at advanced countries, since euro area countries are almost the only advanced countries in a fixed exchange rate arrangement (note that we include Denmark in the sample because it had a peg to the euro for the entire period, as well as Estonia, which only joined the euro area in 2011). Second, we look at "normal" fluctuations in exchange rates and not only at large devaluations as previous literature has mostly done (see, amongst others, Burstein and Gopinath 2015).

Our paper reaches two main findings. Overall, we find that real appreciation has two countervailing effects. On the one hand, appreciation leads to a demand switching away from exports and towards imports; hence our results confirm that real appreciation is detrimental for competitiveness. We also find that appreciation has an allocative effect, shifting resources away from manufacturing and tradables towards services and non-tradables. Predictably, it also results in a deterioration of the current account. At the same time, the competitiveness channel is more than compensated by the improvement in the terms of trade. We find that as countries get richer with better terms of trade, imports become cheaper and real disposable income, real wages and consumption rise.[2] Moreover, while the CPI and the import deflator fall in the short term for the mechanic effect of appreciation, they eventually rise in the medium term on account of the expansion of economic activity. Finally, we subject our main results to a battery of robustness checks to which they survive at least qualitatively. One notable result, however, is that the expansionary effect on activity and wages appear to be quicker in the so-called peripheral countries of the euro area, which also leads to a sharper deterioration

[2]This is broadly consistent with findings in the literature on the effects of commodity price shocks on commodity exporters. For example, Kamber et al. (2016) find that consumption and investment rise after higher commodity prices that imply real appreciation. Bjornland and Thorsrud (2016) find that for two commodity exporters (Norway and Australia) the Dutch disease only applies in certain circumstances, in particular if the improvement in the terms of trade is not driven by a rise in global demand for commodities.

of the current account in these countries compared with the so-called core ones. Overall, appreciation makes countries richer and their citizens better off, while at the same time hurting the exports sector and competitiveness more generally, including a fall in the employment share of manufacturing (although not in tradables more broadly).

One important question that our analysis also needs to address is the impact of exchange rates on welfare. Previous work (in particular Di Tella et al. 2003) has established that measures of subjective wellbeing are correlated with real GDP growth, the unemployment rate and inflation (with respectively positive, negative and negative signs).[3] By looking at the effect of exchange rate movements on these variables, we can indirectly estimate the effect on household welfare. A detailed calculation of the welfare effects of exchange rate movements, however, is outside the scope of this paper.

There are some important caveats that have to be kept in mind in interpreting our results. First, our results are conditional on the type of shock that we look at through our identification strategy. The way the model is set up leads one to consider movements in real exchange rates that are caused by non-fundamental exchange rate shocks, imposing a kind of pecuniary externality on the economies of euro area countries. However, we check if results change significantly when shifts in the euro exchange rate are caused by monetary policy shocks, and we find this not to be the case. Second, our time horizon is limited by the length of the sample, which is limited to the period since the introduction of the euro. Therefore, we have little to say on the longer term consequences of appreciation, which may also imply unsustainable booms in external borrowing and credit growth, as well as the need for a costly internal devaluation down the road.

The paper is organised as follows. Section 2 contains a theoretical background, explaining what the transmission channels of appreciation could be for euro area countries. Section 3 presents the data. Section 4 provides a description of the empirical model. The results are presented in Section 5. Section 6 concludes.

2 Theory: What should we expect?

Before turning to the empirical analysis, which is the main novel contribution of our work, it is useful to pause to consider the possible transmission channels whereby real appreci-

[3]See Stracca (2014) for similar results for EU countries.

ation influences consumption and output.[4] Generally speaking, the effect of appreciation on the economy clearly depends on the shock driving the appreciation. The way we see real appreciation in the context of a typical small open economy, that is also a euro area member, is very similar to that of a small open economy (SOE) facing an exogenous improvement in its terms of trade due to a global shock in the market of the good that it exports. To a large extent this can be seen as a positive wealth shock which may boost aggregate demand, especially so if the shock is expected to be persistent. The logic of the two-country model of Bodenstein et al. (2011) for oil shocks carries through to a large extent here; real appreciation leads to a wealth transfer towards the home country, at least in the absence of complete markets and full international risk sharing.

With this main idea in mind, we illustrate a real (flexible price) redux version of the Lombardo and Ravenna (2014) SOE model. The model (henceforth "Lombardo and Ravenna redux") features households who consume a non-tradable and a tradable good, where the tradable good can be produced at home or in the foreign country. The share of domestically produced tradables depends on the real exchange rate, which is subject to exogenous shocks.[5] Moreover, domestic production of tradables requires the use of an imported (intermediate) good, the cost of which declines after real appreciation.[6] Note that by focusing on a real model we do not consider a host of issues related to nominal rigidities and exchange rate pass-through which have been emphasised in recent research; see for example Casas et al. (2016). Although understanding pass-through is important, our focus here is on the medium term implications of real appreciation, and we just assume that nominal appreciation leads to real appreciation.

Armed with this simple model, we study the effect of an exogenous appreciation of the SOE real exchange rate on the SOE variables (output, consumption, etc.) depending

[4]An early analysis of the possible channels whereby devaluation can be contractionary, rather than expansionary, is Lizondo and Montiel (1989).

[5]Think of those shocks as shocks to the foreign price level that, due to nominal rigidities in the foreign economy, are not immediately compensated by movements in the nominal exchange rate; or to an import subsidy that is paid for by a foreign government.

[6]This is related to the literature on Global Value Chains and their implications for the role of the real exchange rate for exports and competitiveness. For example, Amiti et al. (2014) observe that Japanese yen 30 per cent depreciation in 2011 failed to increase exports. They show from Belgian firm-level data that large exporters are also large importers, which has a material effect on the pass-through from exchange rate changes on export prices. In particular, they show that pass-through is especially low for exporters with large import shares.

on the model parameters. Intuitively, there are three channels to consider, *(i)* real appreciation tilts production of tradables towards foreign producers (expenditure switching), curtailing exports; *(ii)* domestic production of tradables is made less expensive by lower expenditure on imported inputs; *(iii)* appreciation relaxes the budget constraint of the household, because of the lower cost of the consumption basket due to cheaper foreign goods; hence households can find it optimal to borrow from abroad and consume more, with expansionary effects.[7] Whether real appreciation is expansionary or contractionary depends on whether the second and third effects dominate on the first one, and whether we measure the effect on consumption or on output.

In our "redux" version, domestic consumers maximise a per-period utility function defined as

$$log(c_t) - \frac{h_t^{1+\eta}}{1+\eta} \tag{1}$$

where c is real private consumption, and h is hours, $h = h_N + h_D$ where N is the non-tradable sector and D the domestic production of tradables. The balance sheet for the domestic household is

$$c_t + b_t + \frac{\delta}{2} b_t^2 = w_{tD} h_{tD} + w_{tN} h_{tN} + \frac{m_t}{S_t} + b_{t-1} R_t \tag{2}$$

where b is the real value of a foreign bond (denominated in domestic currency), w is the real wage, R is the ex post (world) real interest rate and S is the real exchange rate; m represents (the real value of) imported intermediate goods purchased at the real price S_t.[8] The term $\frac{\delta}{2} b_t^2$ is included in order to ensure determinacy of the level of (net) foreign asset position and to close the SOE model. Note that as in Bodenstein et al. (2011) we assume incomplete markets and only a risk-free bond is traded internationally. Therefore, there is no international risk sharing.

Agents maximise a discounted infinite sum of per-period utility functions, using a discount factor β. Consumption c is a composite index of tradables T and non-tradables N,

$$c_t = c_{Nt}^{\gamma_n} c_{Tt}^{1-\gamma_n} \tag{3}$$

[7] Although it is not part of the simple model that we illustrate, one could also think that appreciation relaxes an open-economy borrowing constraint, further boosting aggregate demand, as shown in previous work (see, e.g., Mendoza 2002).

[8] Note that this is a real version of the model, so everything is re-based in terms of relative prices vs. the price of the overall consumption basket including tradables and non-tradables.

In turn, the tradable basket can be domestically or foreign produced:

$$c_{Tt} = c_{Dt}^{\gamma_D} c_{Ft}^{1-\gamma_D} \tag{4}$$

Production in the non-tradable sector is driven by

$$Y_{Nt} = h_{Nt} \tag{5}$$

whereas for non-tradables is

$$Y_{Dt} = h_{Dt}^{\gamma_v} m_t^{1-\gamma_v} \tag{6}$$

Observe that we do not focus on valuation effects in this model, because balance sheet exposure to currency movements is not important in euro area countries, most of which tend to have mild positive net foreign asset positions; see Figure 1 and Benetrix et al. (2014). Therefore, valuation effects are unlikely to play a material role in the transmission of exchange rate shocks in euro area countries.

The resource constraint is

$$Y_t = h_{Nt} + h_{Dt}^{\gamma_v} m_t^{1-\gamma_v} \tag{7}$$

and for the tradable sector (because there is no investment in the model)

$$Y_{Dt} = c_{Dt} + c_{Dt}^* \tag{8}$$

where c_{Dt}^* is foreign consumption of imported goods, namely the SOE's exports. Note that these are a function of foreign consumption, which is assumed to be exogenous.

