

# Hanging from a cross of euros? Macroeconomic adjustment in and out of the Eurozone

Livio Stracca (European Central Bank)\*

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## **Abstract**

As the euro has celebrated its 20-th birthday, I review macroeconomic adjustment in the euro area by comparing EMU countries to a control group of advanced countries with floating exchange rates. Three pieces of evidence are provided. First, I compare average and standard deviations of key macroeconomic variables in EMU and non-EMU countries. Second, I compare the impact of the global financial crisis on the two country groups. Third, and this is the primary contribution of the paper, I compare the adjustment of country-specific demand shocks in and out of the eurozone. The main finding is that macroeconomic adjustment is not significantly different in EMU and non-EMU countries pre-crisis, but slower in EMU countries in crisis times especially for the labour market. Moreover, almost all of the euro area under-performance in the aftermath of the global financial crisis is explained by the sovereign debt crisis in 2011-2012. The paper also briefly discusses the policy implications of these findings for the institutional reform of EMU.

**Keywords:** EMU, macroeconomic adjustment, exchange rate regime, demand shocks, Walters critique.

**JEL:** E2, E4.

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\*Email [livio.stracca@ecb.int](mailto:livio.stracca@ecb.int). The views expressed in the paper are personal and are not necessarily shared by the European Commission or the ECB. I thank participants in seminars at the ECB, the Central Bank of Ireland and the 19th Public Finance Workshop at the Banca d'Italia, in particular Johannes Lindner, Aitor Erce, Lucio Pench, Arnaud Mehl, Demos Ioannou, Gabriel Fagan, Lucio Pench, Aitor Erce, and Donata Faccia.

PRELIMINARY

# 1 Introduction

As the euro has just celebrated its 20-th birthday and is therefore leaving behind its troubled teenage years, there is now enough empirical evidence to address the question of whether the monetary union in the euro area, and more generally any (irrevocably) fixed exchange rate arrangement, a straightjacket for macroeconomic adjustment, perhaps similar to the Gold Standard of the past centuries. Are the euro area countries really hanging from a "cross of euros" (O'Rourke and Taylor [2013])? Making progress on this question is important for the viability and design of the euro area as a monetary union, and from a global perspective for the optimal design of the international monetary system.

The monetary union in the euro area can be seen as a natural experiment on the role of floating exchange rates for the adjustment to macroeconomic shocks. Outside of the euro area, almost all advanced countries have a floating exchange rate regime.<sup>1</sup> It is therefore very difficult to single out the role of exchange rates for economic developments and adjustment for advanced countries, and the experience of developing countries is of limited usefulness, because the shocks and frictions to which they are subject are not the same. With the establishment of the euro area, a number of advanced countries have irrevocably abandoned floating exchange rates and chosen to centralise monetary policy, for reasons that are essentially geographic and political, hence to a large extent exogenous. There are lessons to be learnt for the international monetary system in the wider world and for international economics more generally.

Focussing more narrowly on the euro area, the question of whether the adjustment to macroeconomic shocks is different from that prevailing in other advanced countries is fundamental for the design of the monetary union, and its viability in the long term. A less smooth adjustment mechanism, for example, may imply the need to develop additional policy instruments, for example more risk sharing within the union. It may therefore speak to the question whether the euro area is sustainable as it is or it has "fatal flaws" (Giavazzi and Wyplosz [2015]).

In this paper I systematically compare macroeconomic performance and adjustment in euro area countries and in a control group of advanced countries with floating exchange

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<sup>1</sup>Denmark is of course one exception, but for the purpose of this study I consider it as a euro area country.

rates, over the 1998-2017 period - the first two decades of the euro. I provide three types of evidence. First, I simply compare developments in key macroeconomic variables in the two groups, looking at both group averages and standard deviations. The question I want to address in this part is whether picking one euro area country at random is essentially the same as picking another advanced country in terms of macroeconomic performance over time. Second, I look at the vulnerability of EMU and non EMU countries to the global financial crisis, both at its peak (2008-2009) and in the aftermath (2010-2017). Was a typical euro area country harder hit by the global financial crisis, arguably a global shock and hence a neutral benchmark?

Finally, and this is the primary contribution of the paper, I compare the adjustment to a *country-specific* demand shock in EMU and non-EMU countries. Previous criticism of EMU has emphasised the risk surrounding asymmetric demand shocks in particular. Because a demand shock pushes output and inflation in the same direction, it normally requires a strong monetary policy response and it may hence make the absence of an independent monetary policy particularly hardly felt.

A traditional criticism of macroeconomic adjustment in EMU indeed builds on the so-called "Walters critique": an asymmetric shock raising (decreasing) inflation is normally met by a higher (lower) nominal interest rate, but the ECB sets monetary policy for the euro area as a whole, not for individual countries. Hence the short term rate does not react (or reacts much less than in the counter-factual to the shock); this in turn drives the real interest rate down (up), which has further expansionary (contractionary) effect, and so forth. This mechanism may be compounded and aggravated by booms and busts in credit and real estate prices. Market rigidities and uncorrelated shocks make the adjustment more difficult. Eventually, the country ends up with an appreciated real exchange rate, and a costly internal devaluation may become necessary. To the author's knowledge, this paper is the first to formally test for the Walters critique and to focus on the adjustment to asymmetric demand shocks in the euro area and elsewhere. In particular I want to address two questions, (i) is the adjustment to asymmetric demand shocks slower in the euro area than in comparable countries, and (ii) is this plausibly due to a more muted reaction by the short term interest rate than in the control group?

One important caveat to keep in mind that a monetary union is not quite the same as a fixed exchange rate arrangement, and indeed previous monetary unions are also

a poor guide for EMU (see O'Rourke and Taylor [2013]). Therefore, the experience of the euro area is not necessarily insightful for pegs more generally. EMU is equipped with specific institutions such as the EU fiscal rules (Stability and Growth Pact) and the common monetary policy, which also implies a role for TARGET2 imbalances as an adjustment mechanism, somewhat similar to, but not the same as, the use of foreign exchange reserves in pegs. While these qualifications need to be acknowledged, I do not think that they are really material for macroeconomic adjustment. As far as EMU fiscal rules are concerned, they have hardly constrained budgetary policies in EMU countries (see Ioannou and Stracca [2014]). The role of TARGET2 imbalances is still not well understood despite recent research (Cecchetti et al. [2012]; Fagan and McNelis [2014]) and may in essence not be very different from the use of foreign reserves in pegs, although there are some important institutional differences. Overall, a comparison should not be taken at face value but that it is still instructive and important.

The evidence shown in this paper identifies four main results. First, the performance of the euro area countries has not been very different from that of other advanced countries, and so appears to be macroeconomic adjustment, in the pre-crisis period. Second, however, the effects of the global financial crisis have taken longer to heal for the euro area countries, in particular for the unemployment rate, which is to a large extent due to the sovereign debt crisis in 2011-12 and its aftermath (relevant particularly for inflation). Third, there is some evidence that the adjustment mechanism to asymmetric demand shocks works less well and more slowly in the euro area than in a control group of advanced countries with floating exchange rates and that the lack of a monetary policy reaction to local shocks could contribute to this difference, but we should also keep in mind that this is (i) largely confined to the post crisis period and (ii) the findings are not fully consistent with the Walters critique. In particular, I find no evidence for the perverse spiral of falling real interest rate and rising inflation exacerbating the initial shock that is the hallmark of that critique. Finally, I find that there are also significant differences *within* the euro area, with a lack of convergence in the quality of institutions over time and lasting imbalances in the real effective exchange rate and the current account balance, only corrected (at high cost) in the most recent years. In terms of adjustment to shocks, I find that inflation and the unemployment rate respond in a more sluggish way in the peripheral countries, which could be due to higher product

and labour market rigidities in these countries.

This paper mainly relates to three strands of previous literature. On the international side, a substantial literature exists on the costs and benefits of floating exchange rates. The classic view of Milton Friedman is that flexible exchange rates facilitate macroeconomic adjustment, and in particular external adjustment (correction of current account imbalances). Subsequent literature has not reached a consensus on whether this is indeed the case. On the theory side, it has been pointed out in several contributions that the adjustment-enhancing role of flexible rates hinges on whether prices are set in local currency or producer currency; the currency denomination of foreign assets and liabilities also plays an important role (see Gourinchas and Rey [2007]). The empirical literature is also divided. Some contributions tend to support Friedman's view: for example Broda [2004] for terms of trade shocks, and more recently Ghosh et al. [2014]. On the opposite side, the "Mussa puzzle" stipulates that real exchange rates are driven by nominal exchange rates rather than the other way round (Mussa [1986]; Obstfeld and Rogoff [2000]). Chinn and Wei [2013] surmise that the benefits of flexible exchange rates for external adjustment are a "faith-based initiative", not supported by the evidence: the exchange rate regime does not matter for the adjustment of the current account. Rose [2011] points to the substantial measurement problems in identifying the exchange rate regime<sup>2</sup> and to the fact that the choice of the regime seems largely inconsequential for economic performance. Rose, however, does not really look at adjustment to domestic shocks, which is the main focus in this paper. As far as the euro area is concerned, Martin Berka and Engel [2012] find that real exchange rates are more correlated with productivity (fundamentals) in the euro area than elsewhere, suggesting that floating exchange rates are not necessarily helpful from that perspective.

