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Quarterly Report on the Euro Area

VOLUME 13 N° 3 (2014)

Highlights in this issue

- Focus: Private sector deleveraging: where do we stand?
- Structural reforms at the zero lower bound
- Member State vulnerability to changes in the euro exchange rate

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Directorate-General for Economic and Financial Affairs

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Table of contents

Foreword	5
I. Private sector deleveraging: where do we stand?	7
I.1. Introduction	7
I.2. Taking stock of the adjustment	8
I.3. The outlook	12
I.4. Conclusion	18
II. Special topics on the euro area economy	21
II.1. Structural reforms at the zero lower bound	21
II.2. Member State vulnerability to changes in the euro exchange rate	28
III. Recent DG ECFIN publications	35
Boxes	
I.1. Deleveraging needs based on a sustainability analysis	14
II.2.1. Estimating exchange rate pass-through rates into prices	28
II.2.2. Export demand equations for the euro area Member States	31



Marco Buti
Director General

The euro area's economy is struggling to shake off its lethargy. Most Member States have been unable to generate or sustain strong economic momentum since the outbreak of the global economic and financial crisis in 2008. Indeed, recent data dent hopes that an acceleration of the economic recovery is imminent, suggesting rather that it will remain subdued: euro area output stagnated in the second quarter of 2014 and sentiment indicators, such as the ESI and PMI, have declined in recent months.

The difficult economic environment calls for the parallel implementation of supply- and demand-side measures aiming at closing the output gap and increasing potential output. In this context, investment plays a vital role. Weak investment is a key reason for the euro area's sluggish growth. Weak investment weighs on supply (by affecting the capital stock) as well as demand. Commission estimates show that the fall in investment since the crisis has knocked off nearly half a percentage point from the euro area's potential growth.

As stressed by ECB President Mario Draghi in his September speech at Jackson Hole, the euro area needs a three-pronged strategy encompassing monetary, fiscal and structural policies, appropriately timed within a credible framework. Let me focus on key priorities for the last two.

First, growth-friendly fiscal consolidation remains crucial. This includes a thorough implementation of the reinforced fiscal governance framework to ensure its credibility. Further efforts should be made to raise the quality of public expenditure, prioritise productive investment, and make tax systems more fair and efficient. Countries with more fiscal space should take measures to encourage domestic demand, with a particular emphasis on promoting investment.

Second, further structural reforms are needed to boost growth and restore competitiveness so as to enable countries to grow out of debt and to generate more and better jobs. By opening up markets, fostering employment and stimulating innovation, reforms can create new profitable investment projects. Some

economists have recently argued that structural reforms could be counter-productive at the current juncture because their short-term effect on growth could be negative when monetary policy is constrained by the zero lower bound. However, simulations presented in this report show that, while the short term impact of structural reforms on economic activity can be negative under the zero lower bound, these effects are likely to be small and depend on the measure adopted. Postponing reforms would not improve economic conditions at the zero bound.

Although reforms are mainly the responsibility of Member States, the euro area's architecture can offer its support. For instance, the country-specific recommendations (CSRs) already set out policy avenues to address their most urgent reform needs. The CSRs and their implementation are closely monitored by the Eurogroup, which is currently focusing in particular on questions related to labour taxes and on services markets. Analyses of the implementation of CSRs reveal that peripheral countries have generally shown more reform activism than most of the other euro area members. Further support could be also be provided by designing incentives (sticks and carrots) for Member States to reform their economies.

Finally, to boost investment, policies need to remove regulatory bottlenecks to investment, ensure better use of available funding, improve access to long-term financing, and complete the Banking Union, so as to address financial fragmentation and ensure financial stability.

Overall, credibly implementing the reform priorities identified remains a challenge. Different views about the causes of the crisis and on the appropriate policy responses have undermined trust between Member States. Forging an agreement over the best way forward among all Member States will help to rebuild trust and commitment to reforms. The launch of an ambitious EUR 300 bn investment plan, announced by the Commission's President-elect Jean-Claude Juncker at the European Parliament last July, will provide the opportunity for such a comprehensive strategy.

I. Private sector deleveraging: where do we stand?⁽¹⁾

This focus section contributes to the debate on private sector deleveraging by reviewing the adjustment achieved so far in household and corporate indebtedness, by estimating remaining deleveraging needs and by discussing their materialization in the coming years. The main findings of the analysis can be summarised as follows.

