EXTERNAL AND MACROECONOMIC ADJUSTMENT IN THE LARGER EURO AREA COUNTRIES

Elena Angelini, Michele Ca' Zorzi and Katrin Forster

In 2014 all ECB publications feature a motif taken from the €20 banknote.

THE COMPETITIVENESS RESEARCH NETWORK

CompNet The Competitiveness Research Network

This paper presents research conducted within the Competitiveness Research Network (CompNet). The network is composed of economists from the European System of Central Banks (ESCB) - i.e. the 28 national central banks of the European Union (EU) and the European Central Bank – a number of international organisations (World Bank, OECD, EU Commission) universities and think-tanks, as well as a number of non-European Central Banks (Argentina and Peru) and organisations (US International Trade Commission).

The objective of CompNet is to develop a more consistent analytical framework for assessing competitiveness, one which allows for a better correspondence between determinants and outcomes.

The research is carried out in three workstreams: 1) Aggregate Measures of Competitiveness; 2) Firm Level; 3) Global Value Chains

CompNet is chaired by Filippo di Mauro (ECB). Workstream 1 is headed by Chiara Osbat, Giovanni Lombardo (both ECB) and Konstantins Benkovskis (Bank of Latvia); workstream 2 by Antoine Berthou (Banque de France) and Paloma Lopez-Garcia (ECB); workstream 3 by João Amador (Banco de Portugal) and Frauke Skudelny (ECB). Julia Fritz (ECB) is responsible for the CompNet Secretariat.

The refereeing process of CompNet papers is coordinated by a team composed of Filippo di Mauro (ECB), Konstantins Benkovskis (Bank of Latvia), João Amador (Banco de Portugal), Vincent Vicard (Banque de France) and Martina Lawless (Central Bank of Ireland).

The paper is released in order to make the research of CompNet generally available, in preliminary form, to encourage comments and suggestions prior to final publication. The views expressed in the paper are the ones of the author(s) and do not necessarily reflect those of the ECB, the ESCB, and of other organisations associated with the Network.

Elena Angelini
European Central Bank; e-mail: elena.angelini@ecb.europa.eu

Michele Ca' Zorzi
European Central Bank; e-mail: michele.cazorzi@ecb.europa.eu

Katrin Forster
European Central Bank; e-mail: katrin.forster@ecb.europa.eu

Abstract

A balanced current account in the euro area has disguised sizeable net lending imbalances at the country level, exposing the common currency area to severe pressures during the financial crisis. The key contribution of this paper is to evaluate the adjustment process through the lenses of the New Multi Country Model at the country and sectoral level. We find that shocks to the external, fiscal and monetary environment help explain, to a large degree, the sizable current account adjustment and rise in unemployment in Spain. The model also suggests that a recovery in wage competitiveness helps to reduce external deficits at the cost of higher net borrowing by households. The stimulus effects on aggregate demand, via the interest rate response of the common monetary authority and the competitiveness channel, are present but not overly large, as the rebound in economic activity depends mainly on global demand, supportive monetary policy, business and consumer confidence.

Key words: net lending, euro area countries, current account, modeling
JEL Classification: C5, F32, F41, O52.

NON-TECHNICAL SUMMARY

The current account in the euro area has historically been close to balance. The presence of deficits and surpluses across the different participating members was not generally perceived as a major policy issue, as e.g. the Spanish deficit was offset by the German surplus (Williamson, 2007). The sizable net borrowing by the euro area public sector was instead offset by the net savings of the euro area private sector. Following the financial crisis the academic literature has moved from a largely benign to a malign assessment of current account divergences. As emphasized by Obstfeld (2012) the country dimension is critical even in a monetary union context. As the financial crisis intensified and liquidity dried out, financial markets in the euro area manifested growing signs of segmentation. The rising borrowing costs for households and corporations that typically characterized countries with high public or private debt have contributed to deepen the recession. Even though the current account divergence among the euro area countries started narrowing, the adjustment has been uneven at the country level. With the notable exception of Germany, the unemployment rate rose to unprecedented levels, particularly in Spain, triggering the question of whether external rebalancing is being achieved at the cost of higher domestic imbalances.

Without a modeling framework it is hard to disentangle the forces driving the rebalancing process. The key contribution of this paper is an attempt to go beyond an assessment of whether current account positions are below or above a certain threshold, as done in much of the literature and policy debates on external imbalances until now. We decompose the counterpart of the current account, i.e. net lending, at the sectoral level to evaluate how each component would evolve as a function of different shocks and policy-adjustments. From a methodological stand-point this is done by extending the accounting framework of the New Multi Country Model (NMCM), a state-of-the-art large scale structural model that is one of the workhorse models employed at the ECB (Dieppe et al., 2012). The model has been developed for the five largest euro area countries, i.e. Germany, Spain, France, Italy and the Netherlands. For the purposes of this paper it was complemented with a number of additional accounting identities to include euro area flow of funds data for three sectors, public, household and corporate sectors. Through the use of counterfactual analysis the NMCM provides valuable insights on the contraction of external imbalances and rise of domestic imbalances stemming from a less favorable external environment, the deterioration of financing conditions, fiscal consolidation efforts as well as worsened consumers and investors' expectations. Their impacts help explain to a large degree the rise in unemployment and the external adjustment process witnessed in Spain. This modeling framework also helps us to assess alternative post-crisis scenarios. To this aim we employ a more extended version of the model, which includes together with the five country models a residual block for the rest of the common currency area, allowing for trade and financial interlinkages as well cross-country spillovers. We evaluate four different scenarios of how the rebalancing process could evolve, considering the following shocks: i) a German-led demand recovery; ii) a wage competitiveness adjustment in Spain; iii) a broad-based foreign trade recovery; iv) a rebound in consumer confidence in Spain. By exploring different scenarios of how the rebalancing may unfold, the difficulty of achieving external and internal rebalancing simultaneously emerges. Among the shocks considered only an improvement in wage competitiveness seems to help both the current account and domestic rebalancing process, favoring the recovery of net trade and employment

mainly via the competitiveness channel but at the cost of higher net borrowing by households. The stimulus effects on aggregate demand are not very large, as discussed in Galí (2013) and Galí and Monacelli (2013). The economic recovery, but also the external financial position, depends critically on several additional drivers, such as global demand conditions, the value of the euro and the firming of business and consumer confidence.

1 Introduction

The current account in the euro area has historically been close to balance. The pattern of deficits and surpluses across the different participating member states was generally not perceived as a major policy issue. Although normative approaches signalled that current account positions at the global level, as well as in the euro area, were out of balance,[1] the currency union dimension could rationalize why net lending was flowing downhill, i.e. from the high per-capita GDP countries to the emerging periphery (Blanchard and Giavazzi, 2002, Blanchard, 2007 and Williamson, 2007) under a scenario of economic convergence.[2] With the benefit of hindsight, net lending developments in the euro area should have been seen as worrisome, not only because they were driven by low savings rather than investment in productive capital (Lane and Pels, 2012), but also because the large external liabilities could represent an important risk in cases of liquidity shortages. Revisiting recent events in the euro area, Obstfeld (2012) also stressed that the country dimension still matters. While, as the crisis deepened, the common currency dimension proved to be important – for the large supportive role of the ECB – the increased financial market segmentation, the rising borrowing costs and the strong recessionary forces, underlined the risk for euro area member states of accumulating too much public and private debt.

The pressures that emerged in several peripheral euro area countries, starting from some of the smaller countries and reaching later Spain and Italy, have indeed triggered a rebalancing process that is now visible along a number of dimensions. In particular, the larger current account divergence among euro area countries has shown a tendency to narrow since about 2007, driven by the changes in savings and investment of the public and private sectors (Atoyan et al., 2013). The external rebalancing adjustment has also been rather uneven at the country level and considerably more marked in the countries in the storm of the crisis. But even where external deficits are now lower this development is not just good news, as it could partly reflect weak economic growth and the sudden withdrawal of foreign capital. In some cases the unemployment rate has reached high peaks, as strong private capital flew toward safe-havens, while fiscal consolidation efforts and a collapse in consumers and investors' confidence have had significant recessionary impacts.

The main contribution of this paper is to go beyond a normative assessment of whether current account positions of a given country are in line with economic fundamentals, as done in much of the *reduced-form* panel data literature (Chinn and Prasad, 2003, Ramhan, 2008, Jaumotte and Sodsriwiboon, 2010, Ca' Zorzi et al., 2012a, b and Lane and Milesi-Ferretti, 2012). Such perspective, however, cannot explain what forces have driven the recent sharp current account movements. Moreover, while current account deficits have narrowed, as in the case of Spain, the unemployment rate has risen very sharply, therefore the normative conclusion that the adjustment process is over could be overplayed. In this paper we take a different route by extending the New Multi Country model (NMCM), a large scale empirically estimated *structural model* that was developed at the ECB for projections and policy evaluation (Dieppe et al., 2012). A particularly innovative perspective is

---

[1] See the methodological frameworks proposed by Chinn and Prasad (2003), Lane and Milesi-Ferretti (2005) also applied for example in Ramham (2008) and Ca' Zorzi et al. (2012a, b).

[2] Lucas (1990) pointed to the paradox that at the global level financial capital was flowing uphill, i.e. from the poor to the rich countries. Until recently the euro area represented an exception, as private capital was flowing toward the emerging periphery.

that we extend the model by decomposing the current account in terms of net lending of the public, household and corporate sectors and have used flow of funds data for the euro area. Moreover, we have also extended the linked-version of the model (which includes the five largest euro area countries and a residual block for the rest of the currency area) to evaluate the spillovers of policy action in one euro area country on the others also at the sectoral level.

Our findings suggest that the adjustment seen so far reflects the impacts of a less favorable external environment, the deterioration of financing conditions, fiscal consolidation efforts as well as worsened consumers and investors' confidence. We also explore different scenarios of how the recovery could unfold, analyzing to what extent this could be achieved without the resurgence of external imbalances. The analysis shows that an internal devaluation process between the adjusting countries and Germany may originate from a set of different shocks, having thus different repercussions at the country and sectoral level. Among the shocks considered only an improvement in wage competitiveness helps reducing the current account deficit and the unemployment rate but at the cost of higher net borrowing by households. Using an estimated multi-country model we find that the stimulus effect is present but not overly large. This provides support to the intuition of Galí, 2013 and Galí and Monacelli, 2013, who suggested that in a currency union wage moderation in a given country has smaller effects on employment since the interest rate response of the monetary authorities, i.e. the *endogenous policy channel*, is muted as monetary policy refers to union-wide indicators. Therefore, in a currency union, wage moderation supports the recovery in that country almost exclusively via the *competitiveness channel*. The economic recovery, but also the external financial position, depends critically on several additional drivers, such as global demand conditions, the value of the euro and the firming of business and consumer confidence.

The remainder of the paper is organized as follows. Section 2 presents the stylized facts for the larger euro area countries and the lending patterns at the sectoral and country level. Section 3 briefly describes the underlying model that we shall use. Section 4 provides a backward assessment on the post-crisis adjustment by examining two counterfactual hypotheses. Section 5 reviews different scenarios and policy options.