For the euro area specifically, empirical work has emphasised a longer adjustment for current account imbalances (Hermann and Jochem [2013]; Berger and Nitsch [2014]); more persistent inflation differentials (Honohan and Lane [2003]); real exchanges rate displaying less reaction to country specific shocks under EMU, but also less persistence (Biroli et al. [2012]). Chen et al. [2013] find that external factors matter for intra euro area imbalances. In a model based analysis, Brzoza-Brzezina et al. [2014] find that

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<sup>2</sup>Note that this is an additional argument for looking at the experience of euro area countries, whose exchange rate regime certainly cannot be in doubt.

Poland would have had much higher business cycle volatility had it joined the euro area in 2007. In an estimated DSGE model, Enders et al. [2013] find that the euro has not changed business cycle volatilities (apart from a strong reduction in real exchange rate volatility), but has changed the balance between domestic shocks (which have diminished in importance) and cross country spill-overs (which have increased). I do not address cross country spill-overs of shocks in this paper, but it would be a quite straightforward extension of this research.

Finally, there is also an important literature on the benefits and costs of monetary unions more generally. One traditional arguments in favour of monetary unions is the ability to eliminate or reduce an inflation bias (see, e.g., Alesina and Barro [2002]). More recently, the literature has focused on the adjustment mechanism in and out of a monetary union. For example, Fahri and Werning [2011] emphasise that the lack of nominal exchange rate flexibility in combination with price rigidity prevents the optimal adjustment in the terms of trade. More recently, Groll and Monacelli [2016] show that a fixed exchange rate implies a sub-optimally inertial adjustment in the terms of trade and inflation under commitment, but this feature actually turns out to be helpful and welfare-improving if commitment is impossible. The inertia in the terms of trade works like an expectation-management feature that brings the economy closer to the commitment case. Corsetti et al. [2011] look, among other things, at the role of exchange rate pass-through for the relative desirability of flexible and fixed exchange rates. Cook and Devereux [2011] consider the role of the zero bound in influencing the relative desirability of fixed and flexible exchange rate arrangements.

The paper is organised as follows. Section 2 describes the data. Section 3 presents the unconditional evidence, and Section 4 the conditional evidence (vulnerability to the global financial crisis and adjustment of country specific demand shocks). Section 5 concludes.

## 2 Data

The empirical analysis is conducted on a panel of countries using both quarterly and annual data. The selection of countries is shown in Table 1. I focus on countries that have been in the euro area since at least 2001 plus Denmark, which I consider as a euro

<i>Euro area</i>	<i>Non-euro area EU and EEA countries</i>	<i>Other advanced countries</i>
<i>"Core" countries:</i> Austria, Belgium, Denmark (euro peg) Finland, France, Germany, Luxembourg, Netherlands; <i>"Peripheral" countries:</i> Greece, Ireland, Italy, Portugal, Spain	UK, Sweden, Switzerland, Norway and Iceland	USA, Australia, New Zealand, Japan, Canada, Korea

Table 1: Country sample.

<i>Variables</i>	<i>Data sources</i>
Real GDP, Unemployment rate, Current Account, CPI, Stock price, GDP deflator	OECD Main Economic Indicators; national sources
House price index	OECD House Price Database; BIS Property Price database; national sources
NEER, REER	IMF International Financial Statistics
Government Bond Yield, Short term interest rate	OECD; national sources
Credit to the private sector	BIS
Banking crises	Laeven and Valencia (2012)
Quality of institutions: Composite risk rating	ICRG

Table 2: Data sources.

area country for the purpose of my analysis because it has been pegged to the euro since its introduction. Countries in the control group have all had floating exchange rates for at least most of the time since 1999. The sample period goes from 1998 to 2017. Table 2 contains information on the data sources and the definition of the variables.

### 3 Unconditional evidence

I begin by showing the unconditional evidence, which is essentially comparing macroeconomic performance (averages and within-group standard deviations at each point in time) in EMU and non-EMU countries. Some of the level variables are re-scaled so that they are equal to 100 in 1998 in both the euro area and the relevant control group. This should help illustrating the relative performance between groups.

In Figure 1 I compare euro area countries with all other advanced countries in the control group; Figure 2 shows the same for annual data. The figures show that euro area



countries have kept up well with the comparison group until the global financial crisis, but have tended to under-perform since then; this is particularly visible for real GDP and especially the unemployment rate (where the cross sectional standard deviation is also higher in the euro area than in the control group). Real GDP growth was in line with the control group until the sovereign debt crisis, where it instead clearly under-performs in euro area countries. Predictably, euro area countries, being in a monetary union, show much less dispersion than the control group in the short term interest rate and in the nominal effective exchange rate. Finally, the evidence for the long term rate is well-known but peculiar: the dispersion is much lower for euro area countries before the crisis, but is higher thereafter, in particular in the period of the sovereign debt crisis (results are quantitatively less strikingly but still qualitatively the same if Greece is excluded). Turning to the annual frequency variables, the real house price tends to grow at a similar rate in the euro area as in the control group in the pre crisis period, but it has a stronger and faster recovery in the latter in the post crisis period. While there appears to have been a higher number of banking crises in the euro area countries than in the control group, there is no indication that euro area countries are more prone to booms and busts in credit and house prices. Finally, it is striking that there appears to have been no convergence in the quality of institutions, both within the euro area and between the euro area and the control group.

In Figures 3 (quarterly data) and 4 (annual data) I compare the euro area only to the non-euro area European neighbors, in the EU and the EEA. On the whole, the performance of these countries is more similar to that of the euro area countries, which is not surprising, but qualitatively the differences are broadly the same as for the whole group of non-euro area advanced countries.

Finally, in Figures 5 (quarterly data) and 6 (annual data) I compare macroeconomic performance in the euro area so-called "core" and "peripheral" countries. Here some interesting results emerge, although on the whole they are certainly not surprising. First, the CPI first grows faster in the peripheral countries, but in the latter part of the sample it slows down markedly to ensure convergence in level towards the CPI of the core. The development of the REER is the mirror image of the relative CPI developments. Long term rates were practically the same before the crisis, but they diverged markedly in the wake of the global financial crisis and particularly in the sovereign debt crisis. There

is also clearer evidence of a boom-bust cycle in the real house price in the peripheral countries. Finally, the current account balance was much more negative in the peripheral countries in the early years of the euro, but has closed the gap with the core countries in the most recent years. It is also interesting to note that the gap in the current account balance has been closed entirely due to the adjustment of the deficit countries, which confirms the well-known stylised fact that surpluses are more persistent and are seen as less urgent problems by policy-makers.

Overall, for the most of the variables the performance of the euro area countries is not that different from that of other advanced countries. However, the scars of the crisis have taken longer to heal for the euro area countries, in particular for the unemployment rate, and the effects of the euro sovereign debt crisis is clearly visible for some variables. There are also significant differences within the euro area, with a lack of convergence in the quality of institutions and lasting imbalances in the real effective exchange rate and the current account balance.

## 4 Conditional evidence

In this section I turn to analyse the conditional evidence, namely (i) the vulnerability of EMU countries to the global financial crisis (Section 4.1) and (ii) adjustment to asymmetric demand shocks (Section 4.2). Before going into the details of the analysis, it is useful to recap the main results. The evidence shown leads to four main conclusions. First, the performance of the euro area countries has not been very different from that of other advanced countries, and so appears to be macroeconomic adjustment, in the pre-crisis period. Second, however, the effects of the global financial crisis have taken longer to heal for the euro area countries, in particular for the unemployment rate, which is to a large extent due to the sovereign debt crisis in 2011-12 and its aftermath (relevant particularly for inflation). Third, there is some evidence that the adjustment mechanism to asymmetric demand shocks works less well and more slowly in the euro area than in a control group of advanced countries with floating exchange rates and that the lack of a monetary policy reaction to local shocks could contribute to this difference, but we should also keep in mind that this is (i) largely confined to the post crisis period and (ii) the findings are not fully consistent with the Walters critique. In particular, I