The labour market is perfectly competitive, which ensures the same equal wage across sectors,

$$w_{Nt} = w_{Dt} \tag{9}$$

Appendix 2 reports the first order conditions of the redux model, which we use to run the following exercise. We assume an exogenous appreciation (rise in S) stemming from a global factor. The baseline calibration is taken from Lombardo and Ravenna (2014) and posits $\beta = 0.995$, $\gamma_n = 0.5$, $\gamma_v = 0.54$, $\gamma_D = 0.74$, $\eta = 0.5$. In Figure 2 we report the impulse responses for the baseline calibration (solid lines), a calibration with higher home bias in consumption ($\gamma_n = 0.75$, red lines with asterisks) and with higher home bias in production ($\gamma_v = 0.75$, blue lines with triangles). We show that, consistent with Bodenstein et al. (2011), the effect of real appreciation is mostly expansionary. The

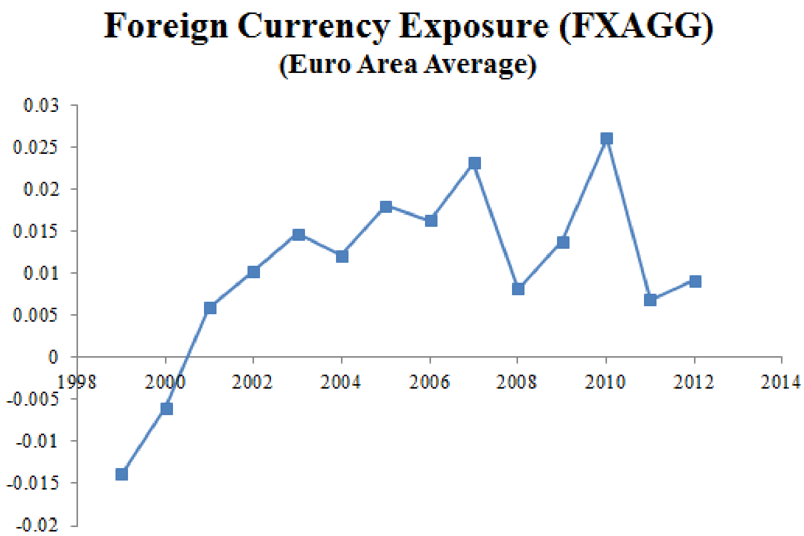


Figure 1: Countries excluding Cyprus, Luxembourg, and Malta. By construction, the FXAGG index lies in the range (-1; 1), where a value of -1 corresponds to a country that has zero foreign-currency foreign assets and only foreign-currency foreign liabilities (a caricature of the traditional profile of a non-advanced economy), whereas +1 corresponds to a country that has only foreign-currency foreign assets and only domestic-currency foreign liabilities (a caricature of the traditional profile of an advanced economy with a reserve-status currency). Source: Benetrix et al. (2014).

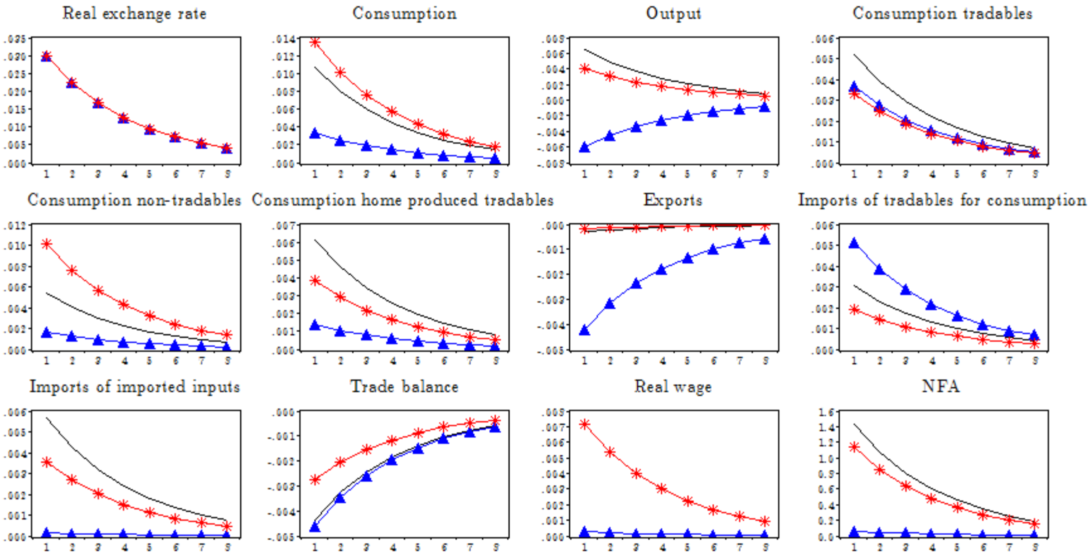


Figure 2: Simulated impulse responses from "Lombardo and Ravenna redux". The solid lines refer to the baseline calibration, the red lines with asterisks to higher home bias in consumption ($\gamma_n = 0.75$), the blue lines with triangles to higher home bias in production ($\gamma_v = 0.75$).

positive wealth effect stemming from appreciation is visible from the fact that the foreign asset position increases despite a contraction in the trade balance. Apart from a fall in exports and in the trade balance, all other variables increase, in particular imports of both foreign produced consumption goods and imported inputs. With high home bias in consumption, the effects are generally similar but attenuated. With higher home bias in production, instead, the beneficial effects are reduced and output actually falls after appreciation, because in this case the beneficial effects of cheaper intermediate goods is reduced in importance, and the expenditure switching channel has a higher relative weight.

3 Data

We focus on euro area countries or countries that are pegged to the euro. The country list is provided in Table 1. Note that we exclude Luxembourg from the sample due to its small size and include Denmark, because it has been in a fixed exchange rate arrangement with the euro continuously since 1999. On the right hand side of Table 1 we drop the

Extended list	Restricted list
Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain	Austria, Belgium, Denmark, Estonia, Finland, Greece, Ireland, Netherlands, Portugal

Table 1: Country sample.

largest euro area countries (Germany, France, Italy and Spain) and hence include only the smaller euro area countries, with the idea that our identification is even stronger for them. It is less likely that idiosyncratic developments in the smaller individual euro area countries affect the euro exchange rate than it is for the larger countries.

The data are annual and cover the time span 1999 to 2015. Table A in the Online Appendix reports a detailed description of the variables and of the data sources, in most cases international institutions such as the European Commission, the OECD and the IMF. The real effective exchange rate (REER) is based on the relative CPI. We also look at sectoral data, in particular manufacturing, services, tradables and non-tradables in the definition of the European Commission.

There is a very high correlation between the country-specific REER and the euro nominal effective exchange rate (NEER), at 0.88. The correlation is even higher for countries with a higher than average trade exposure to non-euro area countries (0.91). A bilateral panel regression of the annual growth in country-specific REER on the annual growth of the euro NEER (as well as country fixed effects) delivers a R^2 of 0.77. In short, variation in the euro exchange rate is the major source of variation in country-level REER at the annual frequency. This is visible in Figure 3, where we report the euro nominal appreciation and real appreciation in two euro area countries, Ireland and Austria (with respectively high and low exposure to extra euro area trade). It shows the high correlation between euro nominal appreciation and country-level real appreciation, as well as the fact that the link is much closer for Ireland (example of high exposure to extra area trade) than for Austria (example of low exposure).

4 Empirical approach

4.1 Measuring the impact of real exchange rate movements

In order to measure the effects of real exchange rate movements we estimate local projections similar to Jorda (2005) combined with instrumental variables (IV). The model has a panel specification and can be described as follows

$$x_{i,t+h} = \alpha_i + \beta_h \Delta REER_{it} + \gamma z_{t+h}^{EA} + \delta \Delta fd_t^{EA} extrade_{i,t-1} + \zeta \Delta fd_t^{EA} + \rho x_{i,t-1} + \varepsilon_{it+h} \quad (10)$$

where x is the variable of interest in (EMU) country i, α_i are country fixed effects, $\Delta REER_{it}$ is the appreciation of the real exchange rate, and z_t^{EA} is a set of euro area controls (includes the euro area short term rate, euro area term spread, euro area real GDP growth and euro area HICP inflation); Δfd_t^{EA} is the annual growth in euro area foreign demand, in real terms, which we include for reasons explained below; and $extrade_{i,t-1}$ is the share of the country exports that are sent to countries other than the euro area.[9]. We consider $h = 0, .., 4$, measuring the effects up to 4 years ahead.[10]

4.2 Instrumentation strategy

In principle, real exchange rates are highly endogenous variables, and an OLS estimation of equation (10) would generally lead to inconsistent estimates. Therefore, we instrument the potentially endogenous variable, $\Delta REER_{it}$, using an external instrument Z_{it} defined as follows,

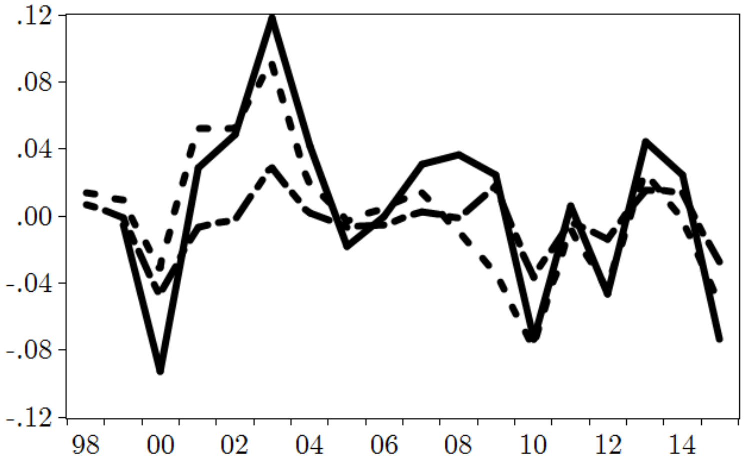
$$Z_{it} = \Delta EuroNEER_t * extrade_{i,t-1} \quad (11)$$

where $\Delta EuroNEER_t$ is the appreciation of the euro in nominal effective terms and $extrade_{i,t-1}$ is the (lagged) share of extra euro area trade for country i.