First, deleveraging of firms and households is under way in many Member States but the adjustment process still has a long way to go given the magnitude of the debt increase before the crisis.

Second, the fall in household and corporate debt-to-GDP ratios, which picked up pace in 2013, has been increasingly driven by negative credit flows. This process, which we term 'active deleveraging', has had adverse knock-on effects on economic activity and asset markets.

Third, the remaining deleveraging needs are still high, including in economies that have already deleveraged by a considerable amount. We estimate that corporations and households in several vulnerable countries may still need to cut their debt-to-GDP ratio by at least 30 percentage points. Elevated credit market deleveraging pressures, often compounded by fragilities due to the distribution of debt, are likely to force this adjustment to occur mostly through active debt repayment over the short-to-medium term, with negative effects on economic activity in the years to come.

To ease the adjustment process and minimise its economic and social impacts, additional policies to boost growth and restore inflation to normal levels should be considered in tandem with policies to strengthen bank balance sheets and to improve the functioning of insolvency frameworks.

I.1. Introduction

The private sector balance sheet repair process taking place in several euro area countries is one of the main factors shaping current economic activity in the euro area. The extent, speed and results of this adjustment vary across Member States depending on their degree of excessive indebtedness, but also on the economic outlook and broader credit market conditions, which determine the private sector's ability and readiness to carry debt.

Against this backdrop, this focus section reviews the adjustment achieved so far in household and corporate indebtedness, and estimates how much further they still need to go and how this adjustment will occur over the coming years.

Throughout this note, the term *deleveraging* refers to the reduction of a sector's debt-to-GDP. Three related concepts are used in the analysis: *deleveraging likelihood*, *deleveraging needs*, and *deleveraging pressures*. The *deleveraging likelihood*, is the likelihood that a sector's indebtedness will turn out to be unsustainable at the end of the expansion phase of the economic cycle. *Deleveraging needs* represent the excessive (or unsustainable) portion of current debt. *Deleveraging pressures* are related to credit

demand and supply conditions, which determine whether and how the deleveraging needs gap will be closed. Special attention is paid to the link between the urgency or acuteness of *deleveraging pressures*, and the resulting deleveraging modes, which are characterised by the degree to which deleveraging is achieved through the active repayment of debts.

An *active deleveraging* mode is one mostly driven by negative net credit flows (the result of credit supply and/or credit demand pressures), which lead to a nominal contraction of balance sheets. Active deleveraging may face headwinds from the effects of falling or stagnating economic activity, or very low inflation, on nominal GDP (because of the denominator effect).

A *passive deleveraging* mode is one where the debt-to-GDP ratio is gradually reduced while net credit flows remain moderately positive. The nominal debt stock increases at a rate lower than nominal GDP growth, leading to a fall in the indebtedness ratio.

An *unsuccessful deleveraging* mode is one where the debt-to-GDP ratio stagnates, or even increases, despite significant negative net credit flows. In that case the contraction of aggregate demand, in part induced by private deleveraging especially if occurring together with fiscal consolidation or

⁽¹⁾ Section prepared by Peter Pontuch.

another factor affecting aggregate demand, has deflationary effects on GDP.

In passive deleveraging the size of the sector's balance sheet is preserved (or slightly increases) in nominal terms, leading to less drag on aggregate demand, lower stress for asset markets, and an overall smoother process. Active deleveraging, by contrast, is likely to be more challenging, leading to a stronger fall in asset prices (also driving up non-performing loans) and to second-round effects via credit supply. The process may have consequences on productivity and economic growth in the medium and long term, due to a prolonged period of subdued investment and low employment. The most extreme case, that of *unsuccessful deleveraging*, may generate even more fragilities in the financial sector, further reinforcing the overall contraction in activity and amplifying social and economic costs.