2 Stylized facts

2.1 Net lending developments

The net lending position of a country, L, is equal to the sum of its current account position and of capital transfers, CA, here all expressed as a percent of GDP. Capital transfers are typically small and determined mainly by European policies to spur economic convergence within the European Union. To evaluate recent trends we shall employ euro area accounts (EAA) flow of funds data and split net lending flows across three sectors using the following accounting identity:

$$L = CA = \sum_{i=p,h,c} L_i$$

where the subscripts, p, h, c indicate the public, household and corporate (financial and non-financial) sectors respectively. We shall begin by reviewing how net lending evolved since the launch of the euro for the common currency area as a whole. Overall net lending in the euro area is

4

close to balance reflecting its current account position. Households have traditionally been net lenders, while the public sector has been borrowing in net terms, especially after the onset of the global financial crisis. Corporations turned into net savers instead in the immediate aftermath of the crisis in 2009 (Figure 1). There were also significant trends at the country level, as shown by developments in Germany (DE), Spain (ES), France (FR), Italy (IT) and the Netherlands (NL) (Figure 2). Since the launch of the euro the role of Germany and the Netherlands as creditors grew, with net lending reaching 8% of GDP in 2007 on the eve of the financial crisis in both countries. The flip side of this story is that, similarly to other smaller peripheral euro area countries, net borrowing requirements rose in Spain to almost 9% of GDP before the crisis. While Italy and France did not record large deficits, within five years their status changed from creditor to debtor countries, as the cumulative price competitiveness losses weighed on the trade balance. In both countries net borrowing requirements reached about 2% of GDP in 2007.

Following the deepening of the crisis an important rebalancing process started gaining momentum, affecting Spain among the debtors and to a lesser extent Germany among the creditors. For this reason these two countries shall henceforth be our main focus. To gain further insights of what has been taking place at the sectoral level, let us next decompose net lending developments at the country level. In the case of Germany, it is mainly the household sector that explains the sustained current account surplus, while the partial adjustment in 2009 and 2010 stems mainly from increased net borrowing of the public sector (Figure 3). As of the beginning of the 2000s, following a phase of strong deleveraging, German corporations became also net lenders.[3] In the case of Spain, the public sector had a limited role in explaining the current account divergence before the financial crisis as it was mainly the corporate sector (mostly non-financial) that strongly borrowed from abroad (Figure 4). Albeit possible negative spillovers of public deficits to the private sector have always been widely acknowledged, the global financial crisis has shown that contagion may occur the other way round, as the excessive exposure of the private sector to external financing has spillover effects on the public sector (Reinhart and Rogoff, 2011, Holinsky et al. 2012, Muellbauer, 2013).[4] Amid strong deleveraging pressures the Spanish private sector, households and corporations, was forced to adjust significantly (Figure 4). A similar descriptive analysis for the remaining three countries is also informative. Overall it confirms that it was the private sector that mostly contributed to the pre-crisis current account configuration and the subsequent adjustments.

---

[3] A similar decomposition would show that households saved in net terms before the crisis also in France and Italy.

[4] Muellbauer (2013) proposes a jointly underwritten Eurobond, where each country would pay into a common fund an insurance premium that is also function of private and not only government debt. The author finds that a 100% private debt ratio excess relative to Germany would contribute 0.37 percentage points to the overall fundamental spread.

Figure 1: Net lending in the euro area
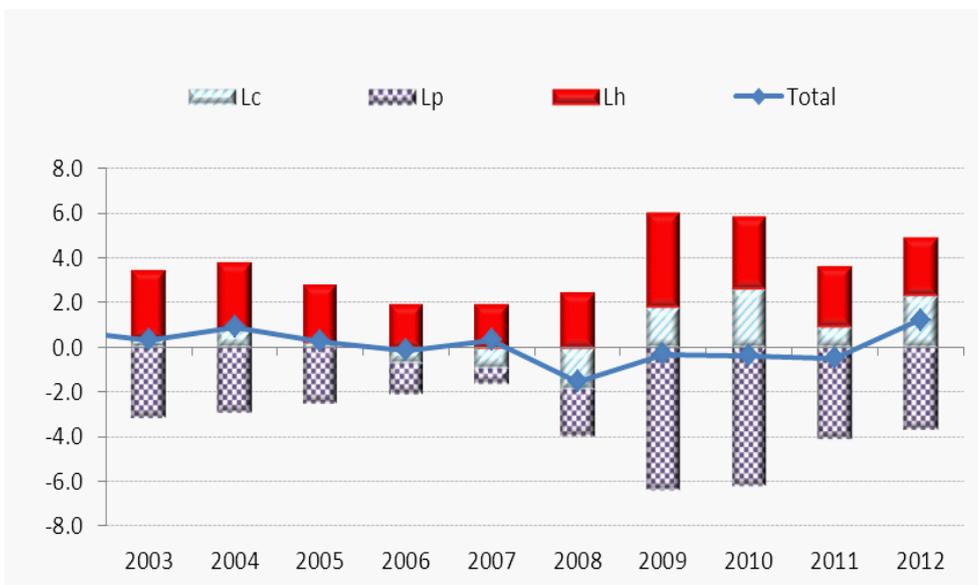
Figure 2: Net lending in percent of GDP for the euro area and selected countries
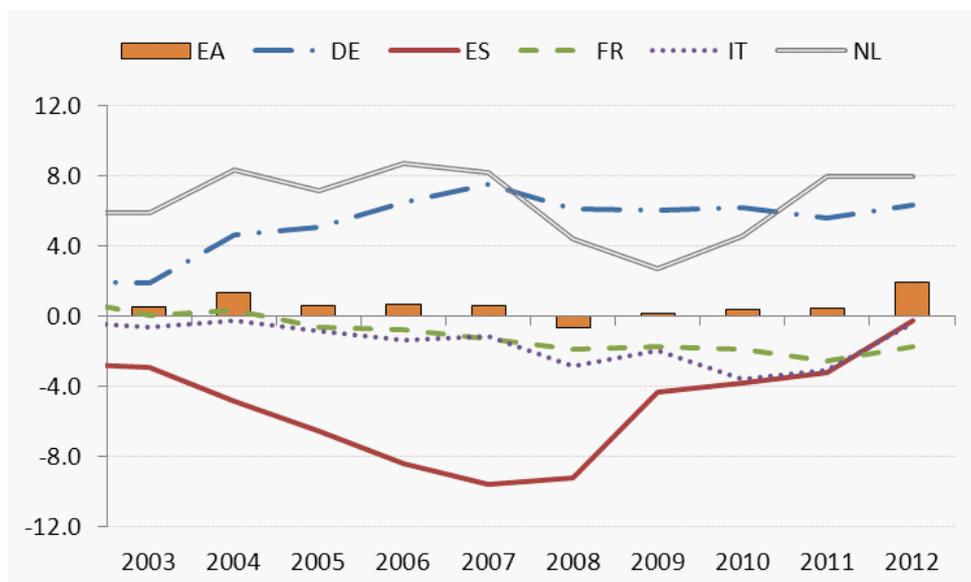
Figure 3: Net lending in DE in percent of GDP
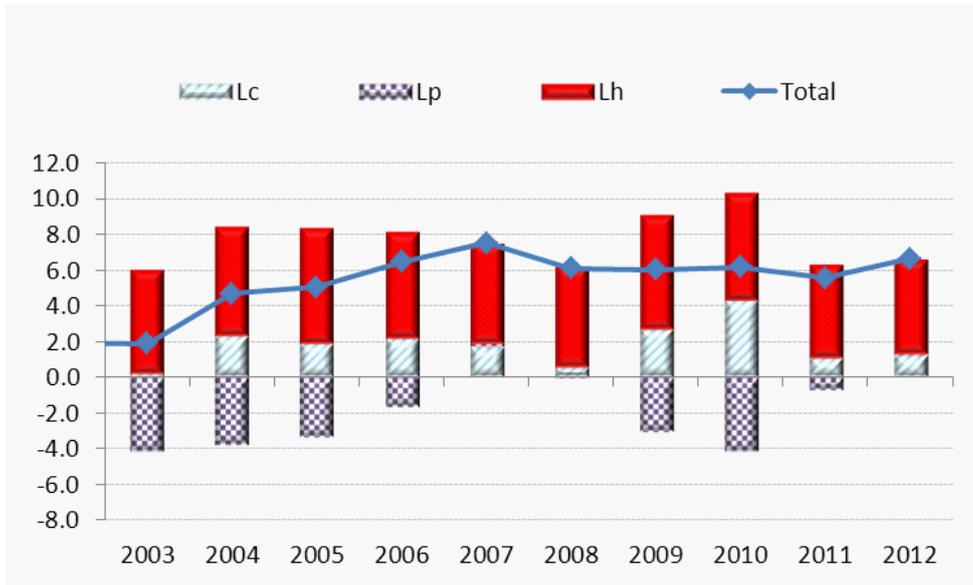
Figure 4: Net lending in ES
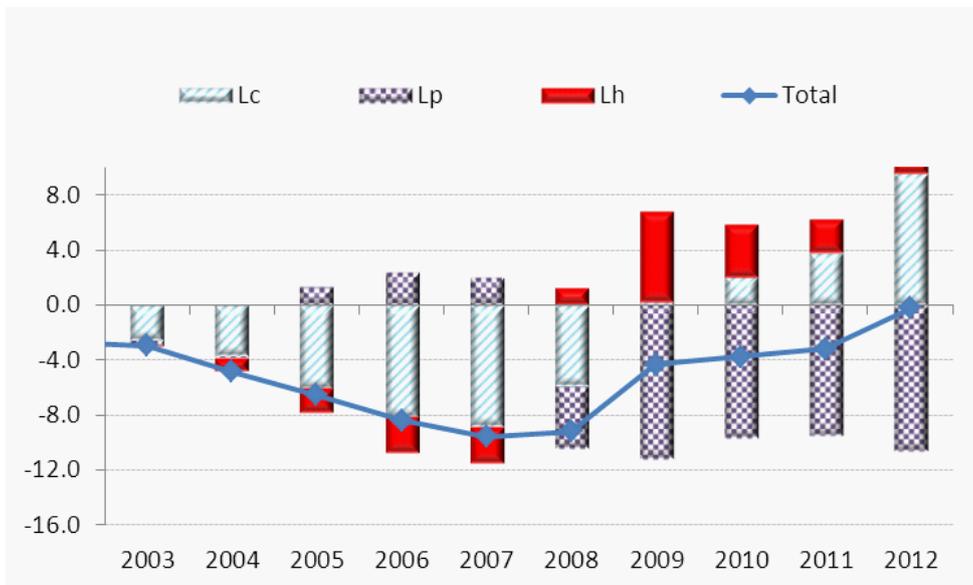
2.2 Potential explanatory factors

Without a modeling framework it is hard to disentangle the forces driving the rebalancing process. In terms of net lending patterns the strongest convergence is visible for the specular cases of Germany and Spain at the cost of higher divergence in terms of the unemployment rate (Figure 5). While in Spain in 2007 the unemployment rate was lower than in Germany, in recent years it overtook the 25% threshold. Net borrowing diminished to almost zero also in Italy amid rising unemployment, although less sharply than in Spain. Different patterns could be seen for the two remaining countries. In France the rise in the unemployment rate was accompanied by a slight rise in net borrowing. In the Netherlands the rise in the unemployment rate was instead matched by a rise in net lending to the rest of the world, mainly via the corporate sector.