The intuition behind our identification relies on the different trade structure of euro area countries. Consider two countries, one with a substantial share of extra euro area trade (say, Ireland) and one with a low share (say, Austria); see Figure 3. We assume that the euro can appreciate for reasons that are independent of country fundamentals

[9]Results including country-specific time trends, t_{it}, are essentially the same, see the figure in the Online Appendix

[10]Standard errors are robust to serial correlation and heteroscedasticity.



Solid line: Euro NEER; dashed line: Austrian REER; dotted line: Irish REER

Figure 3: Note: See Table 2 for the definition of the data. Data are in log differences. The extra euro area trade share of Ireland is 68 per cent on average, while it is 40 per cent for Austria.

in Austria or Ireland, *controlling for euro area aggregates* (growth, growth forecasts, inflation, short term rate, term spread). If this is the case, and considering the different trade composition (essentially given in the short term), movements in the euro nominal effective exchange rate will influence the real effective exchange rate of Ireland more than that of Austria. We can therefore look at the different impact on countries like Ireland vs. countries like Austria to identify the effects of exogenous movements in the exchange rate. In this way, we achieve a clean identification of the effects of exogenous changes in exchange rates. *Appendix 1* sketches a simple model which underpins the identification strategy, and makes more transparent the conditions under which the identification is valid.

Note that a valid instrument also needs to satisfy the exclusion restriction: that is, it should affect variables only through $\Delta REER$ and not independently. One concern with our identification could be that shocks in the rest of the world (say, a demand shock in the US) may drive the euro effective exchange rate (say, through a dollar appreciation) and at the same time influence countries with larger trade links with the rest of the world, which is correlated with the extra euro area trade share. In other words, such shocks could be correlated with Z_{it} and with ε_{it+h}, undermining the exclusion restriction. To address this concern, we also add in the regression the term $\delta \Delta fd^{EA}_{t+h} extrade_{i,t-1}$ where Δfd^{EA}_{t+h} is the annual growth in euro area foreign demand, in real terms (a proxy for growth outside of the euro area and demand for euro area imports).

Finally, note that when presenting the results we assume a 3 percent real appreciation, which corresponds to the standard deviation of the annual real appreciation in the data. This should facilitate the interpretation of the results in terms of economic significance for the fluctuations of the real exchange rate that we typically observe over a year.

4.3 First stage regression

Table 2 reports the results of the first stage regression. We first include the baseline regression, then two regressions using estimated monetary policy shocks and FX shocks for building the instrument (see later in Section 5), and finally we consider appreciations and depreciations separately. For those, we consider changes in the country-level real exchange rate that are associated with a positive (appreciations) or negative (depreciations) value for the instrument Z_{it}, i.e. the "predicted" sign of the exchange rate movement. Overall, the estimates shown in the table confirm that our instrument is strong and the sign of the coefficient is consistent with our identification story: a nominal effective appreciation of the euro contributes to real appreciation in euro area countries, more so in countries which trade a lot outside the euro area. The key message is that a nominal appreciation of the euro in effective terms translates into a real appreciation of about the same size in countries with a higher share of extra euro area trade. In fact, the F statistic is well above the standard benchmark of 10, indicating that the instrument is strong.

5 Results

We now turn to the results of the empirical analysis. Before describing the results in detail, it is useful to give a first overview. Overall, we find that real appreciation has two countervailing effects. On the one hand, appreciation leads to a demand switching away from exports and towards imports; hence our results confirm that real appreciation is detrimental for competitiveness. We also find that appreciation has an allocative effect, shifting resources away from manufacturing and tradables towards services and non-tradables. Predictably, it also results in a deterioration of the current account. At

	(1)	(2)	(3)	(4) Apprecia-tions	(5) Deprecia-tions
Instrument: Euro NEER appreciation*Extra euro area trade share (t-1)	0.816***			0.315***	0.501***
	(0.101)			(0.058)	(0.131)
Euro area foreign demand growth*Extra euro area trade share (t-1)	-0.278	-0.133	-0.017	0.074	-0.352*
	(0.308)	(0.328)	(0.326)	(0.252)	(0.165)
Euro area foreign demand growth	-0.277	-0.201	-0.343*	-0.136	-0.141
	(0.187)	(0.172)	(0.187)	(0.121)	(0.111)
Euro area real GDP growth	0.766**	-0.063	0.531*	0.181	0.585**
	(0.270)	(0.272)	(0.265)	(0.118)	(0.195)
Euro area inflation	0.712***	1.158***	1.346***	-0.298*	1.010***
	(0.209)	(0.296)	(0.238)	(0.155)	(0.184)
Euro area short term rate	-0.921**	-0.222	-0.659	0.470***	-1.391***
	(0.367)	(0.337)	(0.392)	(0.144)	(0.286)
Euro area term spread	-0.887**	-0.277	-1.075**	0.738***	-1.625***
	(0.372)	(0.336)	(0.377)	(0.185)	(0.315)
Instrument: Euro area monetary policy shock*Extra euro area trade share (t-1)		-0.037***			
		(0.009)			
Instrument: Euro area FX shock*Extra euro area trade share (t-1)			-0.127***		
			(0.013)		
Observations	206	206	206	206	206
R-squared	0.391	0.141	0.427	0.253	0.363
Number of countries	13	13	13	13	13
F statistic	35.59	30.47	33.83	75.54	79.98

Table 2: First stage regressions. Dependent variable: Log real effective exchange rate. Pooled OLS regression with country fixed effects. Robust standard errors in parentheses; ***/**/* denotes significance at 1/5/10 percent confidence level. Sample period: annual data from 1999 to 2015. See Section 3 on the definition of the instrument; for columns (2 and (3) the instrument is based on euro area monetary policy and FX shocks respectively (see Section 5 for more details).

the same time, the competitiveness channel is more than compensated by the improvement in the terms of trade. We find that as countries get richer with better terms of trade, imports become cheaper and real disposable income, real wages and consumption rise. Moreover, while the CPI and the import deflator fall in the short term for the mechanic effect of appreciation, they eventually rise in the medium term on account of the expansion of economic activity. Finally, we subject our main results to a battery of robustness checks to which they survive at least qualitatively. One notable result, however, is that the expansionary effect on activity and wages appear to be quicker in the so-called peripheral countries of the euro area, which also leads to a sharper deterioration of the current account in these countries compared with the so-called core ones.

5.1 Baseline results

Figure 4 reports the results of the baseline model in (1) for all countries of the left hand side of Table 1, for 30 variables. The impulse responses are derived from the β_h coefficients in equation (1) (for example, the impulse response reported in period 1 is the coefficient β_0).

One main result from the impulse response is that appreciation leads to a demand switching away from exports and towards imports, as can be expected. In particular, net exports decline by around 1.5% after a 3% appreciation while the unit labour cost increases by almost 3%. Overall, this confirms the view that real appreciation is detrimental for competitiveness. This is also confirmed by the contraction of the manufacturing sector and the parallel expansion of services (non-tradables). The relative real wage goes down in both manufacturing and tradables, suggesting that appreciation boosts wages more in the sectors that are less exposed to international competition.[11] Real exchange rates, therefore, have a powerful allocative effect.

At the same time, the competitiveness channel is more than compensated by the improvement in the terms of trade. As countries get richer with better terms of trade, not only imports increase, but also real disposable income and consumption, by about 2%.[12] It is notable that both exports and imports increase, the latter up to 10%. Real wages

[11] Note that the definition of the tradable sector follows the NACE classification and it is defined broadly, including agriculture, mining, manufacturing, electricity and gas, water supply, wholesale and retail trade, transportation, accommodation and food services, and information and communication.

[12] Somewhat surprisingly, however, consumer confidence falls after real appreciation.

also increase.

Turning to the effect on prices, we find that appreciation reduces both the import and the export deflators, and leads to a fall in the CPI, which is however temporary. Both the CPI as well as import and export deflator eventually *rise* after an initial contraction. The GDP deflator does not change significantly in the short term, but then *rises* significantly in the medium term.

Finally, in terms of external adjustment, we find that the current account deteriorates over time after a real appreciation, by between 0.5 and 1% of GDP at the peak.

5.2 Comparing IV and OLS estimates

After describing the main results, we now present a battery of robustness checks. We begin by comparing, in Figure 5, the results obtained using OLS and IV. Is the correction for the endogeneity of the real exchange rate of material importance for the results? The blue lines refer to the IV baseline, and the red lines to the estimates of equation (1) using OLS. The differences between blue and green lines should reflect the extent of the endogeneity bias of OLS, or in other words the reverse causality running from country-specific variables to the REER. If, as argued above, the country-specific REER are largely driven by the euro NEER, we would expect these differences to be small. This is indeed the case.

Figure 5 shows that differences are mostly small and not statistically significant. One exception is clearly the CPI, which is not at all surprising since it is mechanically a component of the REER (hence reverse causality is there by construction). The difference is also large and statistically significant for other price and cost indicators, notably the unit labour cost and the GDP deflator.