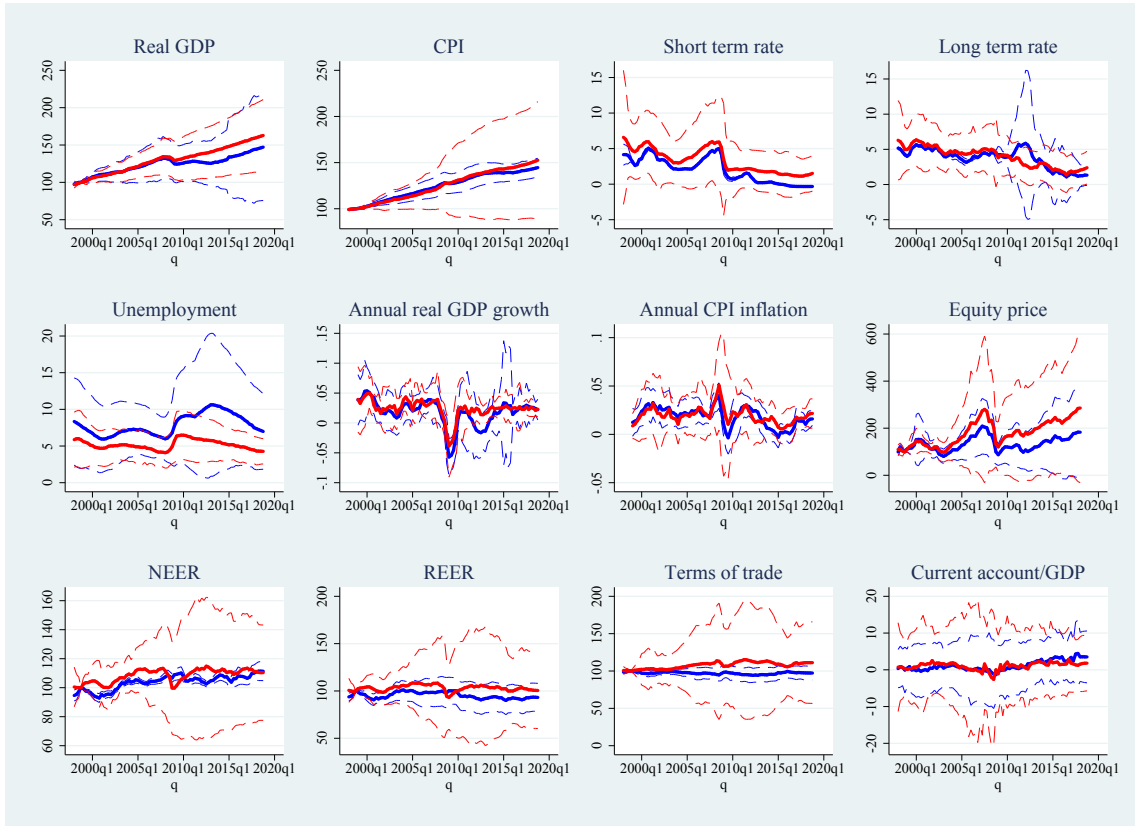


Figure 1: The figures reports within-group mean and cross sectional standard deviations of each variable in euro area countries (blue lines) and in other advanced countries (red lines). See Table 1 for the country list.

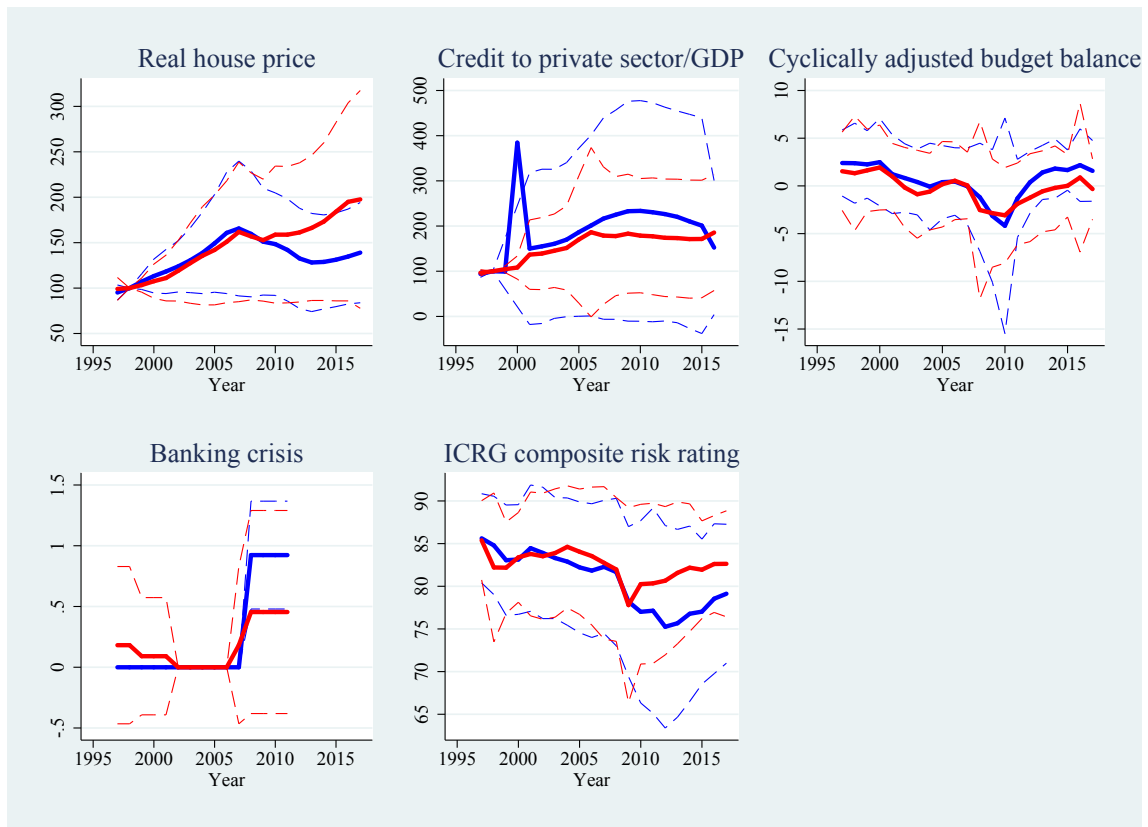


Figure 2: The figures reports within-group mean and cross sectional standard deviations of each variable in euro area countries (blue lines) and in other advanced countries (red lines). See Table 1 for the country list.

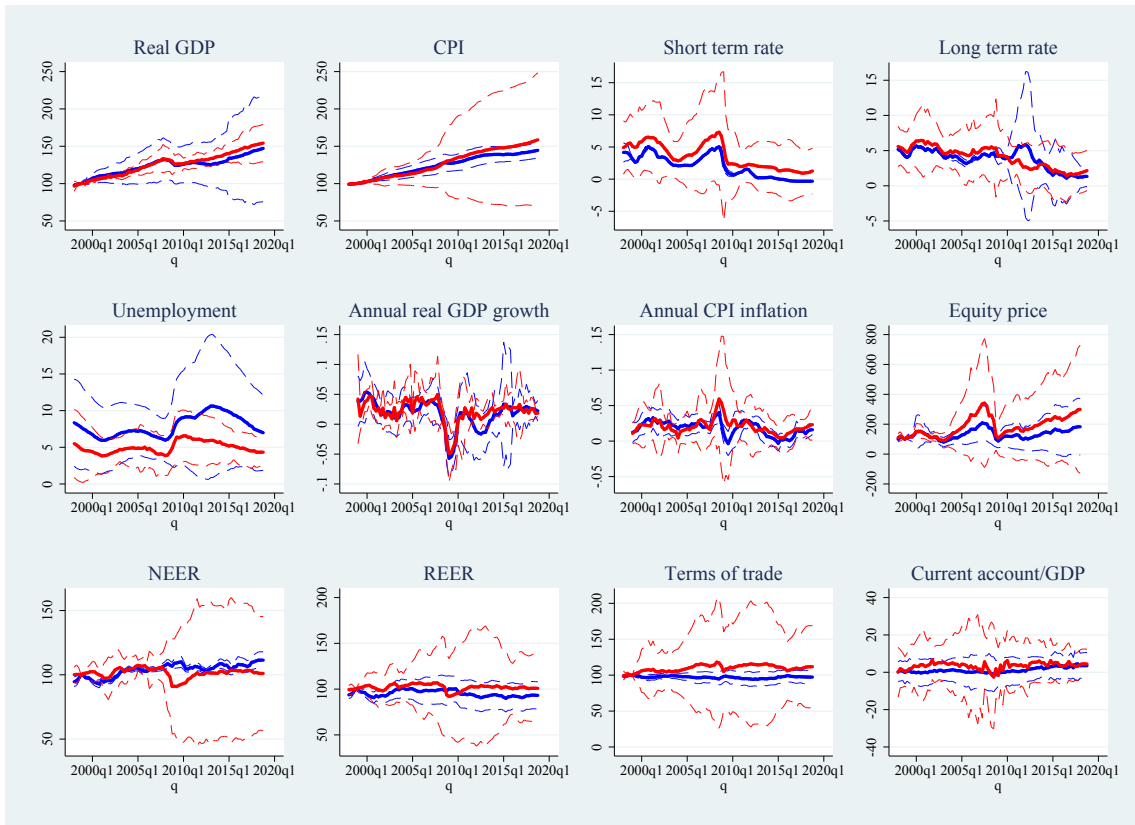


Figure 3: The figures reports within-group mean and cross sectional standard deviations of each variable in euro area countries (blue lines) and in other advanced countries in the EU and EEA (red lines). See Table 1 for the country list.