I.2. Taking stock of the adjustment

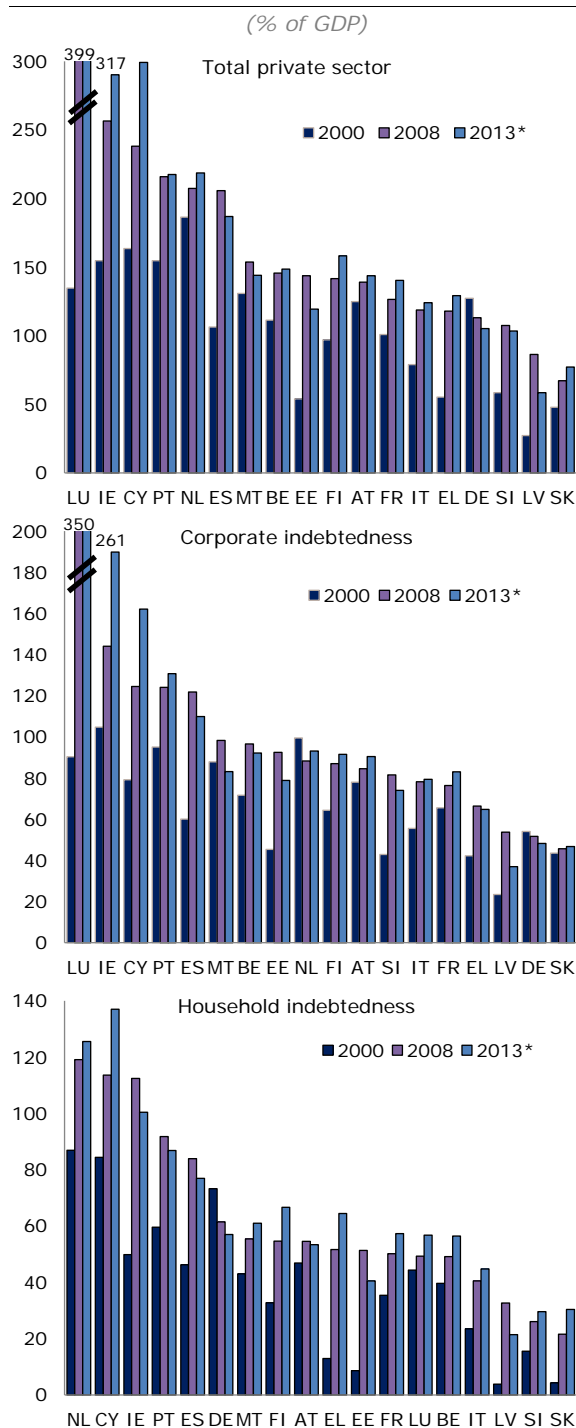
I.2.1. Indebtedness is being reduced

The starting point of the analysis is the evolution of total private non-financial sector consolidated indebtedness relative to GDP. Measures of debt relative to the capacity to repay are central for the assessment of long-term sustainability, although in the short term, debt servicing-to-income ratios are equally if not more relevant for sustainability and solvency. Changes in debt-to-GDP, reflecting the amount of external funds owed by the sector, are also central for gauging the effects on aggregate demand. In the upward phase of the cycle, these funds finance additional spending, while in the downturn, debt repayment may compress it.

Between the start of the financial crisis in 2008 and 2013, total private indebtedness fell in six euro area countries. However, for most cases the extent of the adjustment is just a fraction of the pre-crisis increase (see top of Graph I.1). Luxembourg leads the ranking of countries that have reduced indebtedness, although the reduction is not a genuine deleveraging process but instead reflects the specific structure of this economy. (2)

(2) The size of the corporate sector relative to the Luxembourgish economy is due to the fact that many corporate centres of multinational groups are located here. Changes over time of the degree of centralisation of group financing by these entities can lead to large changes in aggregate statistics. .

Graph I.1: Private non-financial sector indebtedness



(1) Data consolidated at sector level. The initial observation is 2000 except: 2001 for SI and IE, 2004 for MT, 2006 for LU. The 2013* figure is estimated from 2013Q4 data, except for CY and LU where the 2012 figure is presented.

Source: Eurostat, DG ECFIN calculations.

It is followed by Latvia and Estonia, where adjustment was in the 25 to 30 pp. range, and Spain at less than 20 pp. Germany and Malta have also reduced private indebtedness since 2008, by almost

10 pp. The German case deserves specific attention, as Germany's private sector is the only one that has been deleveraging throughout the 2000s period.

Graph I.1 also reveals that in several countries, overall private indebtedness has significantly increased since 2008. High double-digit increases have occurred in Cyprus and Ireland, while increases in Finland, France, the Netherlands and Greece were more moderate but still more than 10 pp.