5.3 Conditional evidence: Does it matter which shock drives the euro NEER?

In this section we consider whether results differ depending on the reason underlying the appreciation or depreciation of the euro, which then has cascading effects on real exchange rates in individual euro area countries.

Identifying structural shocks using a monthly VAR. We decompose movements in the nominal effective exchange rate of the euro into four structural shocks, namely demand,

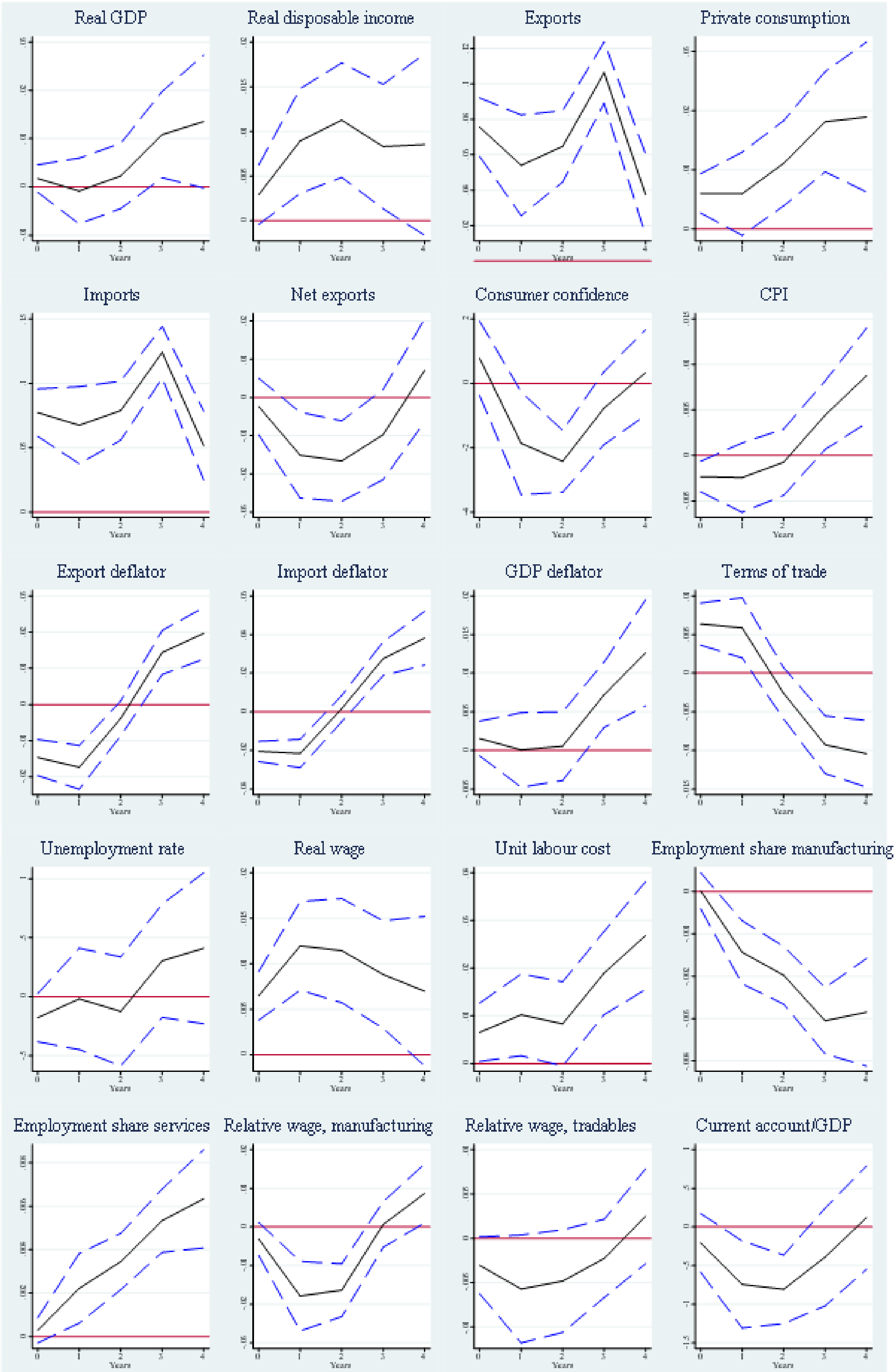


Figure 4: Note: Impulse responses are to a 3 per cent real appreciation. Each impulse response is derived from the local projections estimation (panel with country fixed effects) with instrumental variables, for each horizon h=0,,4; the external instrument is the growth rate of the nominal effective exchange rate of the euro multiplied by each countrys share of extra euro area trade in year t-1. Each regression also includes, for each variable at t+h: the dependent variable at t-1; the euro area short term interest rate, inflation, real GDP growth (actual and forecast for next year) and the term spread at t; euro area foreign demand growth at t; the interaction between euro area foreign demand growth and the extra euro area trade share at t-1. The error bands are based on robust standard errors, and show a 90 per cent confidence interval. Sample period: 1999 - 2015, annual data.

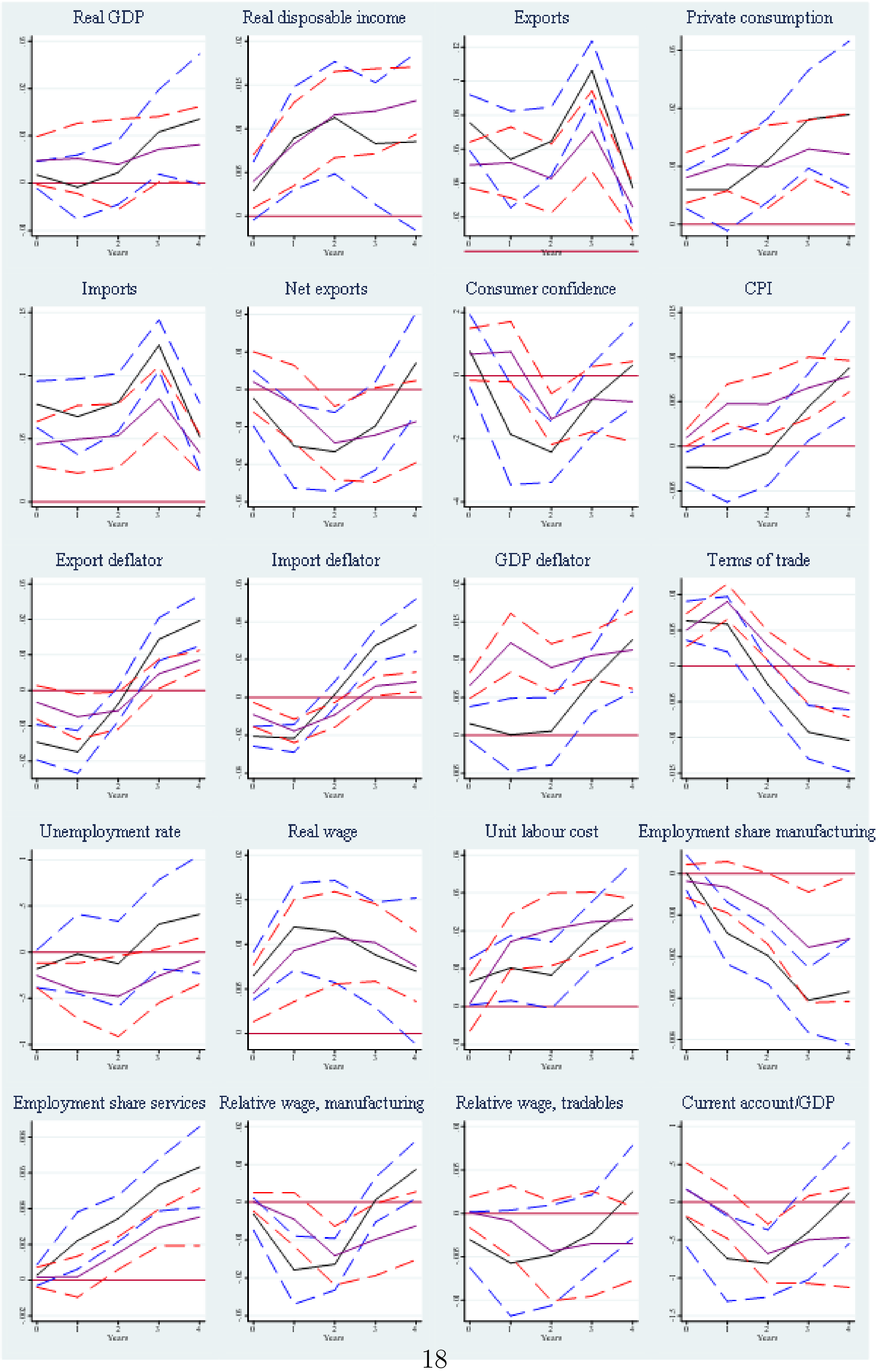


Figure 5: Note: Impulse responses are to a 3 per cent real appreciation. See notes to Figure 4. The blue lines refer to the IV estimates, and the red lines to the OLS ones.