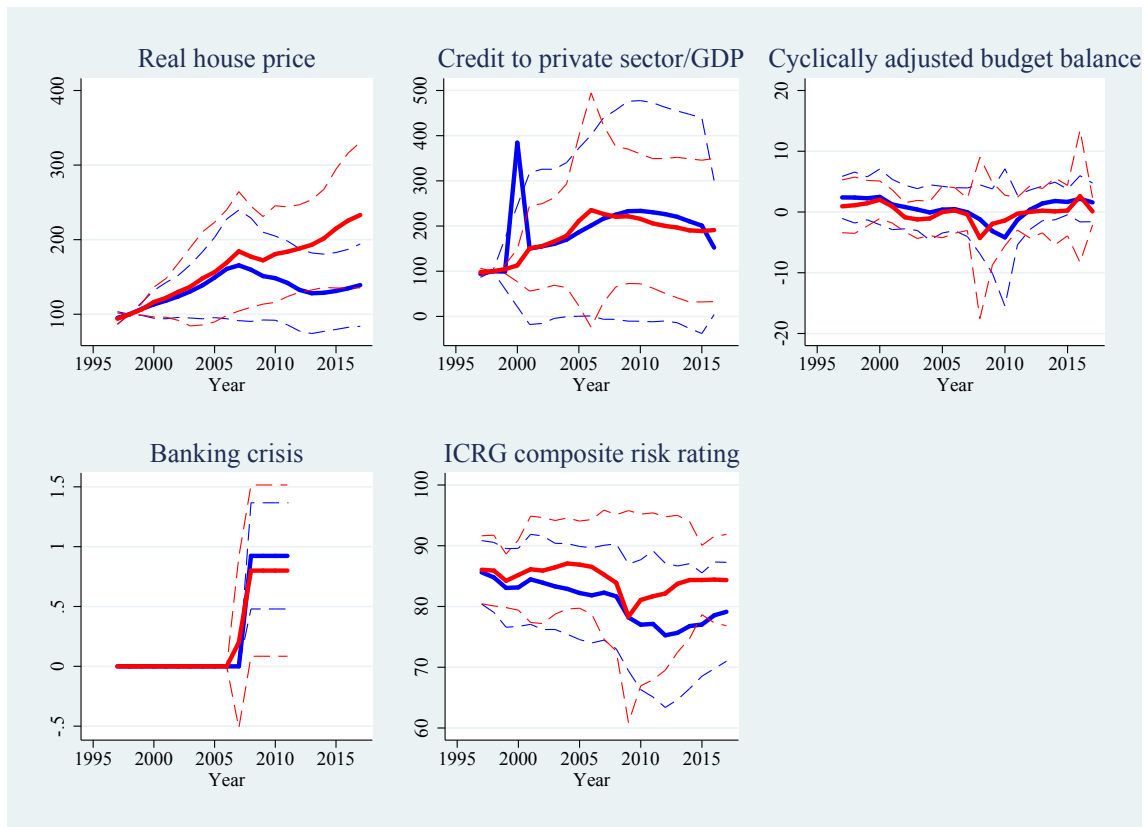


Figure 4: The figures reports within-group mean and cross sectional standard deviations of each variable in euro area countries (blue lines) and in non-euro area EU and EEA countries (red lines). See Table 1 for the country list.

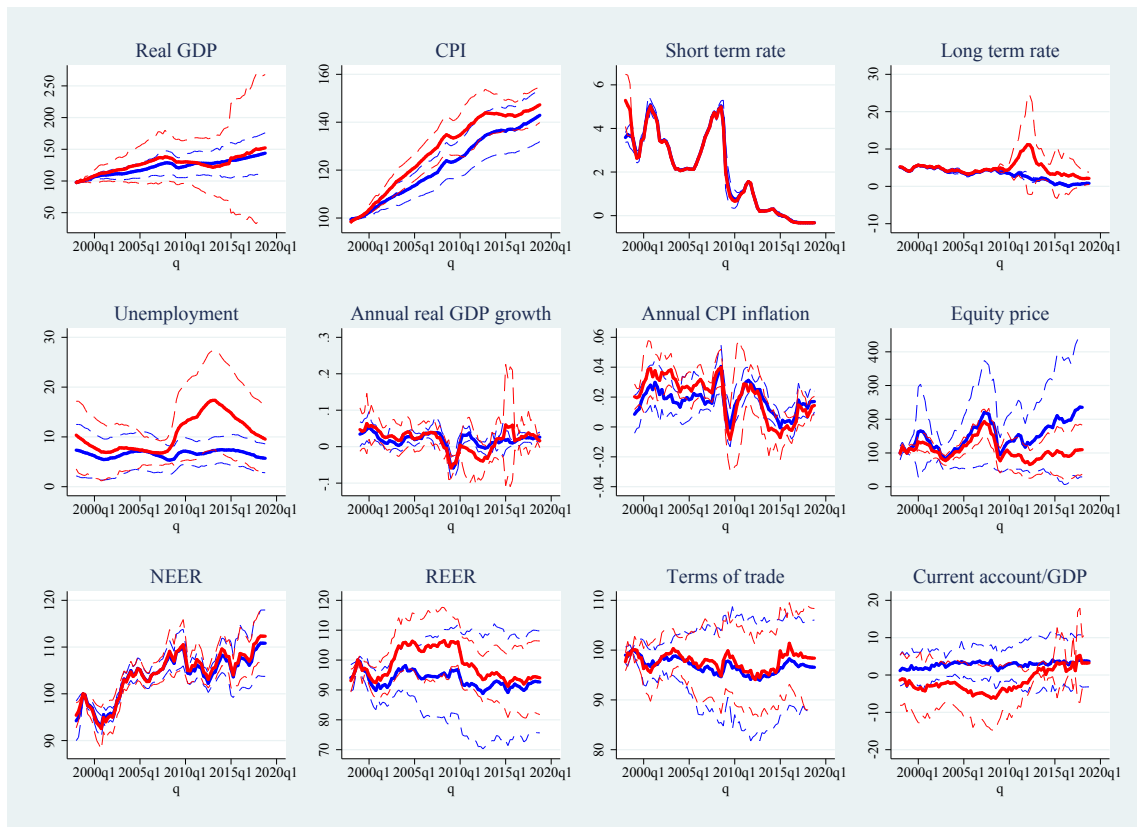


Figure 5: The figures reports within-group mean and cross sectional standard deviations of each variable in euro area "core" countries (blue lines) and in euro area "peripheral" countries (red lines). See Table 1 for the country list.