Figure 5: Unemployment rate and net lending divergence between 2007 and 2012
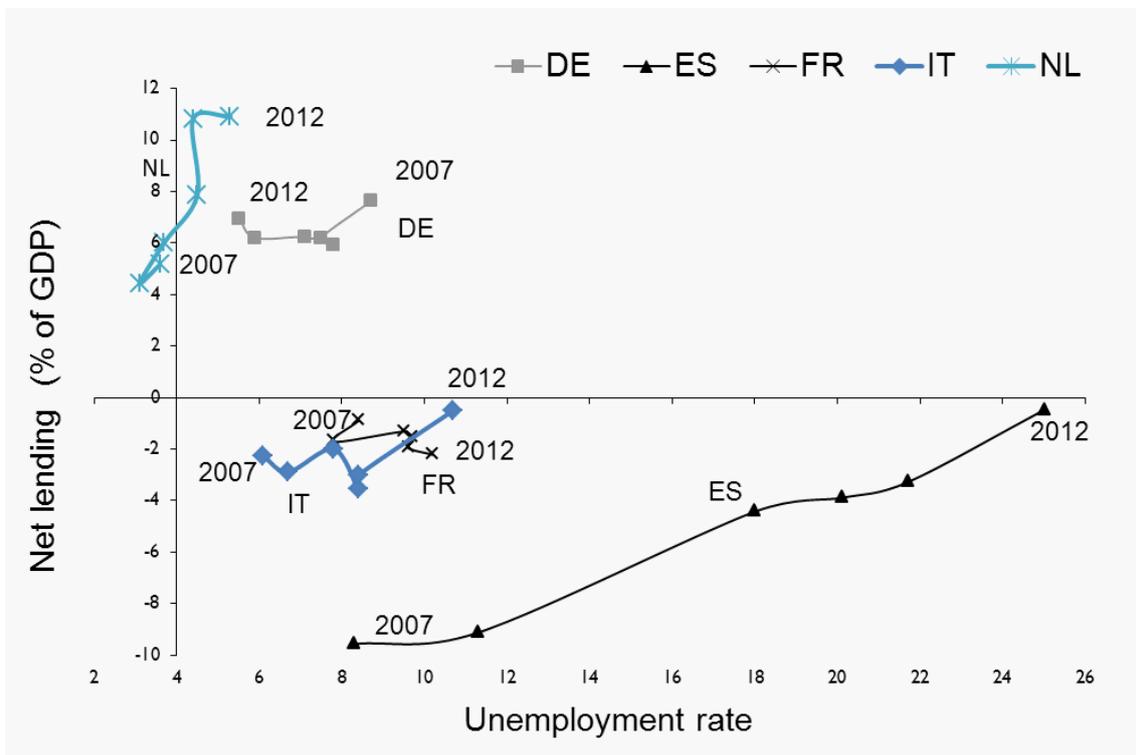
To better assess the nature of the adjustment process, a useful starting point is to compare the external, fiscal and monetary environment during the rebalancing phase — which we define as lasting four years starting from 2008Q4 — with an environment in which previous trends had continued. As for the external environment, during the rebalancing phase on average world demand was, depending on the country, between 14.5 and 16% below what it would have otherwise been since 2000 (Table 1). The rebalancing phase was also characterized by a weaker effective exchange rate of the euro relative to a random walk scenario (-5.8%). On average oil prices were also 24% lower than the pre-crisis level reflecting the sudden fall and subsequent recovery in oil demand. To sum up, during the rebalancing phase the external environment was not favorable but the reaction of oil prices and the

euro buffered, to some extent, the adverse impact on economic growth. A distinctive feature of this period was also the fiscal environment which prevailed in the five largest euro area countries (Table 2). A strong downward adjustment of government investment was particularly visible in Spain and to a lesser extent in Italy and France. Turning to financing conditions, during the rebalancing phase short-term interest rates were on average 370 basis points lower than in 2008Q3 (Table 3). They were matched by a sizable fall in average long-term bond yields in Germany, France and the Netherlands but not in Spain and Italy where lending conditions became tighter despite the worsening of cyclical conditions.

To briefly summarize, the main features of the rebalancing phase appear to be the sizably lower contribution of foreign trade (pointing to a negative *foreign trade shock*), a slightly more benign international environment in terms of price competitiveness (positive *price competitiveness shock*) and oil prices (negative *oil price shock*) as well as tighter fiscal policies in the countries in need of rebalancing such as Spain (negative *government consumption and government investment shocks*). Monetary policy easing had an impact at the short-end of the yield curve in all countries while long-term bond yields and lending conditions failed to decline in Spain and Italy over the period considered given increased market segmentation (country specific positive *sovereign risk premium shocks*).[5] These shocks are however not necessarily exhaustive, as the literature has for example stressed the importance of total factor productivity (TFP) shocks, as we shall discuss briefly later. Moreover the literature has also recognized the role of growth expectations in influencing the current account,[6] as they affect households and investors' willingness to build up debt.[7]

3   A brief outline of the NMCM

The NMCM is a state-of-the-art large scaled structural model that is one of the workhorse models employed at the ECB covering the five largest euro area countries.[8] Later we shall also employ a linked-version of the NMCM, which includes the five largest countries together with a residual block for the rest of the common currency area allowing also for trade and financial interlinkages (more on this below). For each country the model comprises three categories that interact with one another, i.e. utility maximizing consumers, profit maximizing monopolistic firms as well as trade unions that minimize a loss function and are constrained by a staggered wage structure. It is not as fully micro-founded as a Dynamic Stochastic General Equilibrium (DSGE) model but assumes optimizing-agents and is thus characterized by cross-equation restrictions and deep parameters (e.g. it includes a New Keynesian Phillips curve with Calvo pricing). It can be described therefore as a hybrid model between DSGE and more traditional macroeconometric models. It has been classified as a limited

---

[5] For a structural VAR perspective with sign-restrictions identification scheme, see Bahaj (2013).

[6] Using an intertemporal model, Ca ' Zorzi and Rubaszek (2012) show how the optimal current account configuration in a monetary union is highly sensitive to the catching-up prospects of the low per-capita income countries. See also Scenario II later in the paper.

[7] See also a report by the McKinsey Global Institute (2012), "Investing in growth: Europe's next challenges", where it is argued that growth stagnation in Europe is mainly originated by the weakness in private investment and investors confidence. For a discussion on the role of consumer confidence and the evidence of a stronger link between private consumption during this recession see Box 8 of the March 2012 ECB Monthly Bulletin.

[8] It was recently also extended to the United States by Baumann et al. (2013).

Table 1: External environment developments

	2008Q4-2012Q3				
	DE	ES	FR	IT	NL
World demand (extra EA)	-15.5	-15.0	-14.5	-16.2	-15.4
Effective exchange rate			-5.8		
Oil prices			-24.1		

Percentage growth relative to a simple extrapolative rule

Table 2: Fiscal developments

	2008Q4-2012Q3				
	DE	ES	FR	IT	NL
Government consumption	2.9	-7.0	0.6	-4.7	-2.3
Government investment	7.8	-24.4	-6.1	-6.5	-4.0

Percentage growth relative to a simple extrapolative rule

Table 3: Financing conditions

	2008Q4-2012Q3				
	DE	ES	FR	IT	NL
Short-term interest rates			-3.7		
Long-term interest rates	-1.6	0.2	-1.2	-0.1	-1.4

Average difference relative to the value in 2008Q3

information DSGE, which contrary to the canonical model allows for unit roots and cointegrating relations (Dieppe et al., 2012 and 2013). In terms of expectations, the model can be run assuming either rational or learning expectations but we shall henceforth employ the latter specification given the degree of structural change during the crisis. Finally, the technology underlying the supply side is represented by a CES production function. For the purposes of this paper the NMCM was complemented with a number of additional accounting identities to include euro area flow of funds data for three sectors, public, household and corporate. In the model, net lending at the aggregate level is driven by the current account, which is in turn determined by export, import and income balance equations. Net lending by the public sector is derived by gross public savings, which depends on government spending and (direct and indirect) taxes, minus government investment. Net lending by households depends on their gross savings minus housing investment. Finally, net lending by corporations results from an equation for corporate investment minus corporate savings, where the latter is determined as an accounting residual. The properties of the model, described in detail in Dieppe et al. (2012), can also be seen by performing a set of standard diagnostic simulations[9] that highlight its responses in terms of prices, p, economic activity, y, unemployment, u, price competitiveness,[10] q and sectoral net lending, L_i. These include shocks to the external environment (foreign demand, price of oil, exchange rates and competitors' prices), fiscal policy (government consumption and investment) and interest rates (short and long-term). To provide a first illustration of the properties of the model relevant to our discussion we briefly highlight the (sign) response of some key macro indicators after three years: (i) a negative foreign demand shock; (ii) an effective exchange depreciation shock; (ii) a lower oil price shock; (iv) a negative government consumption shock; (v) a negative government investment shock and (vi) higher long-term interest rate shock (Table 4). In some cases the cells are characterized by question marks as the sign of the response to the shock is not the same for all five countries.

Table 4: Responses of selected macro economic variables to six shocks after 3 years

Shock	p	y	u	q	S/Y	I/Y	L/Y	L_p/Y	L_h/Y	L_c/Y
Neg. foreign demand	(-)	(-)	(+)	(+)	(-)	(?)	(-)	(-)	(?)	(?)
Eff. exchange rate depreciation	(+)	(+)	(-)	(+)	(?)	(?)	(+)	(+)	(?)	(?)
Lower oil prices	(?)	(+)	(-)	(+)	(+)	(-)	(+)	(+)	(+)	(+)
Neg. government consumption	(-)	(-)	(+)	(+)	(+)	(?)	(+)	(+)	(?)	(?)
Neg. government investment	(-)	(-)	(+)	(+)	(-)	(-)	(+)	(+)	(-)	(?)
Higher long-term rates	(-)	(-)	(+)	(+)	(-)	(-)	(+)	(-)	(?)	(+)

Notes: S and I stands for savings and investment respectively

All shocks help explain the recessionary impacts on prices, output and unemployment with the exception of the exchange rate and oil shocks. Other than the foreign demand shock, all other shocks

---

[9]By standard diagnostic simulations we mean that there are no endogenous fiscal or monetary policy reactions to the shocks and no cross-country spillovers. Oil prices, foreign demand, fiscal policy, short and long-term interest rates and the nominal effective exchange rate are treated as exogenous variables in each of the simulations.

[10]An increase in price competitiveness (here defined in terms of relative export prices) corresponds to a real exchange rate depreciation.

help explain the rise in net lending (i.e. an improvement of the current account) seen for example in Spain, albeit the sectoral contribution is less clear-cut. In the Appendix we provide the responses to these standard diagnostic shocks for the five larger euro area countries. In the remainder of the paper we shall use simulation analysis to get a sense of the magnitudes of the expected impacts and draw insights on the rebalancing process, past and future. But before proceeding further it is worth highlighting a number of methodological issues concerning the interpretation of shocks as well as the broader difficulties of relying on macro models to interpret the financial crisis. Even theoretically appealing models, such as those in the DSGE family, face considerable challenges in explaining, for example, sudden stops. As pointed out by Mendoza (2010) traditional DSGE models generally rely on the assumption of efficiency of credit markets, whereby households smoothen intertemporally consumption by borrowing in international capital markets. What we have seen however is exactly the opposite, as private capital outflows, even if tempered by the responses of the ECB, have aggravated the European crisis. By not accounting for this, DSGE models tend to exaggerate the role of TFP shocks in rationalizing sudden stops (op. cit. Mendoza). In the DSGE literature there are different promising research avenues that seek to better describe the financial crisis[11] and account for sudden stops, although it remains challenging – for these as well as other models – to explain satisfactorily the euro area post-crisis adjustment and its multi-country dimension.[12] It appears therefore a formidable modeling task, well beyond the purposes of this paper, to attempt to identify structural shocks driving the European dimension of the crisis and claim that they are uncorrelated with policy interventions. In what follows we shall instead rely on the intuition that a hybrid large scale model with learning expectations, such as the NMCM, provides through the use of standard simulation analysis.[13] In several simulations, we shall evaluate the conditional impact of shocks stemming from the external environment, fiscal and monetary policy to get some insights on the rebalancing process.