Shock	*Industrial production*	*HICP*	*euro NEER*	*Short term rate*
Demand	+	+		+
Supply	+	-		
Monetary policy	+	+	-	-
FX	+	+	-	+

Table 3: Sign restrictions imposed to the monthly VAR of the euro area. All restrictions are imposed at months t to $t+2$; for the HICP the restriction is imposed at $t+12$.

supply, monetary policy and foreign exchange shocks, similar to previous contributions such as Farrant and Peersman (2006) and Forbes et al. (2015). We then save estimates of these underlying shocks and use the shocks (rather than the euro NEER appreciation) to build our instrument. We estimate a monthly VAR model, from 1999:1 to 2015:12, including euro area industrial production, the euro area HICP, the euro nominal effective exchange rate and the 3-month Euribor rate. The VAR is estimated in a frequentist way, and sign restrictions are imposed by multiplying the covariance matrix by random orthogonal matrixes, in the same way as in Rubio Ramirez et al. (2010). Table 3 reports the sign restrictions that we impose, that are relatively standard in the literature and consistent with many different open economy models. Figure 6 reports the impulse responses derived from this identification scheme. The impulse responses are consistent with the conventional wisdom on the effect of the shocks we consider and are mostly statistically significant (with the interesting exception of the NEER reaction to the monetary policy shock).

Note that monthly changes in the euro NEER are mostly correlated with FX shocks and significantly less so with other shocks. Table 4 shows the correlations and the variance decomposition for a randomly picked set of 100 structural shocks satisfying the sign restrictions. Predictably, we find that over half of the variance in the euro nominal effective exchange rate is explained by FX shocks, in line with the literature on exchange rate disconnect.

Annual aggregation of monthly shocks. In the second step, we aggregate the monthly shocks into annual frequency using simple averages of monthly observations, and obtain annual demand, supply, monetary policy and FX shocks (note that these are not perfectly orthogonal due to the time aggregation). For each shock ϵ_t^j, $j = 1, .., 4$, we define new instruments as follows,

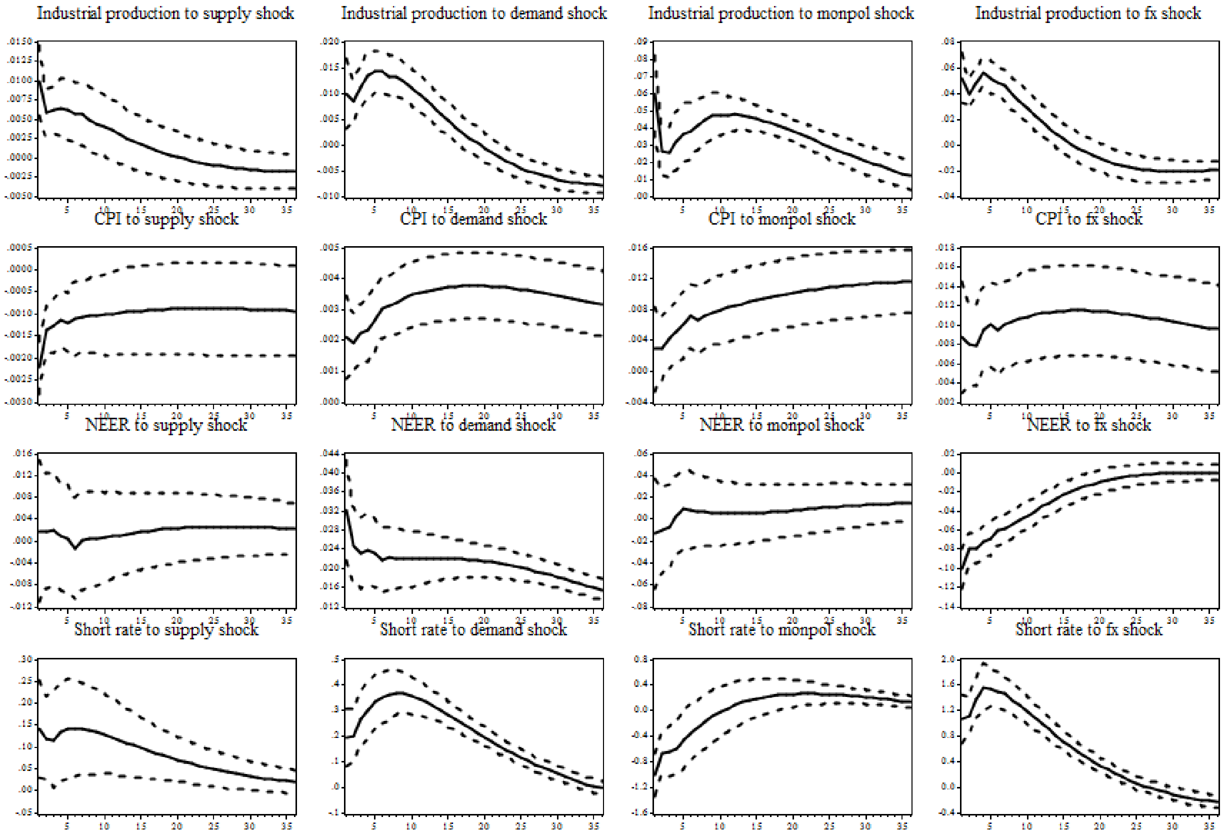


Figure 6: Impulse responses are derived from a monthly VAR including euro area industrial production, the euro area HICP, the euro nominal effective exchange rate and the 3-month Euribor rate, 1999:1 to 2015:12. The sign restrictions are shown in Table 3.

Shock	Correlation	Contributions to the variance of the euro NEER
Demand	.13	0.27
Supply	.22	0.11
Monetary policy	-.39	0.10
FX	-.48	0.52

Table 4: Sample period 1999:1-2015:12, monthly data.

$$Z_{it}^{j} = \epsilon_t^j extrade_{i,t-1} \tag{12}$$

We then compare results using these alternative instruments to the baseline results with the instrument in (11). In particular, we will be looking at movements in the euro effective exchange rate driven by monetary policy and FX shocks, which have most explanatory power as suggested by the variance decomposition also shown in Table 4.[13]

Do the results differ depending on the source of the fluctuation in the euro NEER? In Figures **??** and 8 we instrument real exchange rates with alternative instruments based on, respectively, euro area monetary policy and FX shocks, as described in Section 3 (equation (10)). The information shown in the Figures suggest that the effects of appreciation are largely the same independent of the source of the fluctuation in the euro nominal effective exchange rate. This, in turn, reinforces the view that for individual euro area countries movements in the real exchange rate, after controlling for euro area aggregates, are similar to exogenous terms of trade shocks, irrespective of the origin of the exchange rate movement.[14]

Is this result surprising? In our view it is not because the source of the fluctuation of the euro nominal effective exchange rate should be largely be already captured by the euro area controls that we include in the regression, and it may influence individual euro area countries mainly through the behaviour of the euro area aggregates. The additional effect on individual countries is captured by the pure "pecuniary" element of the FX movement, which remains after controlling for euro area-level trends.

5.4 Comparing appreciations and depreciations

We consider next whether the impact of appreciation and depreciation is different, namely if the real exchange rate has an asymmetric impact as argued, for example, by Demian and di Mauro (2015). One of the advantages of the local projections approach is its

[13]Note that we pick the structural shocks randomly among the many estimated shocks that satisfy the sign restrictions. Generally speaking, structural shocks are generated regressors, which should be taken into account for the standard errors. However, generated regressors are generally not a problem when used as instruments; see Pagan (1984). A caveat here is that annual shocks series are not perfectly orthogonal between them, due to the time aggregation, although the correlations are very low in absolute value.

[14]For the instrument built using estimated euro area monetary policy shocks, however, we find a puzzling fall in imports and exports after 2 years.