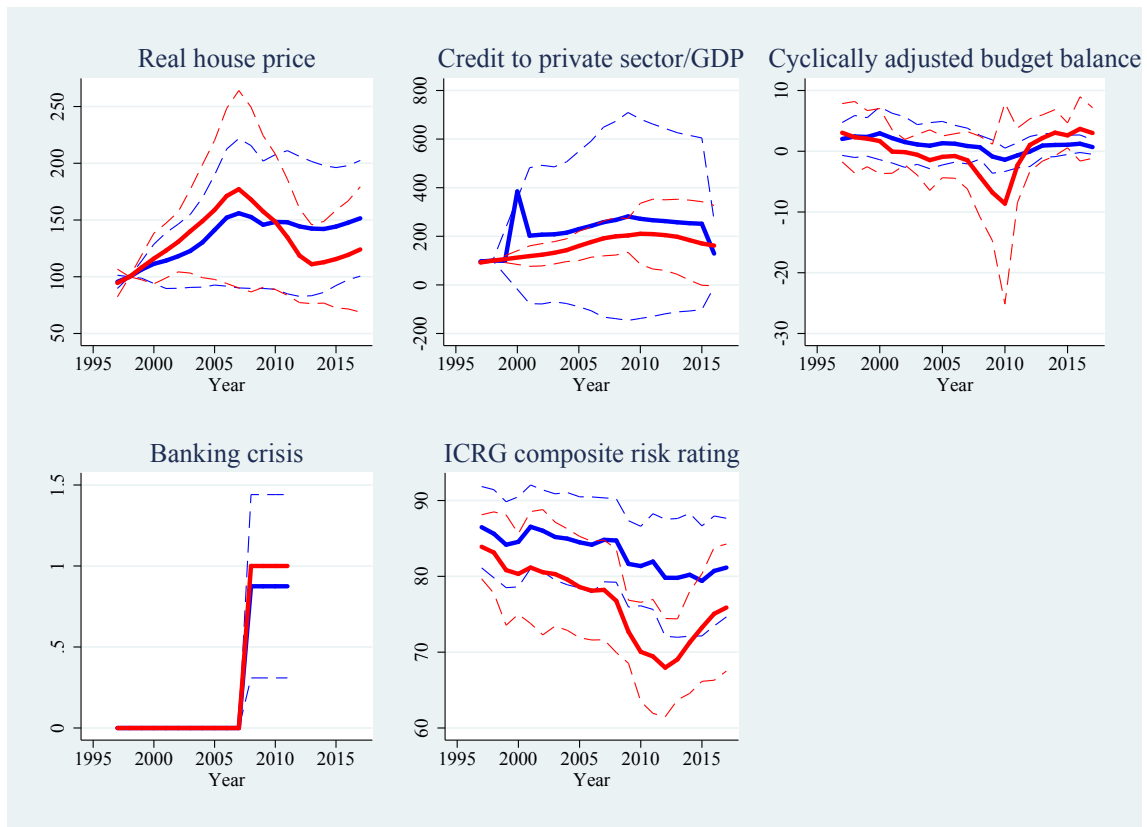


Figure 6: The figures reports within-group mean and cross sectional standard deviations of each variable in euro area "core" countries (blue lines) and in euro area "peripheral" countries (red lines). See Table 1 for the country list.



find no evidence for the perverse spiral of falling real interest rate and rising inflation exacerbating the initial shock that is the hallmark of that critique. Finally, I find that there are also significant differences *within* the euro area, with a lack of convergence in the quality of institutions over time and lasting imbalances in the real effective exchange rate and the current account balance, only corrected (at high cost) in the most recent years. In terms of adjustment to shocks, I find that inflation and the unemployment rate respond in a more sluggish way in the peripheral countries, which could be due to higher product and labour market rigidities in these countries.

#### 4.1 Vulnerability to the global crisis

One important question in evaluating the experience of euro area countries is whether they have been on average more vulnerable to the global financial crisis. While it may be expected that they have been more affected by the euro sovereign debt crisis which saw the euro area as its epicentre, the global financial crisis is a more neutral benchmark and hence a more meaningful comparison. I therefore run the following panel regression,

$$x_{it} = \alpha_i + \beta D_t + \gamma D_t D_{EA,it} + \epsilon_{it} \quad (1)$$

where  $x$  is the variable of interest,  $\alpha_i$  are country fixed effects,  $D_t$  a dummy for the global financial crisis,  $D_{EA,it}$  a dummy on whether a country belongs to the euro area. The coefficient of interest is  $\gamma$ ; it tells us whether euro area countries are on average more vulnerable to a global shock. I consider two definitions of the global financial crisis, namely a dummy taking value 1 in 2008 and 2009 and zero otherwise (short definition) and a dummy taking value 1 from 2008 onwards, hence also including the aftermath of the crisis (long definition). Results are reported in Table 3 below for the short definition of crisis, and in Table 4 for the long definition.

All countries experienced a negative shock from the global financial crisis in the narrow definition (Table 3), which is visible in the large fall in annual real GDP growth (though not in unemployment, the rise of which came with a delay). There is no additional effect that is specific to euro area countries from the global financial crisis, neither positive nor negative. The differences are more marked if I consider also the aftermath of the global crisis (Table 4). There is a statistically significant difference between EMU countries and the control group, with lower real GDP growth and higher unemployment

	(1) Annual real GDP growth	(2) Unemployment	(3) Annual CPI inflation	(4) Current ac- count/GDP	(5) REER	(6) Change in the short term rate	(7) Change in the long term rate
GFC	-0.028*** (0.003)	-0.182 (0.223)	0.009* (0.005)	-1.450 (0.959)	-0.040 (0.024)	-0.322*** (0.055)	0.775*** (0.184)
GFC*Euro area	-0.006 (0.006)	-0.680* (0.384)	-0.008 (0.005)	-0.330 (1.206)	0.087*** (0.026)	0.018 (0.056)	-0.195 (0.364)
Observations	2,000	2,016	2,000	2,100	2,100	2,075	2,075
R-squared	0.152	0.010	0.026	0.025	0.018	0.044	0.015
Number of coun- tries	25	24	25	25	25	25	25

Table 3: Panel regression: Vulnerability to the global financial crisis (GFC), dummy variable for 2008-2009. Robust standard errors in parenthesis. Estimates are based on quarterly data, 1998-2017, 25 countries (see Table 1).

	(1) Annual real GDP growth	(2) Unemployment	(3) Annual CPI inflation	(4) Current ac- count/GDP	(5) REER	(6) Change in the short term rate	(7) Change in the long term rate
GFC Long	-0.014*** (0.002)	0.338 (0.274)	-0.002 (0.002)	0.387 (0.849)	-0.052 (0.061)	-0.059 (0.049)	-2.065*** (0.179)
GFC Long*Euro area	-0.005 (0.004)	1.366 (0.909)	-0.009*** (0.003)	1.019 (1.250)	0.024 (0.063)	-0.017 (0.053)	0.442 (0.407)
Euro area sovereign debt crisis	-0.013* (0.007)	0.949 (0.586)	0.015*** (0.001)	-0.961** (0.423)	-0.017** (0.006)	-0.001 (0.002)	2.537*** (0.808)
Observations	2,000	2,016	2,000	2,100	2,100	2,075	2,075
R-squared	0.126	0.119	0.109	0.023	0.039	0.005	0.281
Number of countries	25	24	25	25	25	25	25

Table 4: Panel regression: Vulnerability to the global financial crisis (GFC), long definition, dummy variable for 2008-2017. The dummy for the euro sovereign debt crisis takes value 1 from 2011:Q1 to 2012:Q3. Robust standard errors in parenthesis. Estimates are based on quarterly data, 1998-2017, 25 countries (see Table 1).

rate in the euro area countries, and a lower level of the short term interest rate, if I do not include the control for the sovereign debt crisis (not shown for brevity). The differences however are largely eliminated if I control for the sovereign debt crisis in the euro area (2011-2012), although inflation is lower in a statistically significant way in the euro area countries (possibly reflecting the delayed effect of the sovereign debt crisis) . Overall, this exercise tells us that the euro area under-performance vs. the control group is mostly concentrated to the post crisis period, rather than the peak of the crisis, and is largely captured by the sovereign debt crisis and its aftermath.

## 4.2 Adjustment to demand shocks

### 4.2.1 Estimating demand shocks

As noted in the Introduction, the literature on the benefits and costs of the monetary union has long emphasised that adjustment to idiosyncratic demand shocks is arguably the most challenging element of macroeconomic adjustment in EMU countries. Asymmetric demand shocks push output and inflation in the same direction; in the absence of a reaction of the short term interest rate, the rise in inflation leads to a fall in the real interest rate, which is itself further expansionary. One may conjecture, therefore, that in the absence of independent monetary policy the adjustment of asymmetric demand shocks is significantly slower or even impaired in EMU countries. To address this question, I proceed in two steps. I first identify country-specific demand shocks, i.e. shocks that (i) have demand-type effects on domestic variables and that (ii) are weakly correlated across countries, both within EMU and outside it. Note that I make no assumption, in the identification of the shocks, on their amplitude and persistence, which is rather the *outcome* of this analysis. Second, I regress a number of variables of interest in EMU and non-EMU countries on the estimated shocks using local projections.

*Identification of country-specific demand shocks.* I estimate country-specific VAR models, including only two variables: the log real GDP and the log GDP deflator, with 6 quarterly lags. For all countries rather than the US, I also include US real GDP growth, GDP deflator inflation and the short term interest rate, in order to cater for global factors. I impose the most basic identification scheme, just assuming that demand shocks lead to a contemporaneous rise in real GDP and the price level, which

is a restriction satisfied in most if not all macroeconomic models.<sup>3</sup>

One possible concern in this approach is that shocks estimated in the euro area countries might be more correlated, because on average euro area countries are more interconnected than most non-EMU country pairs, e.g. in terms of trade and financial links. There are two considerations to be made here. First, the estimated shocks are (i) not highly correlated cross country in general and (ii) on average not more correlated between euro area countries.<sup>4</sup> Therefore, it is likely that the identified demand shocks are indeed largely *asymmetric*. Second, and most important, I include time dummies in the empirical model, so all common factors (including the possible common component of demand shocks) are controlled for, and the estimation should capture the reaction of variables to the truly *idiosyncratic* element of the demand shock.

In the following, I indicate with  $Demand_{it}$  the estimated demand shocks, where  $i$  indicates the country,  $t$  the quarter.