4 Looking back at the adjustment process

This section provides an intuition on the magnitude of the different forces at play by conducting counterfactual simulations starting in 2008Q4 for Germany and Spain.

4.1 Scenario I The role of recessionary forces

In the first exercise we rely on the model to gauge the importance of recessionary forces stemming from external, fiscal and monetary influences. We extrapolate how different the adjustment process might have been if, in the four years which started in 2008Q4, world demand had grown closer to historical trends (see Tables 1-3). We also assume that oil prices had remained 24% higher, the

---

[11] Jaccard (2013) argues that over the great recession liquidity shocks explain a large part of the output fluctuations in the euro area.

[12] Mendoza (2010) and Bianchi (2011) have developed business cycle models with a collateral constraint, where leverage provides an amplifying mechanism in the boom and bust years. As a result the collateral constraint becomes more binding, thus reducing the size of the TFP shocks that may trigger a severe economic downturn.

[13] For an alternative empirical framework see Bonci et al (2008), who explore the sectoral response to monetary policy shocks in terms of net lending responses in the context of a recursive VAR model for Italy.

effective exchange rate of the euro 5.8% stronger and that financing conditions had remained the same as they were in 2008Q3. We shall also postulate that in Spain and Germany real government consumption and investment had grown at pre-crisis trends.[14] The NMCM suggests that, in such environment, the German current account surplus would have adjusted slightly less, remaining 1.2% of GDP larger four years after the shock (Figure 6). This is explained by higher net lending of the public sector in the first year and by higher net lending of the corporate sector in the second and third year. Looking at each factor one by one, the NMCM reveals that the partial current account adjustment seen in Germany was closely associated to the adverse global trade shock, which had a stronger impact than that associated to the lower oil prices and weaker euro. Finally, the scenario proposed is also characterized by lower unemployment in Germany, albeit amid some fluctuations. For Spain the NMCM suggests that (i) the current account adjustment would have been 6.4% smaller at the end of the fourth year, (ii) net borrowing requirements of public sector would have been almost 7% higher and iii) the rise in the unemployment rate would have been 8% smaller (Figure 7). Overall, the main message that we draw from this scenario is that the impacts of the changes to foreign trade, fiscal developments,[15] and financing conditions help explain, to a large degree, the rise in unemployment and the large external adjustment process seen in Spain.[16] The model, however, points to a number of additional important shocks.

4.2 Scenario II Additional factors

The NMCM is well suited to capture the effect of changes in expectations on the outlook. Since the outburst of the crisis the residuals of expected consumption and investment in the country block for Spain turned negative. The role of expectations during the rebalancing phase is also confirmed by the fall in the indicators of consumer and business sentiment. This suggests that the lower willingness of consumers and investors to incur in more debt has played an important role during the rebalancing phase.[17] To highlight the role of the expectation channel we run a counterfactual scenario where expected consumption and the expected capital stock are assumed to remain 3% higher during the rebalancing phase (which would be consistent with the residuals being closer to zero). The model confirms that there are potential important effects of even moderate shifts of expectations on both the real economy and the current account (Figure 8). Corporate borrowing would have remained much more sustained in this scenario. Finally, the model is also characterized by a large negative residual in the import demand equation, which confirms that import compression was particularly sizable even when accounting for the dimension of the crisis. Such compression in import demand

---

[14] For Spain we assume that goverment investment had remained unchanged.

[15] The response of fiscal shocks on the current account is controversial. For recent analyses of the effects of spending shocks on the current account, see in particular Corsetti et al. (2012) and Corsetti and Müller (2008).

[16] In a panel data context Lane and Milesi-Ferretti (2012) showed that current accounts contracted toward the norms more strongly in the countries that were more severely affected by the financial crisis. They concluded that external adjustment was achieved primarily via demand compression rather than expenditure switching.

[17] An intertemporal perspective help explain the key role of growth expectations for the current accounts of euro area countries. Under a post-crisis scenario of weak catching-up and segmented bond markets, optimal current accounts are much closer to balance in light of the lower future economic prospects and the higher cost of accumulating debt (Ca' Zorzi and Rubaszek, 2012).

Figure 6: DE, impact of recession on net lending (left-chart) and unemployment (right-chart)
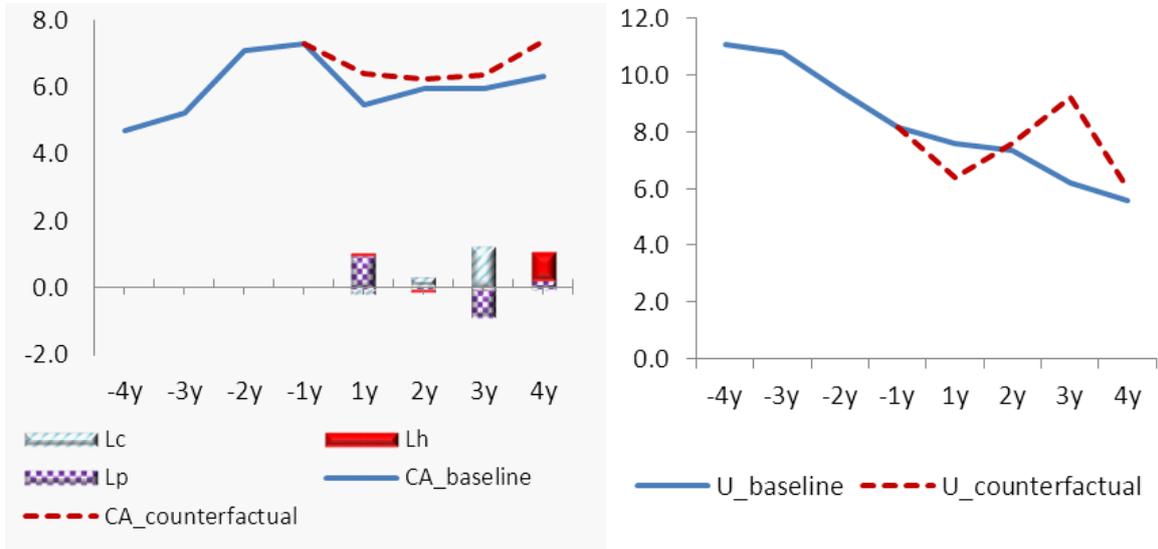

Figure 7: ES, impact of recession on net lending (left-chart) and unemployment (right-chart)
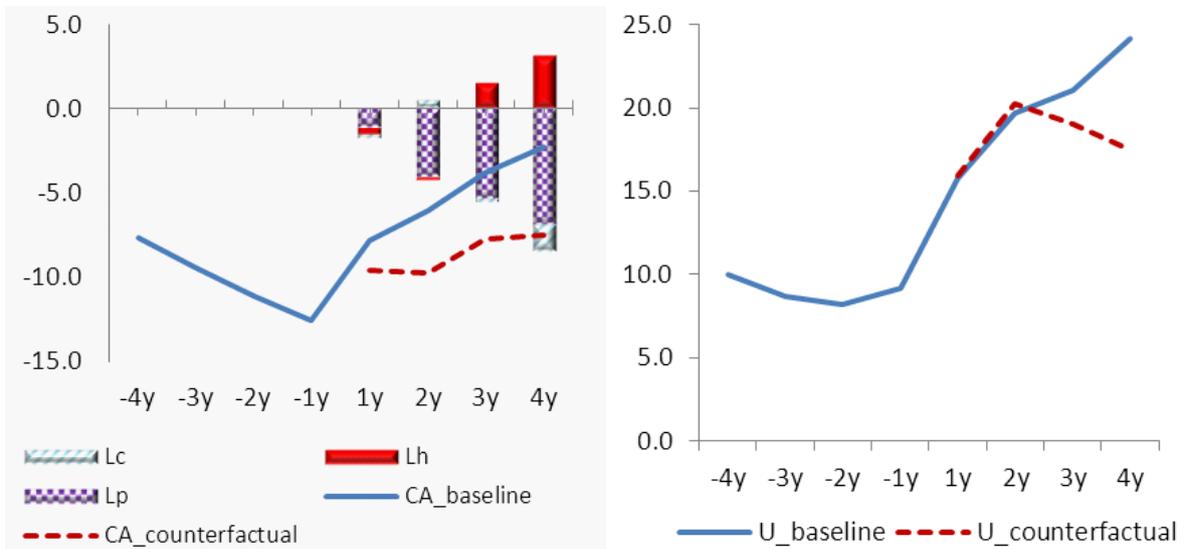
could be well rationalized along the lines of Atoyan et al. (2012), who stressed the pivotal role of the lack of access to credit of corporations and households.

Figure 8: ES, Impact of higher expectations on net lending (left-chart) and unemployment (right-chart)
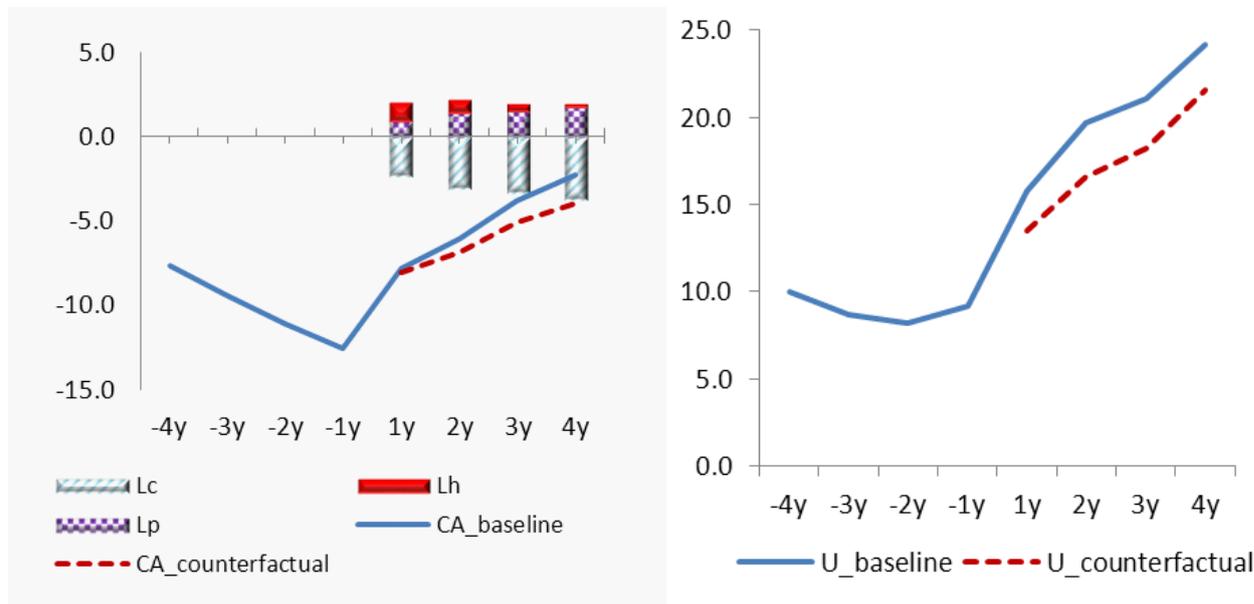
5 Rebalancing scenarios ahead

5.1 The linked-version of the NMCM

The main purpose of the above analysis was to get some insights on the relative magnitudes of the forces driving sectoral net lending. It has highlighted, subject to the caveats of the model, the important contractionary forces stemming from the unfavorable world demand and domestic environment, only partly buffered by the response of oil prices and the euro as well as highlighting the role of expectations. The model can help us also to assess different post-crisis scenarios such as the improvement of the external environment or a rebound of confidence by consumers and/or investors and to evaluate different economic policies that may support the rebalancing process (Chen et al., 2012). To this aim we employ the linked-version of the NMCM (Dieppe et al., 2012), which allows for intra-euro area trade interlinkages. Monetary policy is endogenous and defined by a Taylor rule and the exchange rate channel operates via the uncovered interest rate parity. A fiscal rule is also included to stabilize public debt. Financial markets are forward looking.[18] The simulation analysis conducted in this framework is subject to the earlier mentioned caveats and is illustrative of the interplay of the different transmission channels and their relative size. It also points to the

---

[18]In the standard NMCM specification, long-term rates are forward looking (see equation 36 in Dieppe et al. (2012)) and there are no financial frictions. Therefore the effects of financial fragmentation, excess indebtedness and subsequent deleveraging forces are not explicitly captured by the model.

heterogeneity of the responses across countries. To evaluate the rebalancing process and the possible trade-offs between external and internal objectives we evaluate four scenarios to assess the prospects for economic convergence, sectoral adjustments as well as spillovers among the euro area countries:

1) A German-led demand recovery;

2) A wage competitiveness adjustment (i.e. a fall in compensation per employee) in Spain;

3) A broad-based recovery in global trade;

4) A rebound of consumers' expectations in Spain.