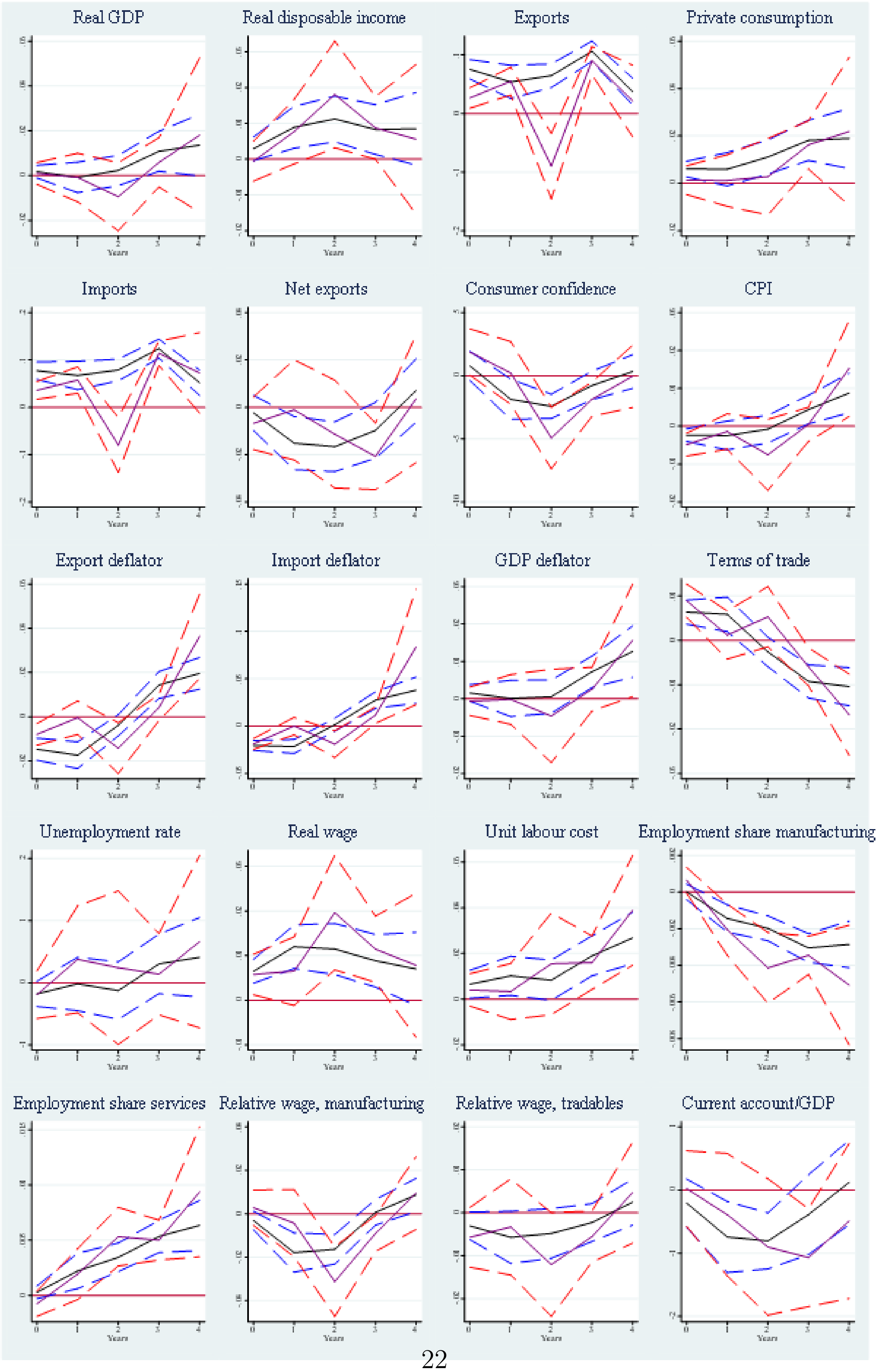


Figure 7: Note: Impulse responses are to a 3 per cent real appreciation. See notes to Figure 8. Blue lines are the baseline impulse responses, red lines are derived using estimated monetary policy shocks (aggregated from the monthly VAR) rather than the euro NEER to build the instrument.

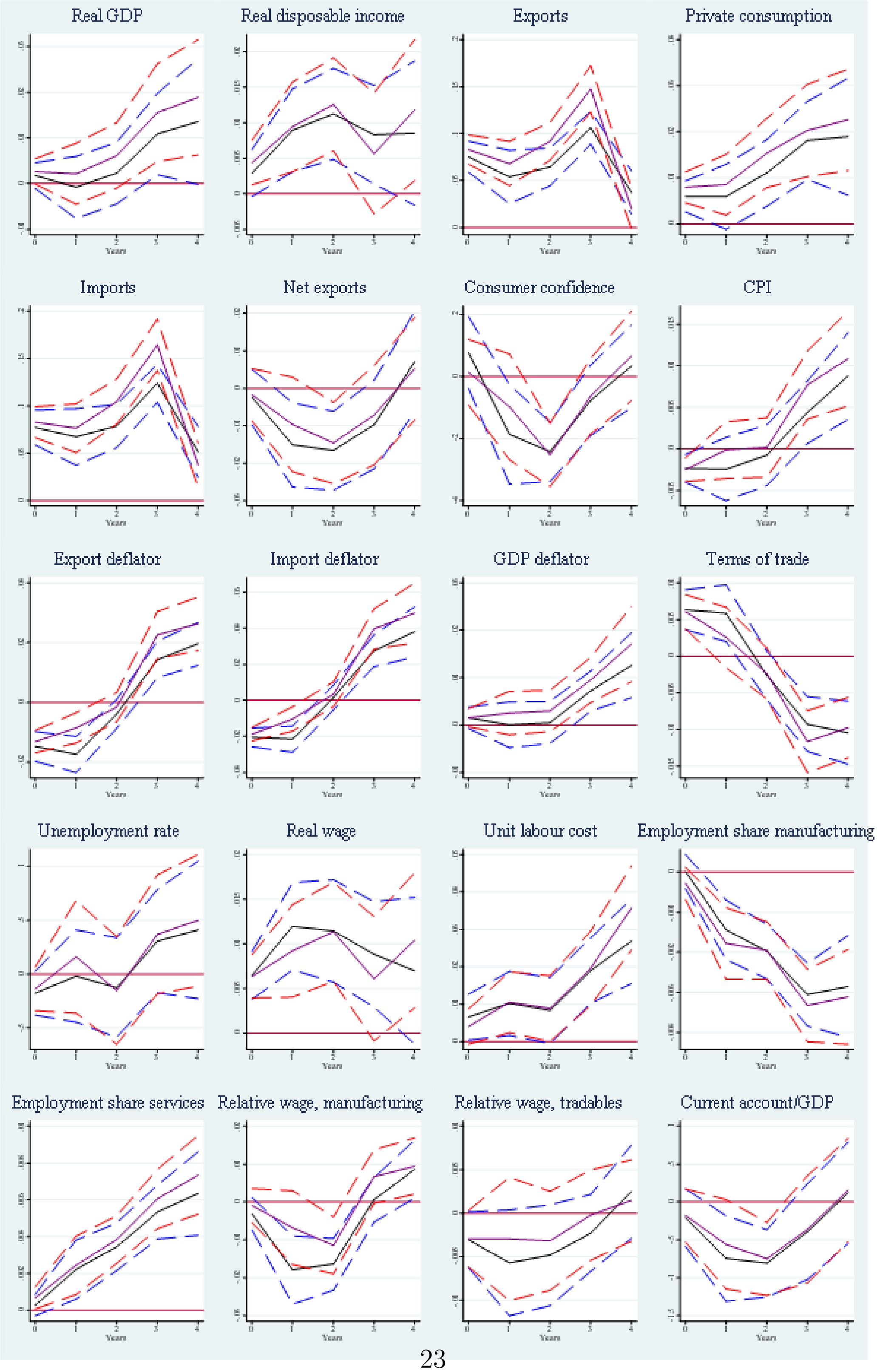


Figure 8: Note: Impulse responses are to a 3 per cent real appreciation. See notes to Figure 8. Blue lines are the baseline impulse responses, red lines are derived using estimated FX shocks (aggregated from the monthly VAR) rather than the euro NEER to build the instrument.

flexibility in allowing for interactions and non-linearities, and we build on this desirable property here. We now build two new variables, say $\Delta REER_appr_{it}$ and $\Delta REER_depr_{it}$, which takes the value of $\Delta REER_{it}$ if respectively the instrument $Z_{it} > 0$ and $Z_{it} < 0$. The logic of this distinction is to see if results differ if the exogenous component of the real exchange rate change is an appreciation or a depreciation. Figure **??** reports the results of this exercise, where blue lines refer to appreciation, and red lines to depreciation. Overall, most of the results are qualitatively the same, i.e. the effects of appreciation are largely the mirror image of the effects of depreciation. In some cases, however, the standard errors are larger due to the decrease in the sample size. We generally find no statistically significant difference between impulse responses for appreciation and depreciation.

We also exclude the sovereign debt crisis period (2010-2012) from the sample to exclude the possibility that events in smaller euro area countries (e.g., Greece) may have had an own independent impact on the euro exchange rate in that period. The results, not reported for brevity, indicate that this makes little difference to the results, which are qualitatively the same as in the baseline analysis.

5.5 Excluding the largest countries

As mentioned before, our identification strategy is stronger for the smaller countries of the euro area. In a Figure reported in the Online Appendix we compare results for the full sample (blue lines) with results for the smaller nine countries in the right hand column of Table 1 (red lines). Results in this Figure lend further support to our identification strategy, because the results are largely the same in the two country groups, and removing the large countries does not have an appreciable difference.

5.6 Core vs. peripheral countries

Finally, in Figure 10 we report results separately for so-called "core" countries (Austria, Belgium, Denmark, Estonia, Finland, France, Germany, the Netherlands) and "peripheral" ones (Greece, Ireland, Italy, Portugal and Spain). We consider this distinction because these two sets of countries have experienced significant economic divergence, especially in crisis times. Real appreciation, in particular, was widely considered to be a problem in the latter group of countries, leading to a costly internal depreciation that is partly still on-going. Blue lines refer to peripheral countries, red lines to core countries.