#### 4.2.2 Local projections

In the second step, after having estimated the shocks  $Demand_{it}$ , I regress a number of variables on them using panel local projections (Jorda [2005]):

$$x_{i,t+h} = \alpha_i + \lambda_t + \beta_h Demand_{it} + v_{i,t+h} \quad (2)$$

where  $h$  is the horizon in quarters,  $h = 0, \dots, 16$ . This same equation is estimated for all countries as well as for all country groups (euro area, core and peripheral countries, non-euro area EU and EEA countries, and other advanced countries). Also note that I re-scale the estimated demand shock so that the impact on real GDP is 1% in the same

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<sup>3</sup>Note that my identification is different from Bayoumi and Eichengreen [2017] and Campos and Macchiarelli [2016] who estimate demand and supply shocks in EMU countries according to whether they are temporary or permanent. Here I want to allow for the possibility that demand shocks are very persistent due to a supposed lack of adjustment mechanism, and therefore the persistence of demand shocks should be an outcome of the analysis, not part of the assumptions. I also experimented with long-run restrictions but the results were less satisfactory as the shocks were less strongly correlated with most macroeconomic variables I consider. Moreover, as noted by Taylor [2004], long-run restrictions do not uniquely identify demand shocks and additional restrictions, notably sign restrictions, are typically needed.

<sup>4</sup>The full table with the pairwise correlations of the estimated shocks is available in the Online Appendix. Note that most correlations are below 0.2, although some specific country pairs are highly correlated, e.g. Spain and Portugal.

quarter. Observe that I include both country and time fixed effects in the model, so the estimates can be interpreted as diff-in-diff.

### 4.2.3 Baseline results

*Results for all countries.* Figure 7 reports the estimated effects of country-specific demand shocks raising real GDP by 1% on impact, for the whole set of countries (EMU and control group). Overall, the effects are consistent with the priors on the propagation of a typical expansionary demand shock. The shock leads to an expansion of real GDP, to a gradual rise in the CPI and in the short term interest rate, and to a fall in the unemployment rate. It also leads to a deterioration of the current account over time, though not in the short term. Note that, in the whole country group (which includes countries in a monetary union and countries with floating exchange rates) I find no systematic reaction of the NEER to the demand shock, and a depreciation of the REER (mainly on account of the price effects). Generally speaking, the effects are economically significant and plausible in terms of size.

*EMU vs. non-EMU countries.* Figure 4.2.3 reports the core result of this paper as I compare the effects of a demand shock in EMU countries (blue lines) and non-EMU countries (red lines). A main result is that the reaction of real GDP and the unemployment rate is significantly stronger and more persistent in the euro area countries than in the control group, possibly reflecting a slower adjustment mechanism. The reaction of the CPI, however, is similar in the two country groups. I find that the short term interest rate increases only in the control group but not in the euro area, consistent with the view that the ECB cannot, and does not, react to country-specific developments. Although this evidence is consistent with the Walters critique, note again that price developments are not statistically significantly different, implying that there is no evidence of a perverse behaviour in the real interest rate that is at the core of the Walters critique. As to the exchange rate, I find that the NEER and REER *depreciate* on impact in the control group, whereas they remain unchanged in the euro area countries (which is, of course, unsurprising for the NEER given that the shocks are idiosyncratic). Overall, there is evidence that the adjustment mechanism to asymmetric demand shocks works less well in the euro area and that the lack of a monetary policy reaction could be an element of that difference, but at the same time I do not find all the elements tradition-

## All countries

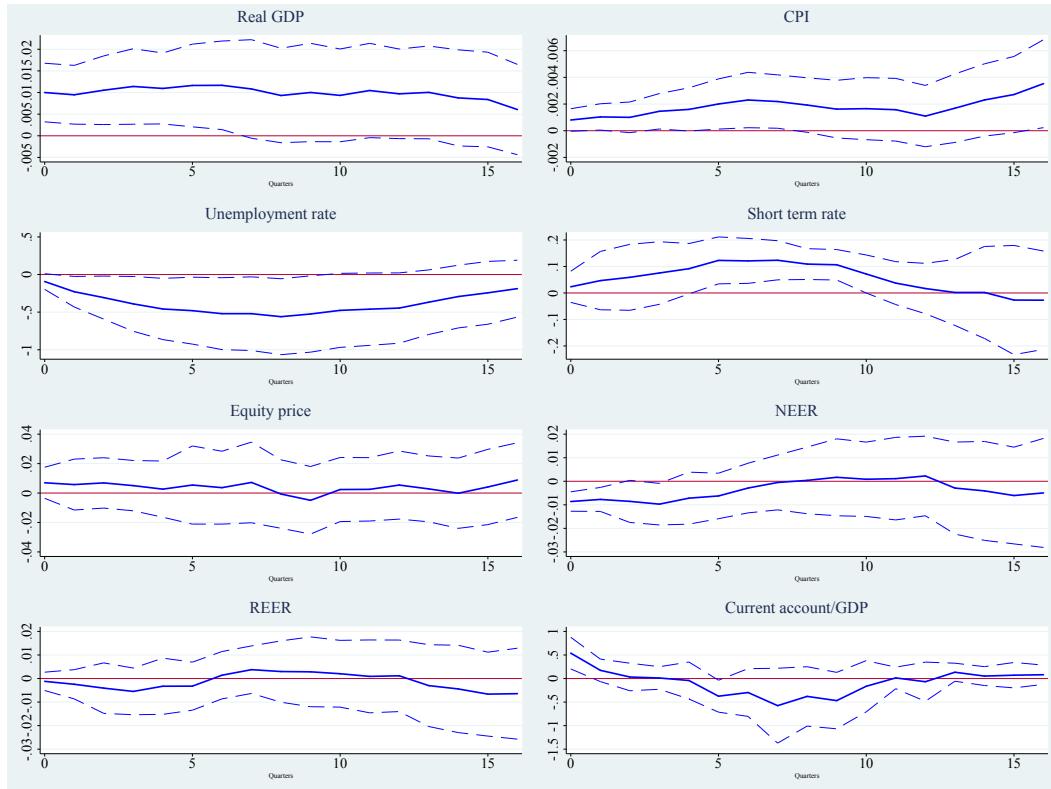
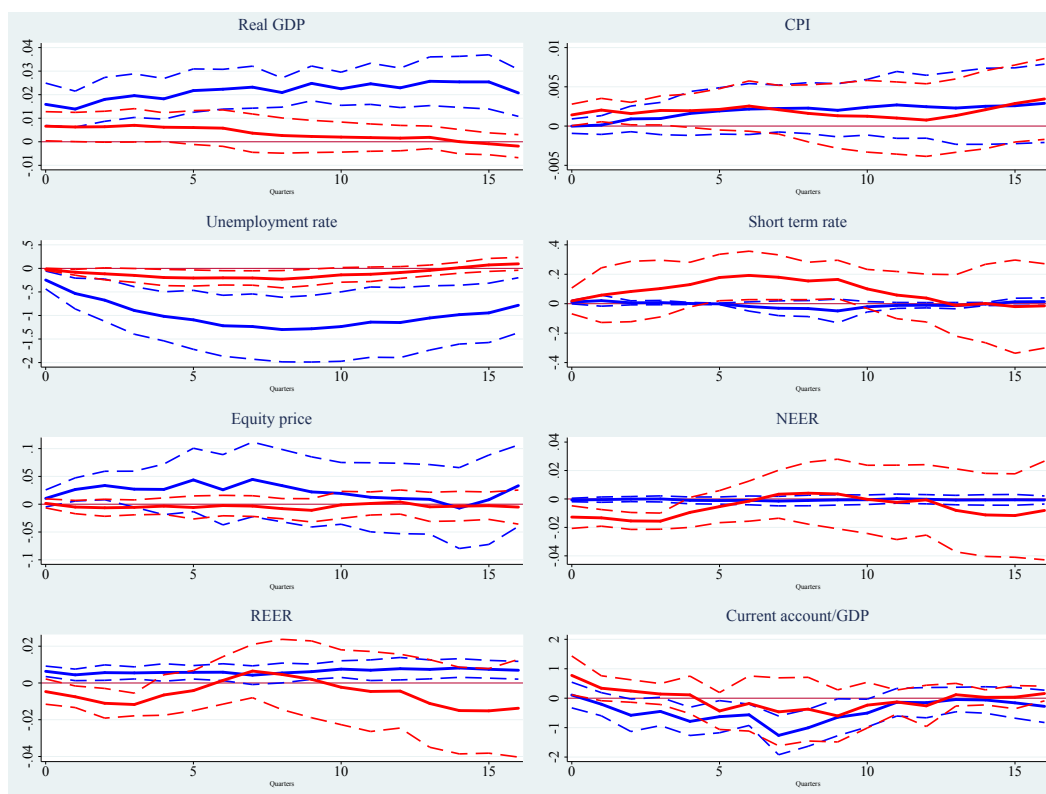


Figure 7: The figure reports impulse responses obtained with the local projections described in Section 4.2.2; sample period 1998Q1 - 2017 Q4. The estimates refer to the whole country group, including both EMU and non-EMU countries. Confidence bands are at the 10% significance level.