5.2   Scenario III A German-led demand recovery

The policy debate has often concentrated on whether the internal adjustment process should take place more via higher demand in the surplus countries or slower wage growth in the countries with external imbalances. In the next two scenarios we shall consider both options using the NMCM. We first assess the impact of a consumption shock that is twice as strong in Germany than in Spain.[19] We assume that consumption increases by 5% in Germany and by 2.5% in Spain within a time span of four years. This could be explained by the different ways in which the crisis has affected the balance sheet of euro area households. A heterogeneous shock such as this triggers a loss of price competitiveness of Germany vis-à-vis Spain both in terms of prices and wages. The simulation shows that the current account position of both countries however worsens (Figure 9), although it improves in Spain relative to Germany. The demand-led recovery helps reduce unemployment sizably but, by construction, the impact is larger in Germany than in Spain. The main point from this scenario is that an internal adjustment process such as this does not help reduce current account divergences within the euro area. Moreover, from a sectoral perspective net borrowing by households rises considerably (Figure 10). Finally, even if this scenario would be matched by a depreciation of the euro, the positive impacts on the real economy would be skewed toward Germany.

5.3   Scenario IV Wage competitiveness shock in Spain

Although a German-led demand shock may support an internal devaluation process, the latter might be fostered also through the design of different economic policies. The role of different policy prescriptions to address external divergences in the euro area using the NMCM and other models have been analyzed by Angelini et al., 2013 and ECB, 2012 and shall not be repeated in detail here. The main conclusion of these papers is that current account deficits could be alleviated through the (i) improvement of wage competitiveness, (ii) fiscal devaluations (namely a shift from direct to indirect taxes) and (iii) with polices aimed at enhancing non-price competitiveness and productivity. To evaluate the role for policy reform we run, as an example, a scenario characterized by a progressive reduction of wages in Spain relative to the baseline, reaching -15% at the end of the four year horizon, which would imply an internal devaluation process vis-à-vis Germany. Galí (2013) and Galí and Monacelli (2013) have recently argued that wage moderation in one country of

---

[19]This might be the by-product of the currency union self-adjustment mechanism, stemming from the inflows of capital from the periphery to the core of the union, or be the consequence of the different demand conditions in the aftermath of the financial crisis.

Figure 9: Impact of a German-led recovery on the CA (left-chart) and unemployment (right-chart)
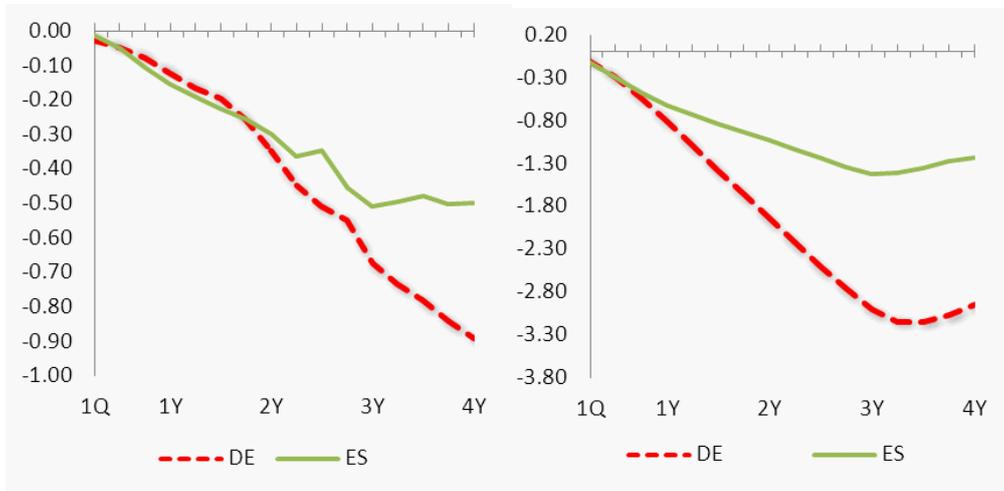
Figure 10: Impact of previous shock on sectoral net lending in ES (left-chart) and DE (right-chart)
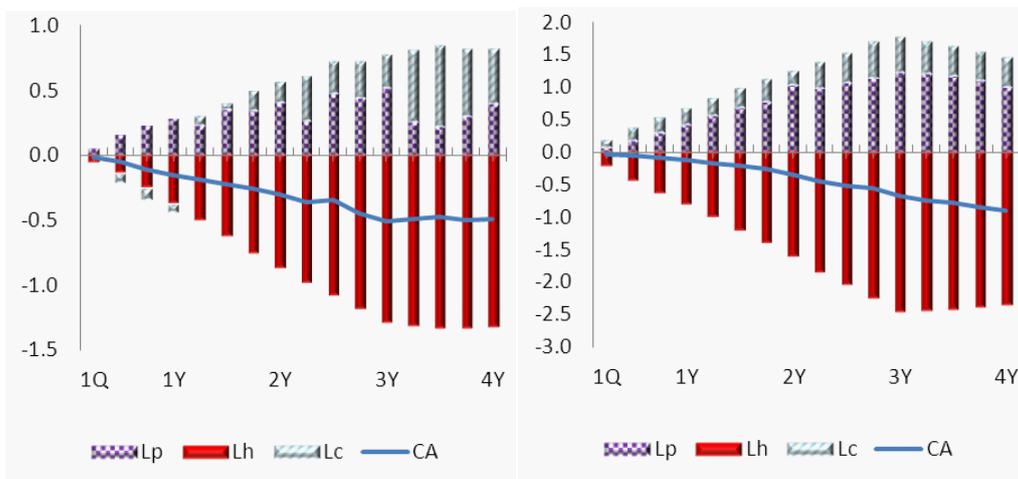
a currency union would not increase employment significantly,[20] since the interest response of the monetary authorities (*the endogenous policy channel*) is muted as monetary policy refers to union-wide indicators.[21] The rich multi-country structure of the NMCM accounts for the weak interest rate response of the monetary authorities as well as the favorable competitiveness effects on net trade. Being an estimated model it is also well-suited to quantify the magnitude of the impacts at the country and sectoral level. Under the scenario proposed, the economic divergence between Germany and Spain falls along both the external and internal dimension (Figure 11). The current account in Spain improves by about 3.6% percent of GDP relative to Germany, underscoring the importance of relative wage competitiveness among euro area countries. The unemployment rate gap falls by 2% at the end of the simulation period. According to this modeling framework, wage restraint matters for the external adjustment process and to some extent stimulates the economy. However, from a sectoral perspective the current account improvement in Spain would be mainly driven by a rise in net lending in the corporate and public sectors but net borrowing requirements by households increases (Figure 12, left chart). Moreover, the external financial position (i.e. net foreign assets in percent of GDP) worsens somewhat due to the fall in nominal GDP.[22] From the point of view of spillovers, the model shows that wage moderation in Spain leads to a slight decline in the current account surplus in Germany, as higher borrowing requirements by the corporate sector would be offset by higher net lending by the public sector (Figure 12, right chart).

5.4 Scenario V Stronger than expected trade recovery

External factors will also play a key role going forward. More specifically, we evaluate what the strengthening of world demand by 10% implies. For Germany, the model predicts that one year after the shock the current account surplus rises by 1.6% of GDP and the unemployment rate falls by 2.5% relative to the baseline (Figure 13). For Spain the results are similar but the magnitudes smaller as the estimated model points to some heterogeneity in the responses. In the absence of other shocks, the model predicts that the unemployment and net lending divergence between the two countries widens slightly. The presence of supportive external conditions, while facilitating the undertaking of the necessary reforms, would not necessarily unravel intra-euro area imbalances. To highlight the role of the flexibility of the euro we also evaluate a scenario where a 10% positive foreign demand shock is matched by a 10% effective exchange rate appreciation. The results change sizably as the improvement to the current account is almost completely reversed over time (Figure 14). Similarly the unemployment rate falls to the lowest point approximately one year after the shock but then rebounds toward previous levels. This suggests that an improvement of the external

---

[20]They also argue that the welfare effects from wage flexibility are not necessarily positive, as employment might stabilize at the cost of higher inflation volatility.

[21]Participating to a currency union could still be optimal as long as the lower ability to respond to asymmetric shocks is compensated by higher potential growth due to stronger trade integration and greater access to financial markets (Ca' Zorzi, De Santis and Zampolli, 2012 and Ca' Zorzi and De Santis, 2004).

[22]The fiscal rule helps to stabilize debt but only over a longer horizon. Wage restraint accompanied by a positive external demand scenario would avoid debt/deflation risks (only partly accounted for in this framework).