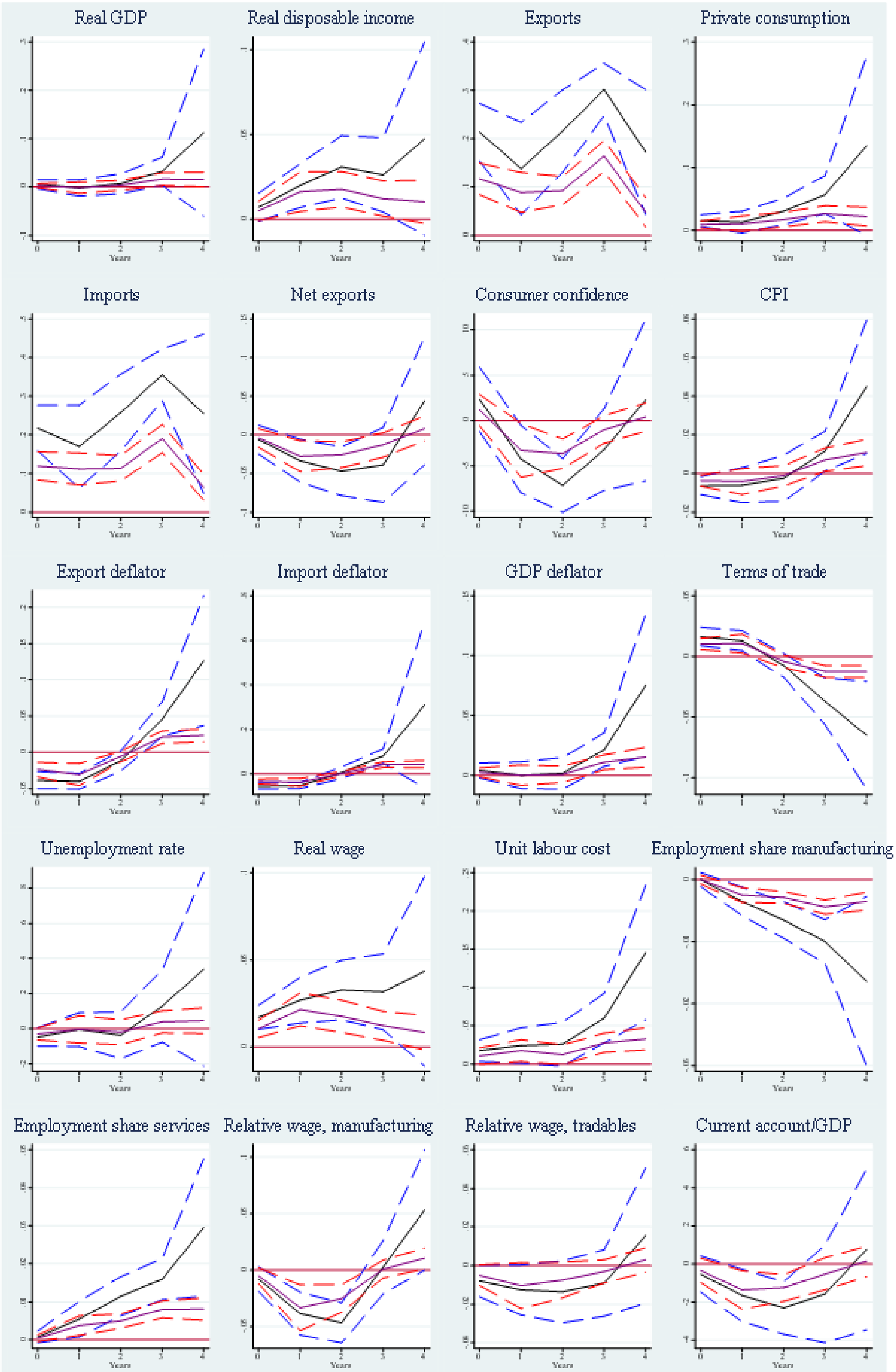


Figure 9: Note: Impulse responses are to a 3 per cent real appreciation. See notes to Figure 9. The blue lines refer to predicted appreciations, the red lines to predicted depreciations.

Our results suggest that, to some extent, effects of real appreciation are in part different between the two country groups. Both the loss of competitiveness and the expansion associated to the terms of trade effect are larger and quicker in peripheral countries, although they eventually overlap over the medium term. Moreover, the deterioration in the current account is more pronounced in peripheral countries. Overall, there is some asymmetry within the euro area in the way movements in the euro exchange rate are transmitted to individual euro area countries. We do not investigate formally what the reasons for this interesting discrepancy may be in this paper, but there are two plausible candidates that may be further explored in future research. First, households might be more liquidity constrained in the peripheral countries, and hence more responsive to the relaxation in the budget (and possibly balance sheet) constraint brought about by appreciation. Second, the wage setting behaviour might have amplified the upward impact on real wages stemming from real appreciation. We emphasise that, at this stage, these are just plausible conjectures that merit further work. Finally, although this is largely outside the scope of this paper, we note that one important implication of these findings is that movements in the euro exchange rate may contribute to creating imbalances *within* the euro area itself (see also Honohan and Lane 2003).

6 Conclusions

In this paper we have built on the unique situation of euro area countries to address one of the most intractable questions in international economics, namely the effects of exogenous real appreciation (i.e. exchange rate movements that are not related to country fundamentals). We note that appreciation has effects that can benefit or hurt different sectors of the economy: on the one hand, it lowers import prices, boosting the terms of trade, purchasing power and thereby making domestic residents richer. On the other hand, it makes exports less competitive, which may be a drag for growth, in particular in manufacturing. Which of the two effects dominates, from a welfare standpoint, is largely an empirical matter. There is little evidence available so far in the literature because it is not easy to identify exchange rate movements that can be characterised as truly exogenous shifts unrelated to domestic fundamentals. Hence, our paper is among the very first to provide evidence on this important question.

Figure 10: Note: Impulse responses are to a 3 per cent real appreciation. See notes to Figure 4. Blue lines refer to "peripheral" countries, red lines to "core" countries.

We note that fluctuations in real exchange rates in individual euro area countries are largely driven by a common component, the variation in the euro exchange rate vs. other major currencies, and country-specific sensitivity to it, which is practically unchanged over time (i.e. the share of extra euro area trade). We assume that shifts in the euro exchange rate are unrelated to country-specific fundamentals, after controlling for euro area and global aggregates. Building on this assumption, we build a strong external instrument by interacting movements in the euro nominal effective exchange rate and countries' exposure to extra area trade. We then run local projections with instrumental variables on a large number of country-specific variables on real appreciation, up to 4 years after an appreciation episode.

The main findings of our work are two. First, we find that the expansionary effects of appreciation due to the terms of trade dominate over the expenditure switching effect, by raising real disposable income and consumption. In terms of distributional effects within societies, this suggests that consumers stand to benefit from appreciation, and lose from depreciation. In other words, appreciation makes countries richer and citizens potentially better off, but it does hurt the exports sector and competitiveness more generally. Second, while the main results are generally robust to different assumptions and samples, the effects of appreciation are to some extent different within the euro area, in particular between so-called "core" and "peripheral" countries. In particular, we find that effects are larger and quicker in peripheral countries, at least for some variables. In turn, this implies that movements in the euro exchange rate also foster an internal reallocation within the euro area, with appreciation leading to more growth, but also more imbalances (for example, a current account deficit) in the peripheral countries. Sooner or later, these imbalances need to be corrected.

Our study is subject to a number of limitations. First, the time horizon is limited to 4 years, while real appreciation may have long lasting effects on economies, in particular needing a correction of current account imbalances (and often of excessive credit and asset price growth) down the road. Second, the experience in euro area countries may not necessarily extend to other advanced countries, and even less so to emerging countries.[15] Finally, it should be clear that in this paper we are looking at the "pecuniary" effect of

[15] In fact, one of us has shown in another paper that depreciation is beneficial for growth in emerging countries (Habib et al. 2016).

exchange rate movements, namely at shifts that are essentially exogenous for the individual euro area countries. It is a different matter to analyse the role of exchange rates in a larger economy for which movements in exchange rates are endogenous, and for which the nature of the shock driving the change in the exchange rate may be crucial. In spite of all these limitations, however, we believe that this paper makes a significant progress towards understanding the effects of exchange rate shocks and in thinking about global exchange rate configurations and the international monetary system.

7 Appendix 1: A simple model underpinning the identification scheme

In this Appendix we present a very simple model which helps making the assumptions behind our empirical identification scheme clearer and more transparent.[16] We assume that there are two economies, the Euro Area (EA) and a Small Open Economy (SOE) that is a (small) member of it. The law of motion for EA is

$$X_{EA} = -\beta R_{EA} - \gamma_{EA} S_{EA} + \epsilon_{EA}^{X} \tag{13}$$

$$R_{EA} = \rho X_{EA} + \epsilon_{EA}^{R} \tag{14}$$

$$S_{EA} = \delta X_{EA} - \eta R_{EA} + \epsilon_{EA}^{S} \tag{15}$$

where X_{EA} represents the "state of macro" (think of a combination of output and inflation), R_{EA} is the euro area monetary policy rate, S is the euro nominal effective exchange rate. The first equation describes the law of motion for the macro variable, which depends negatively on the interest rate and the exchange rate; the second is a euro area monetary policy rule, whereby the interest rate is an increasing function of the macro variable; and finally the third equation describes the law of motion for the exchange rate, which is driven by the macro state, the interest rate and is also hit by exogenous FX shocks.

Turning to the SOE, the law of motion is simpler than for the EA,

$$X_{SOE} = \phi X_{EA} - \beta R_{EA} - \gamma^{SOE} RER_{SOE} + \epsilon_{SOE}^{X} \tag{16}$$

$$RER_{SOE} = \rho_{SOE} X_{SOE} + \omega S_{EA} + \epsilon_{SOE}^{RER} \tag{17}$$

where RER is the real effective exchange rate, which reflects both the country-specific fundamentals X_{SOE} and is also a function of the EA exchange rate and hit by exogenous shocks ϵ_{SOE}^{RER}. The SOE is very correlated, in terms of macro, with the EA, i.e. we assume that ϕ is positive and close to one.

[16]We thank Cedric Tille for suggesting the idea of this simple model to us.

Suppose the parameter we want to estimate is γ^{SOE}. Regressing X_{SOE} on RER_{SOE} will generally lead to inconsistent estimates, because the RER is an endogenous variable and in particular is itself a function of the macro state. In particular, RER_{SOE} and ϵ_{SOE}^{X} will be correlated, leading to inconsistent estimates. However, S_{EA} is a valid instrument because it is uncorrelated with ϵ_{SOE}^{X} (this shock does not appear anywhere in the determination of S_{EA}) but clearly correlated with RER_{SOE} via equation (16). A simple numerical example, available from the authors upon request, shows that this is indeed the case, and that instrumenting RER_{SOE} with S_{SOE} leads to a consistent estimate of γ^{SOE}.[17] Clearly, the key assumption, as highlighted in the main text, is that SOE-specific shocks do not exert an independent influence on S_{EA}, once controlling for EA variables.