## Euro area vs. other advanced countries



The figure reports impulse responses obtained with the local projections described in Section 4.2.2; sample period 1998Q1 - 2017 Q4. Confidence bands are at the 10% significance level. Euro area countries are shown in blue lines, the control group (all other advanced countries in Table 1) in red lines.

ally associated to the Walters critique, in particular the perverse spiral of falling real interest rate and rising inflation that exacerbates the initial shock.

### 4.2.4 Comparing normal and crisis times

One important question arising from the unconditional analysis is whether differences between EMU and non-EMU countries are visible at all times or only in crisis times. Due to the nature of the exercise I cannot single out the peak of the global financial crisis, as this would give us too few time series observations. However, I can at least split the sample between the pre- and post-2007 sample. This is what I do in this section, where I show results for the 2007-2017 sample (Figure 8) and for the pre-crisis sample (Figure 9). The interesting finding of this exercise, and consistent with the unconditional

## Euro area vs. other advanced countries, 2007-2017

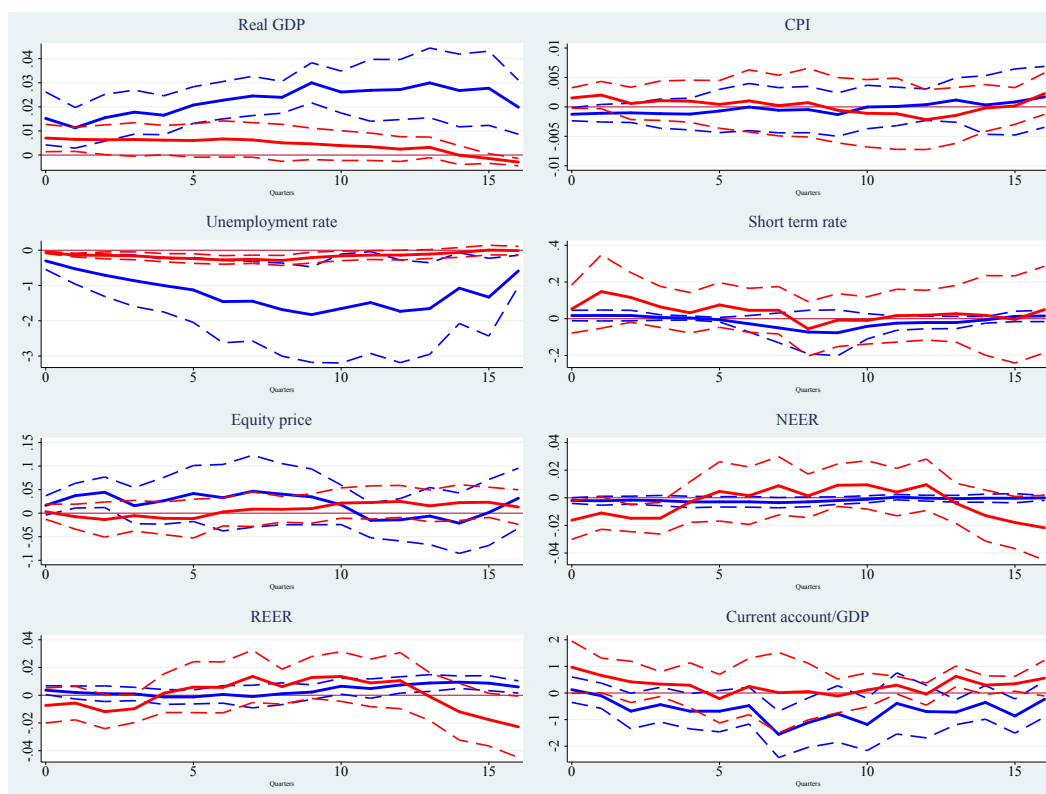


Figure 8: The figure reports impulse responses obtained with the local projections described in Section 4.2.2; sample period 2007Q3 - 2017 Q4. Confidence bands are at the 10% significance level. Euro area countries are shown in blue lines, the control group (other advanced countries; see Table 1) in red lines.

evidence, is that most of the differences highlighted in the comparison between the euro area and the control group pertain to the crisis and post-crisis period, whereas differences are statistically insignificant in the pre-crisis period. Together with the unconditional evidence, this result strongly suggests that the crisis has highlighted the vulnerability of macroeconomic adjustment in EMU countries that was not visible in "normal" times. At the same time, one should avoid reading too much in this exercise as the degrees of freedom are severely reduced in the time dimension, suggesting caution in interpreting the results.

*Benchmarking against non-euro area European countries.* In Figure 10, I conduct the same exercise of comparing euro area countries with a control group, but this time taking



## Euro area vs. other advanced countries, 1998-2007

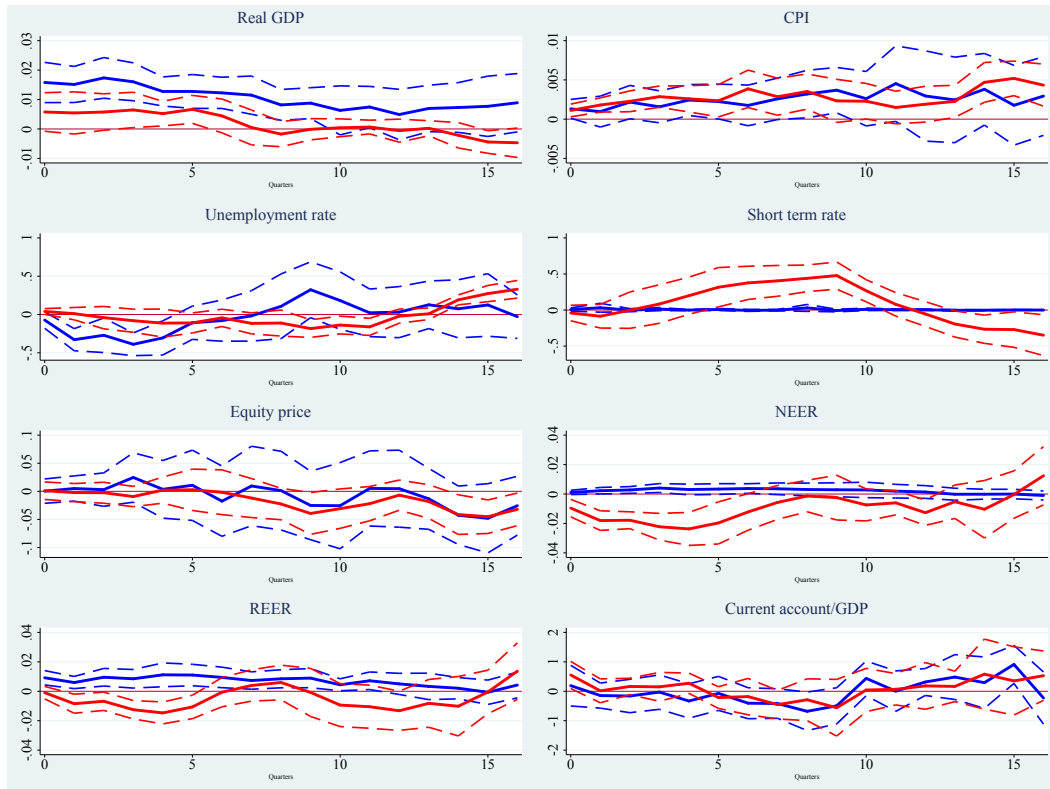


Figure 9: The figure reports impulse responses obtained with the local projections described in Section 4.2.2; sample period 1998:Q1 - 2007:Q2. Confidence bands are at the 10% significance level. Euro area countries are shown in blue lines, the control group (other advanced countries; see Table 1) in red lines.