Figure 11: Impact of the wage competitiveness shock on the CA (left-chart) and unemployment (right-chart)
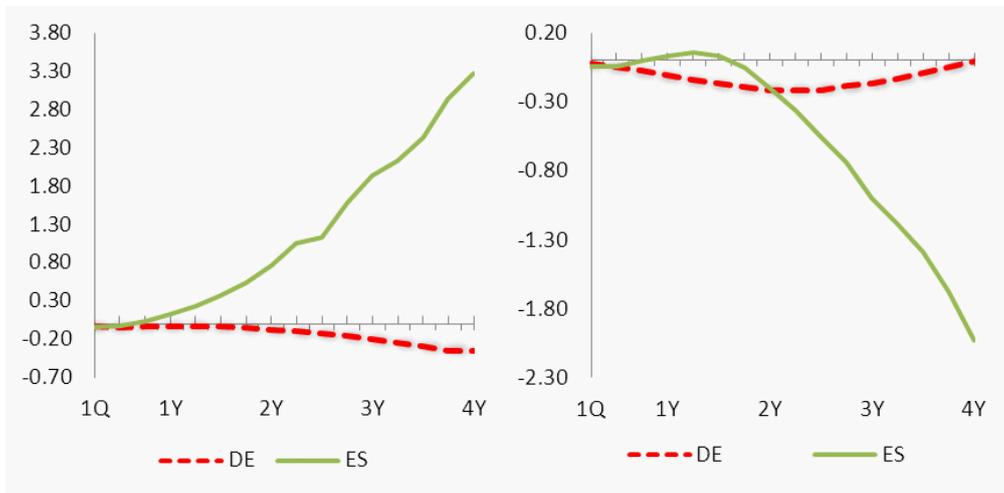
Figure 12: Impact of previous shock on sectoral net lending in ES (left-chart) and DE (right-chart)
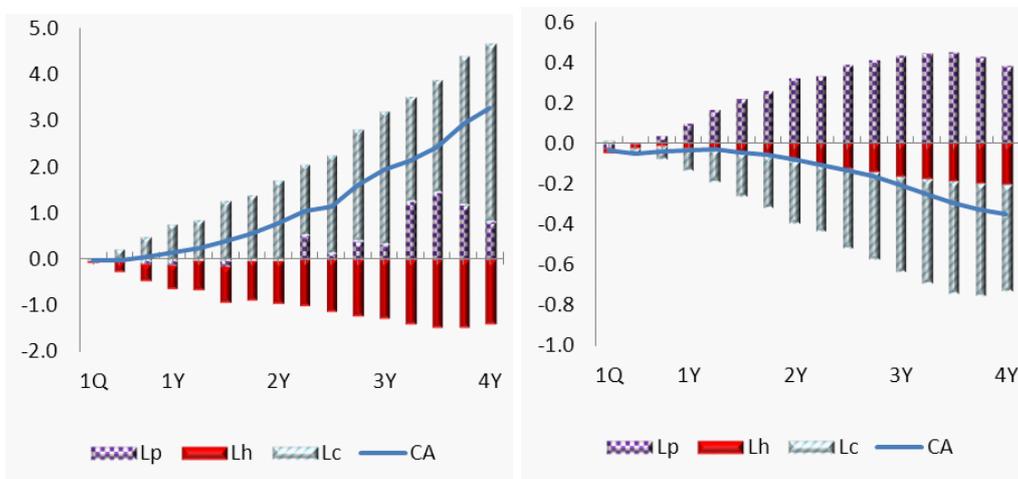
environment helps reduce the external deficits and the unemployment rate but the response of the euro plays a key role to preserve a balanced recovery.

Figure 13: Impact of a foreign trade recovery on the CA (left-chart) and unemployment (right-chart)
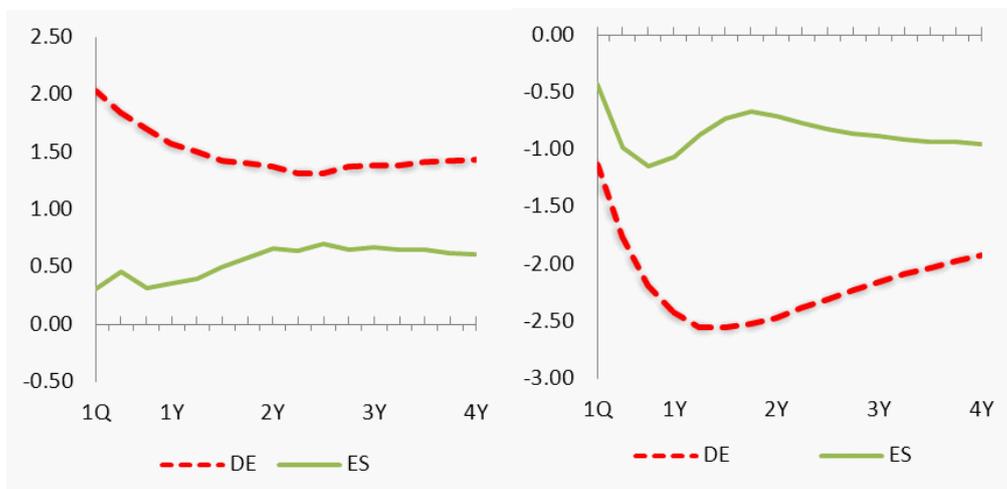
Figure 14: Impact of a foreign trade recovery matched by a euro appreciation on the CA (left-chart) and unemployment (right-chart)
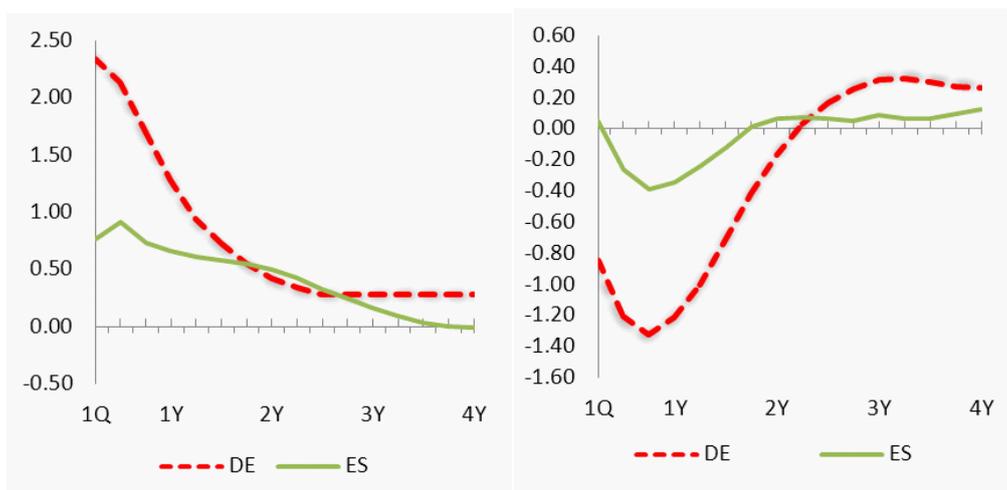
5.5   Scenario VI Rebound in expected consumption in Spain

As aforementioned consumers and investors' expectations have played a key role. The model helps us to gauge, for example, the impact of a pick up in expected consumption. In the following scenario we assume that it rises up to 5% within four years. The results reported in the fan charts below suggest a rather strong fall in the Spanish unemployment rate (Figure 15). This comes at the cost of a higher external deficit, as the net borrowing by households rises (Figure 16) and their saving ratio

falls by 3%. The message that we draw is that, while consumers' expectations play a key role for the Spanish recovery, household indebtedness could increase again unless the recovery is sustained.

Figure 15: ES, impact of a recovery in consumer expectations on the CA (left-chart) and unemploymnet (right-chart)
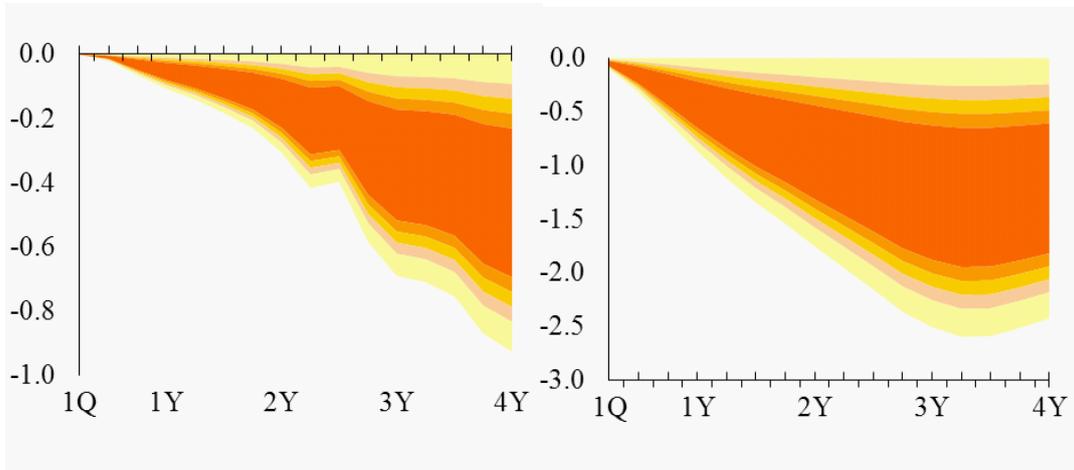
Figure 16: Impact of previous shock on net lending by households, Lh, (left-chart) and change in the saving ratio (right-chart)
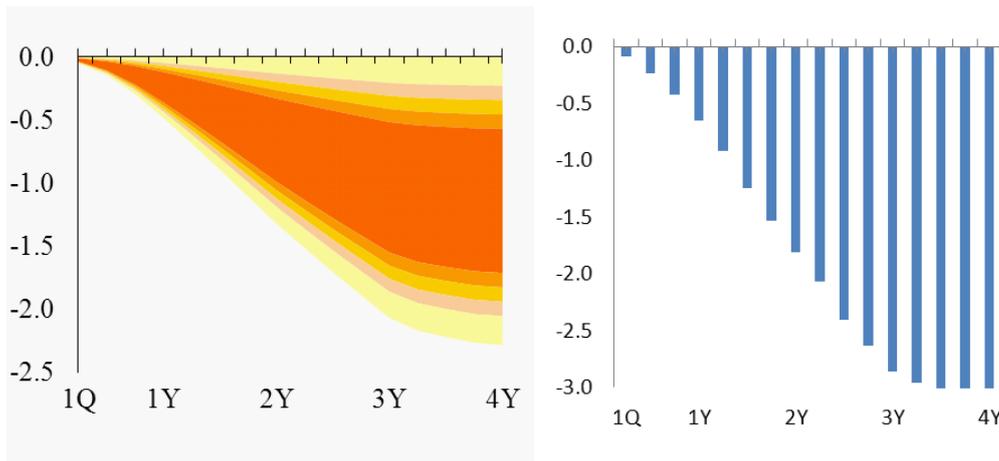
6 Conclusions

Before the Great Recession net lending and borrowing patterns in the euro area were not seen as overly worrying, even if the adjustment mechanism was not functioning as simply as text-books might have suggested. Some concerns were expressed that not all countries recipient of capital were improving at a sufficient pace, for example in terms of productivity trends. The currency union dimension was however mitigating these fears. Following the global financial crisis there has been a greater recognition that sizable net lending among countries and sectors may constitute a significant risk to the currency union. In our study we have provided a first assessment of the rebalancing process through the lenses of the NMCM. We described the impact of the large external, fiscal and monetary shocks in the aftermath of the financial crisis. Such factors help explain, to a large degree, the current account adjustment and the large rise in unemployment in Spain. The NMCM points to additional factors such as the sudden fall in expected consumptions and investment as well as the strong compression in import demand. This modeling framework also helps us to explore alternative scenarios of how this rebalancing process is unfolding. Under the scenario of a German-led demand recovery the economic outlook improves and unemployment falls both in Germany and Spain. Ceteris paribus the current account however deteriorates in both countries and the real economic divergence between the two persists. By contrast in this modeling framework an improvement in wage competitiveness helps both the current account and domestic rebalancing process but at the cost of stronger pressure on households' balance sheets. The stimulus on the Spanish aggregate demand is also not enough to bring unemployment down to pre-crisis levels. The economic recovery, but also external indebtedness in percent of GDP, depends critically on several additional drivers, such as global demand conditions, the value of the euro and the firming of business and consumer confidence.

7 Appendix

7.1 External environment shocks

Shocks are carried out assuming that there are no endogenous fiscal or monetary policy responses, and no cross-country spillovers. The results are reported in terms of % deviations from the baseline.[23]

7.1.1 Impact of an adverse world demand shock by 10%

In this simulation we investigate the impact of a fall of extra-euro area world demand by 10% below the baseline for three years (Table 5). Given the large weight of intra-euro area trade the fall of total exports and imports is sizably smaller. This adverse trade shock determines a rise in net borrowing requirements in the range of 0.6 and 1.1 p.p. of GDP one year after the shock. This is mostly due to a fall in savings as a percentage of GDP, which is driven by the public sector through lower tax revenues. The fall in export demand triggers a fall in GDP, a rise in unemployment, a fall in investment and, to a lesser extent, of consumption. Lower exports prices through lower domestic inflation cause an improvement in price competitiveness, which mitigates the negative impact on net trade. Over a three-year horizon the real economy recovers somewhat. Net borrowing of the corporate sector tends to increase, as investment recovers more than nominal output.