[17]In the numerical example we assume $\beta = 0.5$, $\gamma_{EA} = 0.2$, $\rho = 1$, $\delta = 0.4$, $\eta = 1$, $\phi = 0.9$, $\gamma_{SOE} = \gamma_{EA}$, $\omega = 1$.

8 Appendix 2: First order conditions for Lombardo and Ravenna redux

The Euler equation (which is also the UIP condition) reads:

$$\lambda_t + \delta b_t = \beta E_t R_{t+1} \lambda_{t+1} \tag{18}$$

where λ is the Lagrange multiplier for the budget constraint, and $\lambda_t = 1/c_t$. The first order conditions derived from the optimisation of consumption and leisure are

$$h_{Ht}^{\eta} = \lambda_t w_{Ht} \tag{19}$$

$$h_{Nt}^{\eta} = \lambda_t w_{Nt} \tag{20}$$

Note that domestic production costs are given by the real wage, which is the same in the tradable and non-tradable sector. Moreover, the model assumes perfect competition, therefore the relative price of foreign-produced tradables is S, and the relative price for all tradables depends on the parameter γ_D, in particular it is $1 - \gamma_D/S$. Therefore:

$$c_{Ht} = (1 - \gamma_n)\gamma_n \frac{c_t}{S_t^{1-\gamma_D}} \tag{21}$$

$$c_{Ft} = (1 - \gamma_n)(1 - \gamma_D)\frac{c_t}{S_t} \tag{22}$$

and from these it is immediate to derive c_T and c_N. Note that c_{tH}^* (exports for domestic producers) can be derived in the same way (assuming the same structural parameters), taking total foreign consumption as exogenous and swapping signs:[18]

$$c_{Ht}^* = (1 - \gamma_n)(1 - \gamma_D)\frac{c_t^*}{S_t} \tag{23}$$

From the optimisation of the production side we derive

[18]Note that we keep the same calibration for the large foreign economy. If the foreign economy is interpreted to be the rest of the world, one would expect c_t^* to be much larger than c_t, but this is compensated by the fact that the weight of foreign produced tradables (i.e. domestic from the standpoint of the foreign economy), γ_D, should also be much higher.

$$\frac{w_H h_D}{Y_H} = \gamma_v \tag{24}$$

$$\frac{m}{SY_H} = 1 - \gamma_v \tag{25}$$

Finally, the real exchange rate S follows an autoregressive exogenous process,

$$S_t = k + \rho_S S_{t-1} + \epsilon_t \tag{26}$$

where the constant term k is scaled so that the steady state value of S is 1.

References

[1] Amiti, M., Itskhoki, O. and J. Konings (2014): "Importers, Exporters, and Exchange Rate Disconnect", American Economic Review, 7, 1942-1978.

[2] Artis, and M. Ehrmann (2006): "The exchange rate - A shock-absorber or source of shocks? A study of four open economies", Journal of International Money and Finance, 25, 6, 874-893.

[3] Backus, D. K and G. W. Smith (1993), "Consumption and real exchange rates in dynamic economies with non-traded goods", Journal of International Economics, 35, 3–4, 297–316.

[4] Bems, R. and J. Di Giovanni (2014): "Income-Induced Expenditure Switching", CEPR Discussion Paper 9987.

[5] Benetrix, A. S., Lane, P. R. and J. C. Shambaugh (2014): "International currency exposures, valuation effects and the global financial crisis", Journal of International Economics, 96, 98-109.

[6] Bjornland, H. C., and L. A. Thorsrud (2016): "Boom or gloom? Examining the Dutch disease in two speed economies", Economic Journal, 126, 598, 22192256.

[7] Bodenstein, M., Erceg, C. J. and L. Guerrieri (2011): "Oil shocks and external adjustment", Journal of International Economics, 83, 168-184.

[8] Burstein, A. T. and G. Gopinath (2015): "International prices and exchange rates", in K Rogoff, E Helpman and G Gopinath, eds., Handbook of International Economics, Vol. 4, Elsevier, chapter 7, 391 – 451.

[9] Campa, J. M. and L. Goldberg (2005): "Exchange Rate Pass-Through into Import Prices", The Review of Economics and Statistics, 87, 4, 679-690.

[10] Casas, C., Diez, F. J., Gopinath, G. and P.-O. Gourinchas (2016): "Dominant currency paradigm", NBER Working Paper 22943.

[11] Cooper, R. (1971): "Currency Devaluation in Developing Countries", Princeton Essay in International Finance No. 86.

[12] Cravino, J. and A. A. Levchenko (2015): "The distributional consequences of large devaluations", RSIE Discussion Paper 648.

[13] Demian, C.-V. and F.di Mauro (2015): "The exchange rate, asymmetric shocks and asymmetric distributions", ECB Working Paper No. 1801.

[14] Di Tella, R., MacCulloch R. J. and A. J. Oswald (2003): "The Macroeconomics of Happiness," The Review of Economics and Statistics, MIT Press, vol. 85(4), pages 809-827, November.

[15] Diaz-Alejandro, Carlos F. (1963), "A Note on the Impact of Devaluation and the Redistributive Effect," Journal of Political Economy 71, 577-580.

[16] Doyle, B. M., Erceg, C. J. and A. T. Levin (2015): "Monetary policy rules in economies with traded and non-traded goods", mimeo.

[17] Edwards, S. and E. Levy Yeyati (2005): "Flexible exchange rates as shock absorbers", European Economic Review, 49, 8, 2079-2105.

[18] Farrant, K. and G. Peersman (2006): "Is the Exchange Rate a Shock Absorber or a Source of Shocks? New Empirical Evidence", Journal of Money, Credit and Banking, 38, 4, 939-961.

[19] Forbes, K., Hjortsoe, I. and T. Nenova (2015): "The shocks matter: improving our estimates of exchange rate pass-through", No 43, Discussion Papers, Monetary Policy Committee Unit, Bank of England.

[20] Frieden, J. A. (2009): "Global governance of global monetary relations: Rationale and feasibility", Economics, 2009-06.

[21] Frieden, J. A. (2014): Currency Politics: The Political Economy of Exchange Rate Policy, Princeton: Princeton University Press.

[22] Gopinath, G. (2015): "International Aspects of Inflation Dynamics", paper presented at the Federal Reserve Bank of Kansas City annual economic policy symposium, Aug. 27-29.

[23] Gourinchas, P. O. (1999): "Exchange Rates and Jobs: What Do We Learn from Job Flows?", NBER Macroeconomics Annual 1998, 13, 1999, 153-222.

[24] Habib, M., Mileva, E. and L. Stracca (2016): "Real exchange rates and economic growth: Revisiting the case using external instruments", Journal of International Money and Finance, forthcoming.

[25] Honohan, P. and P.R. Lane (2003): "Divergent Inflation Rates Under EMU," Economic Policy 37, 358-394.

[26] Jorda, O. (2005): "Estimation and Inference of Impulse Responses by Local Projections", American Economic Review, 95, 1, 161-182.

[27] Kamber, G., Nodari, G. and B. Wong (2016): "The impact of commodity price movements on the New Zealand economy", Reserve Bank of New Zealand Analytical Note Series, 2016/05.

[28] Krugman, P. and L. Taylor (1978): "Contractionary Effects of Devaluation", Journal of International Economics 8(3), 445-456.

[29] Lane, P. R. and J. C. Shambaugh (2010): "Financial Exchange Rates and International Currency Exposures", American Economic Review 100(1), 518-540.

[30] Lizondo, J. S. and P. J. Montiel (1989): "Contractionary Devaluation in Developing Countries: An Analytical Overview", IMF Staff Papers, 36, 1, 182-227.

[31] Lombardo, G. and F. Ravenna (2014): "Openness and optimal monetary policy", Journal of International Economics, 93, 153-172.

[32] Mendoza, E. G. (2002): "Credit, Prices, and Crashes: Business Cycles with a Sudden Stop", in Edwards, Sebastian, and Jeffrey A. Frankel (Eds.), Preventing Currency Crises in Emerging Markets, Chicago: University of Chicago Press.

[33] Mussa, M. (1986): "Nominal exchange rate regimes and the behaviour of real exchange rates: Evidence and implications", Carnegie Rochester Conference Series on Public Policy, 25, 1, 117-214.

[34] Obstfeld, M. and K. Rogoff (2000): "The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?," NBER Macroeconomics Annual 2000, 15, 339-412.

[35] Pagan, A. (1984): "Econometric Issues in the Analysis of Regressions with Generated Regressors", International Economic Review, 25, 1, 221-247.

[36] Rodrik, D. (2008): "The real exchange rates and economic growth", Brookings Papers on Economic Activity, Fall 2008, 365-412.

[37] Romer, D. (1993): "Openness and inflation", Quarterly Journal of Economics, 108, 4, 869-903.

[38] Rubio-Ramirez, J. F., Waggoner, D. and T. Zha (2010): "Structural Vector Autoregressions: Theory of Identification and Algorithms for Inference", Review of Economic Studies, 77, 2, 665-696.

[39] Stracca, L. (2014): "Financial imbalances and household welfare: Empirical evidence for the EU", Journal of Financial Stability, 11, C, 82-91.

[40] Tille, C. (2006): "On the distributional effects of exchange rate fluctuations", Journal of International Money and Finance, 25, 8, 1207-1225.