## Euro area vs. EU and EEA non-euro advanced countries

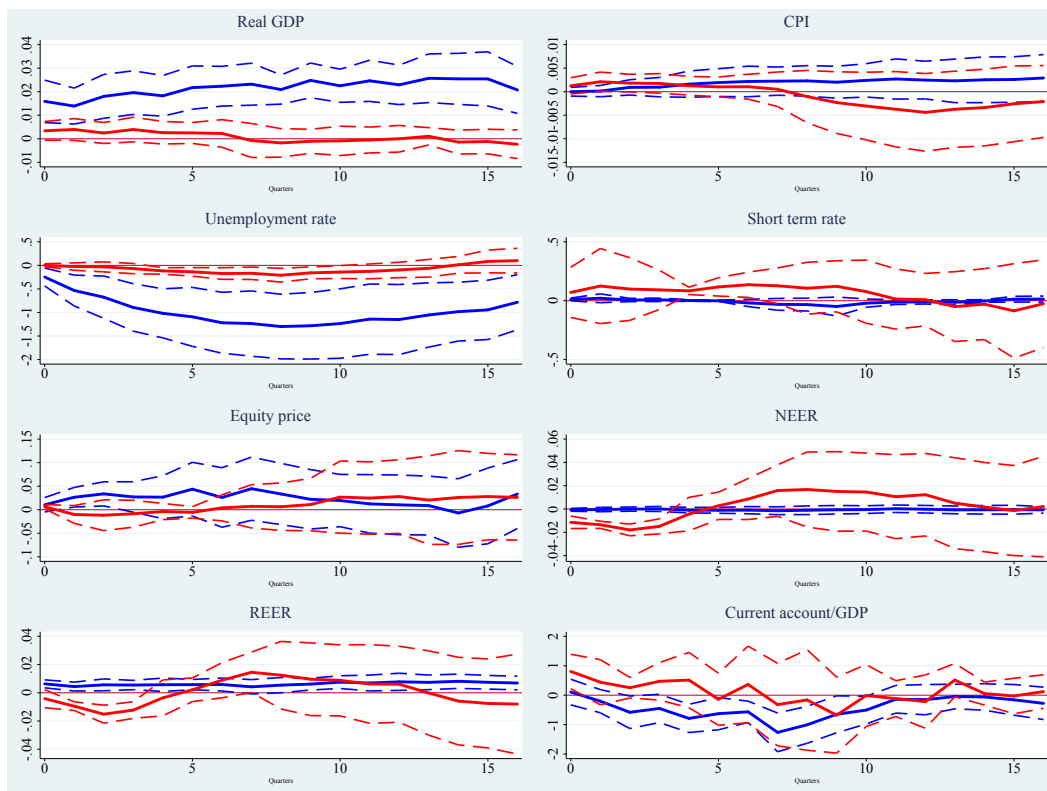


Figure 10: The figure reports impulse responses obtained with the local projections described in Section 4.2.2; sample period 1998Q1 - 2017 Q4. Confidence bands are at the 10% significance level. Euro area countries are shown in blue lines, the control group (EU and EEA non-euro advanced countries) in red lines.

non-euro area EU and EEA countries as the comparison group. Overall, the results are similar to the main exercise, although the differences are somewhat less marked, which may reflect the fact that the two country groups are more homogeneous.

*Comparing adjustment in core and peripheral countries.* Finally, in Figure 10, I compare macroeconomic adjustment in so-called "core" and "peripheral" countries in the euro area (see Table 1 for the country list). There are obvious reasons to consider these two country groups separately, in particular in the crisis and post crisis period, when their economic developments have tended to diverge. Moreover, intra euro area imbalances have been a constant concern in the first two decades of the euro. In the figure the average response of "core" countries is reported with the blue lines, and that of the "peripheral"

## Euro area "core" vs. "peripheral" countries

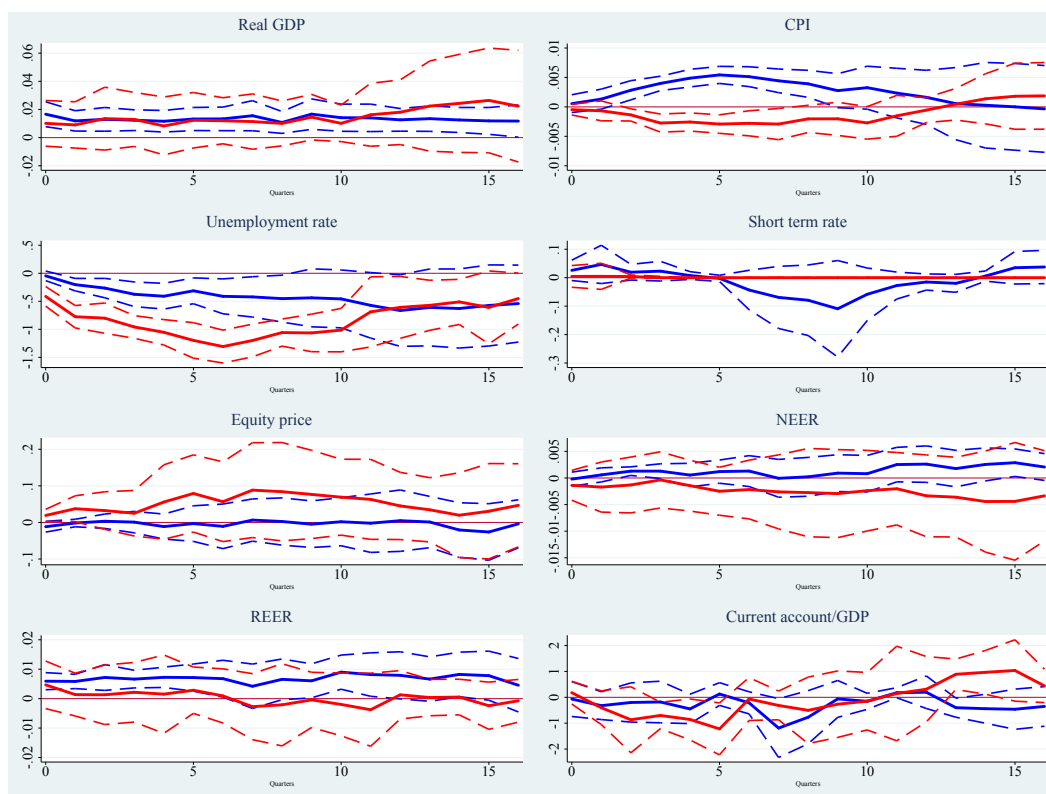


Figure 11: The figure reports impulse responses obtained with the local projections described in Section 4.2.2; sample period 1998Q1 - 2017 Q4. Confidence bands are at the 10% significance level. Euro area "core" countries are shown in blue lines, euro area "peripheral" countries (see Table 1) in red lines.

countries with the red lines. Overall, macroeconomic adjustment appears to be similar in the two country groups for most variables but there are two interesting exceptions. First, the response of the CPI is much more sluggish, and for some time even wrongly signed, in the peripheral countries. Second, the response of the unemployment rate is stronger and more persistent in the same countries. Taken together, these differences suggest that peripheral countries may be saddled with more product and labour market rigidities which impair the macroeconomic adjustment process, although at this stage this is only a conjecture that needs further corroboration.

## 5 Conclusions

In this paper I compare macroeconomic performance and adjustment in euro area and non euro area countries, using quarterly data from 1998 to 2017. I provide evidence in three parts. First, I compare indicators of macroeconomic performance in EMU countries and in a control group of advanced countries with a floating exchange rate. I look not only at average performance, but also at the within group standard deviation, for example to understand if euro area membership promotes convergence and cohesion. Second, I assess the vulnerability of EMU and non EMU countries to a common shock, the global financial crisis and its aftermath. Third, and most novel, I focus on the adjustment of asymmetric demand shocks in and out of the euro area. I first estimate country-specific demand shocks, that are weakly correlated across countries both within and outside EMU. I then estimate the propagation of these shocks on a number of macroeconomic variables, in the whole group and separately for EMU and non-EMU countries. I also look for possible differences in "normal" times (1998-2007) and "crisis" times (2008-2017).

I reach four main results. First, the performance of the euro area countries has not been very different from that of other advanced countries, and so appears to be macroeconomic adjustment, in the pre-crisis period. Second, however, the effects of the global financial crisis have taken longer to heal for the euro area countries, in particular for the unemployment rate, which is to a large extent due to the sovereign debt crisis in 2011-12 and its aftermath. Third, there is some evidence that the adjustment mechanism to asymmetric demand shocks works less well and more slowly in the euro area than in a control group of advanced countries with floating exchange rates and that the lack of a monetary policy reaction to local shocks could contribute to this difference, but we should also keep in mind that this is (i) largely confined to the post crisis period and (ii) the findings are not fully consistent with the Walters critique. In particular, I find no evidence for the perverse spiral of falling real interest rate and rising inflation exacerbating the initial shock that is a main feature of that critique. Finally, I find that there are also significant differences *within* the euro area, with a lack of convergence in the quality of institutions over time and lasting imbalances in the real effective exchange rate and the current account balance, only corrected (at high cost) in the most recent

years. In terms of adjustment to shocks, I find that inflation and the unemployment rate respond in a more sluggish way in the peripheral countries, which could be due to higher product and labour market rigidities in these countries.

The main policy implication is that the euro area works well for the adjustment to average, business-cycle, shocks; but it should be better equipped to deal with crises (large shocks), in particular in the labour market. Above all, it should have prevented the sovereign debt crisis, which explains a lot (indeed almost all) of the euro area under-performance since the global financial crisis. Reforms of the institutional setting of the euro area, in particular those that can prevent a recurrence of debt crises, are paramount to making the euro area more resilient to large shocks, and put it on a more sustainable basis looking forward.

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