Table 5: Negative shock to extra- euro area foreign demand

	first year					third year				
	DE	ES	FR	IT	NL	DE	ES	FR	IT	NL
Prices, cost and competitiveness										
HICP	-1.2	-0.6	-0.3	-0.5	-0.9	-0.8	-1.2	-0.5	-0.7	-0.3
ULC	-1.7	-0.6	-0.6	-0.5	-1.1	-0.5	-1.1	-0.5	-0.8	-0.1
Comp. per emp.	-1.0	-0.5	-0.7	-0.5	-0.9	-0.3	-1.0	-0.4	-0.5	0.5
Price competitiveness	1.0	0.5	0.7	0.4	0.7	0.7	0.7	0.5	0.5	0.2
Economic activity										
Real GDP	-1.7	-0.9	-0.6	-0.9	-1.2	-0.8	-0.6	-0.7	-0.9	-1.1
Consumption	-0.3	-0.1	-0.1	-0.0	-0.1	-0.0	-0.1	-0.1	-0.1	-0.2
Investment	-1.6	-1.2	-0.2	-1.1	-0.6	0.1	-1.2	-0.2	-0.9	-0.1
Real exports	-5.0	-3.8	-4.2	-4.1	-3.2	-5.2	-3.6	-4.6	-4.9	-3.4
Real imports	-3.0	-1.9	-1.6	-1.6	-2.1	-3.8	-2.9	-2.1	-2.4	-2.3
Unem.	2.1	0.8	0.4	0.8	1.3	0.9	0.5	0.8	1.1	1.6
Net lending										
L/Y	-1.1	-0.6	-0.7	-0.7	-1.0	-1.0	-0.4	-0.7	-0.8	-0.9
S/Y	-1.4	-0.8	-0.5	-0.8	-1.0	-0.7	-0.5	-0.6	-0.8	-0.8
I/Y	-0.3	-0.2	0.3	-0.2	-0.1	0.3	-0.2	0.2	0.0	0.1
L_p/Y	-1.1	-0.4	-0.4	-0.6	-0.6	-0.5	-0.3	-0.5	-0.6	-0.5
L_h/Y	-0.4	-0.4	-0.3	0.1	-0.5	-0.1	-0.2	-0.2	0.2	-0.2
L_c/Y	0.4	0.3	-0.1	-0.2	0.1	-0.4	0.2	-0.1	-0.4	-0.2

Notes: Adverse 10% three-year shock.

---

[23] This version of the model has been re-estimated partly compared to Dieppe et al. (2013).

7.1.2 Impact of an oil price fall by 20%

We assume that oil prices fall by 20% (Table 6). The impact of this is an increase in (real) imports, consumption and a fall in prices. The increase in real wages causes a rise in real disposable income with a positive feedback effect on consumption. The fall in prices has also a positive effect on investment in the majority of countries. The rise in consumption and investment affects demand with a standard multiplier effect. The joint impact of a fall in the import deflator and the strengthening in GDP also leads to an increase in real imports. One year after the shock net lending increases in the range between 0.5 and 0.8% of GDP, owing to a rise in saving to GDP ratio but also to fall in the investment to GDP ratio, as the rise in investment is less marked than that of output. From a sectoral perspective the net lending position of all sectors improves. Over time the positive effects on the real economy become stronger, reducing the initial negative impact of the shock on inflation. The overall impact on net lending patterns remains roughly the same, albeit the composition changes depending on the country.

Table 6: Oil price shock

	first year					third year				
	DE	ES	FR	IT	NL	DE	ES	FR	IT	NL
Prices, cost and competitiveness										
HICP	-0.8	-0.5	-0.5	-0.5	-0.6	-0.3	0.1	-0.4	-0.4	-0.6
ULC	0.2	0.2	0.1	0.0	0.1	0.8	0.9	0.2	0.2	0.3
Comp. per emp.	0.2	0.2	0.1	0.1	0.2	0.4	0.7	0.2	0.1	0.1
Price competitiveness	0.7	0.8	0.4	0.6	0.8	0.6	0.5	0.3	0.7	0.7
Economic activity										
Real GDP	0.4	0.2	0.1	0.1	0.2	0.6	0.5	0.2	0.2	0.5
Consumption	0.4	0.2	0.1	0.1	0.2	1.1	0.7	0.4	0.2	0.8
Investment	0.3	0.3	-0.0	-0.1	0.1	0.5	1.1	0.0	-0.0	0.2
Real exports	0.3	0.6	0.3	0.5	0.4	0.5	0.7	0.3	0.7	0.7
Real imports	0.3	0.4	0.2	0.1	0.3	0.9	1.2	0.3	0.4	0.7
Unem.	-0.3	-0.2	-0.1	-0.1	-0.2	-0.9	-0.5	-0.2	-0.2	-0.7
Net lending										
L/Y	0.8	0.6	0.7	0.5	0.6	0.7	0.5	0.8	0.6	0.6
S/Y	0.6	0.5	0.4	0.4	0.4	0.5	0.6	0.3	0.4	0.5
I/Y	-0.2	-0.1	-0.3	-0.1	-0.2	-0.3	0.0	-0.5	-0.2	-0.1
L_p/Y	0.2	0.2	0.1	0.1	0.1	0.4	0.3	0.2	0.2	0.3
L_h/Y	0.3	0.5	0.4	0.3	0.4	0.0	0.3	0.2	0.2	0.2
L_c/Y	0.2	-0.0	0.2	0.1	0.1	0.3	0.1	0.4	0.3	0.1

Notes: 20% three-year shock.

7.1.3 Impact of an effective exchange rate depreciation by 5%

Consider a scenario where the euro depreciates by 5% in effective terms (Table 7). The impact of this is that import prices rise strongly, while there is a more gradual pass-through on HICP inflation. Following a gain of export competitiveness, real exports rise with a positive feedback on investment. Notwithstanding the rise in nominal exports, the current account (and hence net lending) deteriorates initially in Germany owing to the J-curve effect. Over time, however, net trade turns positive also in Germany, while imports and consumption generally fall in response to the rise in the respective deflators. Three years after the shock the impact on GDP remains positive while unemployment falls in the range between 0.4 and 0.8%.

Table 7: Effective exchange rate shock

	first year					*third year*				
	DE	ES	FR	IT	NL	DE	ES	FR	IT	NL
Prices, cost and competitiveness										
HICP	0.9	0.5	0.5	0.6	0.6	1.3	0.9	0.6	0.8	0.7
ULC	0.3	0.2	0.2	0.2	0.3	0.7	0.6	0.3	0.5	0.3
Comp. per emp.	0.3	0.2	0.3	0.3	0.3	0.3	0.4	0.2	0.3	-0.0
Price competitiveness	1.8	0.8	1.3	1.2	1.0	1.3	0.5	1.4	0.9	1.1
Economic activity										
Real GDP	0.5	0.4	0.3	0.5	0.5	0.5	0.4	0.4	0.5	0.6
Consumption	-0.1	-0.0	-0.0	-0.0	-0.0	-0.5	-0.1	-0.1	-0.1	-0.2
Investment	0.4	0.5	0.1	0.6	0.2	0.1	0.8	0.1	0.7	0.1
Real exports	1.1	0.6	1.1	1.0	0.5	1.3	0.6	1.4	1.1	1.0
Real imports	0.1	-0.1	-0.2	-0.2	0.0	-0.3	-0.1	-0.0	-0.4	0.2
Unem.	-0.5	-0.3	-0.2	-0.4	-0.4	-0.8	-0.4	-0.4	-0.6	-0.8
Net lending										
L/Y	-0.2	0.0	0.0	0.1	0.4	0.3	0.1	0.1	0.2	0.6
S/Y	0.1	0.2	0.1	0.2	0.2	0.3	0.2	-0.2	0.2	0.3
I/Y	0.3	0.1	0.1	0.1	-0.1	0.1	0.1	0.1	0.1	-0.3
L_p/Y	0.3	0.1	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.2
L_h/Y	-0.1	-0.0	-0.0	-0.2	0.0	0.1	0.0	-0.0	-0.3	0.0
L_c/Y	-0.3	-0.1	-0.1	0.1	0.2	-0.1	-0.1	-0.2	0.2	0.3

Notes: 5% three-year shock.

7.2 Fiscal policy shocks

7.2.1 Impact of a government consumption contraction by 0.5% of GDP

In this simulation government consumption is decreased by 0.5% of GDP for 3 years (Table 8).
In the short-term the effect of a fall in government consumption has a direct negative impact on
output in the range between 0.5 and 0.8%. The impact is partly mitigated by an improvement of
net trade, which is caused by the repressed import demand and a higher export demand stemming
from improved price and wage competitiveness. Given rigidities in wage and price setting these
effects persist, yielding lower real wages and a fall in employment. Lower income also exercises
downward pressure on consumption, albeit the effect is partly mitigated by a lower price consumption
deflator. One year after the shock a significant contraction of government consumption leads to an
improvement in net lending by about 0.1% of GDP. As to be expected this stems mainly from
higher net lending by the public sector (although this is partly offset by higher net borrowing by
the household sector).

Three years after the shock the negative impact on growth gradually mitigates, owing to some
recovery in net trade. The positive impact on net lending gets therefore stronger at the three year
horizon, even if it stems only from the public sector as the private sector generally dissaves. There
is still an important impact on the unemployment rate in the range between 0.3 and 0.6%.

Table 8: Government consumption shock

	first year					third year				
	DE	ES	FR	IT	NL	DE	ES	FR	IT	NL
Prices, cost and competitiveness										
HICP	-0.4	-0.5	-0.2	-0.3	-0.3	-0.3	-0.9	-0.3	-0.3	-0.1
ULC	-0.5	-0.6	-0.4	-0.4	-0.4	-0.1	-0.9	-0.3	-0.4	-0.0
Comp. per emp.	-0.3	-0.4	-0.5	-0.4	-0.4	-0.1	-0.8	-0.1	-0.2	0.2
Price competitiveness	0.3	0.4	0.6	0.3	0.3	0.2	0.5	0.3	0.2	0.1
Economic activity										
Real GDP	-0.6	-0.8	-0.5	-0.6	-0.5	-0.3	-0.4	-0.4	-0.4	-0.4
Consumption	-0.1	-0.1	-0.1	-0.0	-0.0	0.0	-0.1	-0.0	-0.0	-0.1
Investment	-0.6	-1.0	-0.1	-0.7	-0.2	0.1	-1.0	-0.1	-0.3	-0.0
Real exports	0.2	0.3	0.4	0.2	0.1	0.2	0.6	0.4	0.3	0.1
Real imports	-0.3	-0.5	-0.2	-0.5	-0.2	-0.1	-0.5	-0.1	-0.4	-0.0
Unem.	0.7	0.7	0.3	0.6	0.5	0.3	0.4	0.5	0.5	0.6
Net lending										
L/Y	0.1	0.1	0.0	0.1	0.2	0.1	0.2	0.1	0.1	0.2
S/Y	0.0	-0.2	0.1	-0.0	0.1	0.3	0.1	0.2	0.2	0.2
I/Y	-0.1	-0.2	0.1	-0.1	-0.0	0.1	-0.1	0.1	0.0	0.1
L_p/Y	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.3
L_h/Y	-0.1	-0.4	-0.2	0.1	-0.2	-0.0	-0.1	-0.1	0.1	-0.1
L_c/Y	0.1	0.3	0.0	-0.1	0.1	-0.2	0.1	-0.0	-0.2	-0.1

Notes: 5% of GDP three-year temporary shock.

7.2.2 Impact of a government investment contraction by 0.5% of GDP

In this simulation government investment is reduced by 0.5% of GDP below the baseline for 3 years, reducing economic activity and leading to lower inflationary pressures similarly to the previous shock (Table 9). The overall impact on net lending is similar, falling by 0.1 to 0.3 as a percent of GDP depending on the country and time horizon. The impact is however stronger in terms of savings and investment ratios both at the aggregate level and sectorally. The fall in borrowing requirements stemming from the public sector is partly crowded out by developments in the household sector. Moreover, the small adjustment of the external deficit comes at the cost of a significant rise in unemployment.

Table 9: Goverment investment shock

	first year					*third year*				
	DE	ES	FR	IT	NL	DE	ES	FR	IT	NL
Prices, cost and competitiveness										
HICP	-0.3	-0.5	-0.2	-0.3	-0.2	-0.2	-0.7	-0.2	-0.3	-0.0
ULC	-0.5	-0.5	-0.4	-0.3	-0.3	-0.1	-0.7	-0.2	-0.3	0.0
Comp. per emp.	-0.3	-0.4	-0.4	-0.3	-0.2	-0.0	-0.7	-0.1	-0.1	0.2
Price competitiveness	0.3	0.4	0.5	0.2	0.2	0.1	0.4	0.2	0.2	0.0
Economic activity										
Real GDP	-0.5	-0.7	-0.4	-0.5	-0.3	-0.2	-0.3	-0.3	-0.3	-0.2
Consumption	-0.1	-0.1	-0.0	-0.0	-0.0	0.1	-0.0	0.0	0.0	0.0
Investment	-3.4	2.9	-2.8	-3.3	-2.7	-2.5	-3.0	-2.6	-2.9	-2.5
Real exports	0.1	0.3	0.3	0.2	0.1	0.2	0.5	0.3	0.2	0.1
Real imports	-0.4	-0.6	-0.4	-0.7	-0.3	-0.2	-0.6	-0.4	-0.6	-0.2
Unem.	0.6	0.7	0.3	0.5	0.4	0.2	0.3	0.4	0.4	0.4
Net lending										
L/Y	0.2	0.1	0.1	0.2	0.3	0.2	0.2	0.2	0.2	0.3
S/Y	-0.4	-0.6	-0.3	-0.5	-0.3	-0.2	-0.3	-0.3	-0.3	-0.2
I/Y	-0.6	-0.7	-0.4	-0.6	-0.5	-0.4	-0.6	-0.4	-0.5	-0.5
L_p/Y	0.2	0.2	0.3	0.2	0.3	0.4	0.3	0.3	0.4	0.4
L_h/Y	-0.1	-0.3	-0.2	0.0	-0.1	-0.1	-0.1	-0.1	0.0	-0.1
L_c/Y	0.1	0.3	0.0	-0.1	0.0	-0.2	0.1	-0.1	-0.2	-0.1

Notes: 0.5% of GDP three-year shock.

7.3 Interest rate shocks

7.3.1 Impact of an increase in long-term rates by 100 basis points

Long-term interest rates are increased by 100 basis points for three years (Table 10). The higher cost of capital generates a drop in investment and a deceleration in inventory accumulation and therefore weaker economic activity with a particularly strong impact on Spain and Italy. Private consumption reacts only marginally to the shock, as short-term rates are assumed in this simulation to be unchanged. Given the different response of investment and some heterogeneity on the accelerator mechanism, the negative impact on inflation is stronger in Italy and Spain. Net lending generally increases somewhat through the compression of investment in the corporate sector.

Table 10: Sovereign risk premium shock

	first year					*third year*				
	DE	ES	FR	IT	NL	DE	ES	FR	IT	NL
Prices, cost and competitiveness										
HICP	-0.01	-0.14	-0.01	-0.09	-0.01	-0.01	-0.50	-0.04	-0.20	-0.01
ULC	-0.01	-0.14	-0.02	-0.08	-0.02	-0.01	-0.53	-0.05	-0.23	-0.01
Comp. per emp.	-0.01	-0.12	-0.03	-0.12	-0.02	-0.01	-0.45	-0.05	-0.17	0.0
Price competitiveness	0.01	0.12	0.03	0.09	0.01	0.01	0.29	0.05	0.13	0.0
Economic activity										
Real GDP	-0.02	-0.25	-0.03	-0.24	-0.03	-0.01	-0.33	-0.06	-0.29	-0.03
Consumption	0.00	-0.03	0.00	-0.01	0.00	0.00	-0.09	-0.01	-0.03	-0.01
Investment	-0.12	-0.98	-0.22	-1.45	-0.23	-0.13	-2.35	-0.43	-2.39	-0.32
Real exports	0.00	0.08	0.02	0.06	0.01	0.01	0.32	0.05	0.14	0.01
Real imports	-0.01	-0.20	-0.03	-0.28	-0.03	-0.01	-0.47	-0.06	-0.5	-0.03
Unem.	0.02	0.22	0.02	0.19	0.02	0.01	0.31	0.06	0.32	0.04
Net lending										
L/Y	0.01	0.03	0.00	0.06	0.02	0.01	0.17	0.02	0.16	0.04
S/Y	-0.01	-0.22	-0.03	-0.21	-0.02	-0.01	-0.27	-0.05	-0.25	-0.02
I/Y	-0.02	-0.24	-0.03	-0.27	-0.04	-0.02	-0.44	-0.07	-0.41	-0.06
L_p/Y	-0.01	-0.11	-0.02	-0.13	-0.01	-0.01	-0.18	-0.04	-0.18	-0.01
L_h/Y	0.00	-0.11	0.02	0.02	0.02	0.00	-0.08	0.06	0.07	0.05
L_c/Y	0.02	0.24	0.01	0.18	0.01	0.02	0.43	0.01	0.26	0.00

Notes: Increase of 100 basis points.

References

[1] Angelini, E. and Dieppe, A. and Pierluigi, B., 2013. Learning about wage and price mark-ups in euro area countries, ECB Working Paper, No. 1512.

[2] Atoyan, R., Manning, J. and Rahman, J. 2013. Rebalancing: evidence from current account adjustment in Europe, IMF Working Paper, No. 74.

[3] Bahaj, S. A., 2013. Sovereign risk and sectoral net lending: a cross country perspective, mimeo.

[4] Baumann, U., Dieppe, A., Gonzales-Pandiella, A.,and Willman, A., 2013. Model of the United States economy with learning MUSEL, mimeo.

[5] Bianchi, J., 2011. Overborrowing and systemic externalities in the business cycle, *American Economic Review* 101: 3400-3426.

[6] Blanchard, O., 2007. Adjustment within the euro. The difficult case of Portugal, *Portuguese Economic Journal* 6: 1-21.

[7] Blanchard, O. and Giavazzi, F., 2002. Current account deficits in the euro area: the end of the Feldstein Horioka Puzzle?, *Brookings Papers on Economic Activity* 33: 147-210.

[8] Bonci, R. and Columba, F., 2008. Monetary policy effects: new evidence from the Italian flow-of-funds, *Applied Economics* 40: 2803-2818.

[9] Ca' Zorzi, M., Chudik, A, and Dieppe, A., 2012a. And then current accounts (over)adjusted, *Empirical Economics* 43: 245-270.

[10] Ca' Zorzi, M. Chudik, A, and Dieppe, A., 2012b. Thousands of models, one story: current account imbalances in the global economy, *Journal of International Money and Finance* 31: 1319-1338.

[11] Ca' Zorzi, M. and De Santis, R.A., 2004. Currency unions and the real exchange rate, *Economics Letters,* 85(1): 23-27.

[12] Ca' Zorzi, M., De Santis, R.A. and Zampolli, F., 2012. The minimum economic dividend for joining a currency union, *German Economic Review*, 13(2), 127-141.

[13] Ca' Zorzi, M., Rubaszek, M., 2012. On the empirical evidence of the intertemporal current account model for the euro area, *Review of Development Economics* 16 (1), 95-106.

[14] Chen, R., Milesi-Ferretti, G-M., and Tressel, T., 2012. External imbalances in the euro area, IMF Working Paper, No. 236.

[15] Chinn, M.D., Prasad, E.S., 2003. Medium-term determinants of current accounts in industrial and developing countries, *Journal of International Economics,* 59(1): 47-76.

[16] Corsetti, G., Meier, A., Müller. G.J, 2012. Fiscal stimulus with spending reversals, *The Review of Economics and Statistics,* 94(4): 878-895.

[17] Corsetti, G., Müller. G.J., 2008. Twin deficits, openness, and the business cycle, *Journal of European Economic Association,* 6(2-3): 404-413.

[18] Dieppe, A., Gonzales-Pandiella, A., Hall, S. and Willman, A., 2012. The ECB's new multi-country model for the euro area: NMCM - Simulated with rational expectations, *Economic Modelling,* 29, 2597-2614.

[19] Dieppe, A., Gonzales-Pandiella, A., Hall, S. and Willman, A., 2013. Limited information minimal state variable learning in a medium-scale multi-country model, *Economic Modelling,* 33, 808-825.

[20] ECB, 2012. Competitiveness and external imbalances within the euro area, Occasional Paper No. 139.

[21] Galí, J. 2013. Notes for a new guide to Keynes (I): wages, aggregate demand, and employment, *Journal of European Economic Association,* 11(5).

[22] Galí, J. and Monacelli, T. 2013. Understanding the gains from wage flexibility: the exchange rate connection, Barcelona GSE Working Paper, No. 746.

[23] Holinsky, N., Kool, C. and Muysken, J., 2012. Persistent macroeconomic imbalances in the euro area: causes and consequences, Federal Reserve Bank of St. Louis Review, 94(1):1-20.

[24] Jaccard, I., 2013. Liquidity constraints, risk premia, and the macroeconomic effects of liquidity shocks, ECB Working Paper, No. 1525.

[25] Jaumotte, F. and Sodsriwiboon, P., 2010. Current account imbalances in Southern Euro Area, IMF Working Paper, No. 10/139.

[26] Lane, P. and Milesi-Ferretti, G., 2012. External adjustment and the global crisis, *Journal of International Economics* 88 (2012): 252-265.

[27] Lane, P. and Pels, B., 2012. Current account imbalances in Europe. CEPR Discussion Papers No. 8958.

[28] Lucas, R., 1990. Why doesn't capital flow from rich to poor countries? *American Economic Review* 80 (2): 92–96

[29] Mendoza E. G., 2010. Sudden stops, financial crises and leverage, *American Economic Review* 100(5): 1941-1966.

[30] Muellbauer, J. 2013. Conditional eurobonds and the eurozone sovereign debt crisis, *Oxford Review of Economic Policy, 29*(3): 610-645.

[31] Obstfeld, M., 2012. Does the current account still matter?, *American Economic Review: Papers and Proceedings,* 102(3): 1-23.

[32] Rahman, J., 2008. Current account developments in new member states of the European Union: equilibrium, excess and EU-phoria, IMF Working Paper No. 08/92.

[33] Reinhart, C. M., Rogoff, K.S., 2011. From financial crash to debt crisis, *American Economic Review* 101(5): 1676-1706.

[34] Williamson, J., 2007. Are global imbalances a problem? Manuscript for the conference currency and competitiveness. Austrian National Bank, pp. 19-20.