The split between household and corporate indebtedness in the second and third panel of Graph I.1 is useful for interpreting these heterogeneous developments since the crisis. In particular, corporate indebtedness was behind several notable cases of changes in private indebtedness, such as the post-2008 increase in Ireland and in Cyprus (in the latter, household indebtedness also increased over that period), as well as the fall in Luxembourg.

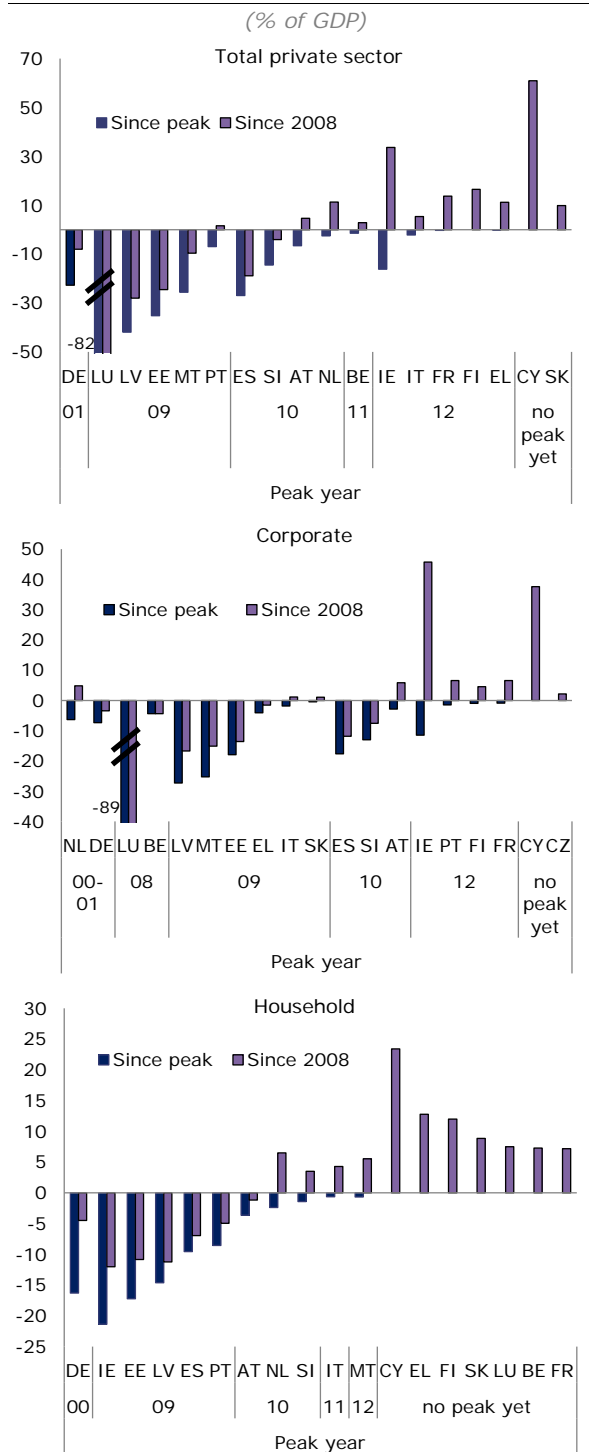
By contrast, post-2008 private deleveraging in Spain, Latvia and Estonia has been almost equally driven by firms and households (although, for instance, in Spain firms increased their net lending at a later stage than households).

I.2.2. Deleveraging activity has intensified

The previous analysis suggests that only a portion of the pre-2008 increase in private indebtedness has been reduced so far. This presentation, however, conceals more recent deleveraging efforts, as most countries' household and corporate indebtedness peaked after 2008. In a number of cases, household and corporate indebtedness have recently followed quite dissimilar paths, leading to a range of peak years. For this purpose, Graph I.2 first ranks countries by the year in which their household, firm or total private debt-to-GDP peaked, and then compares the adjustment of the debt ratio since that peak with the change since 2008.

Individual peaks in the indebtedness of firms (most of them occurring in 2009/10) reveal more generalised deleveraging activity in the recent period. Deleveraging efforts since the peak exceed 10% of GDP in Luxembourg, Latvia, Malta, Spain, and Estonia. Corporate indebtedness in Ireland continued increasing through 2012, then reversed in 2013.

Graph I.2: Change in private indebtedness as of 2013e

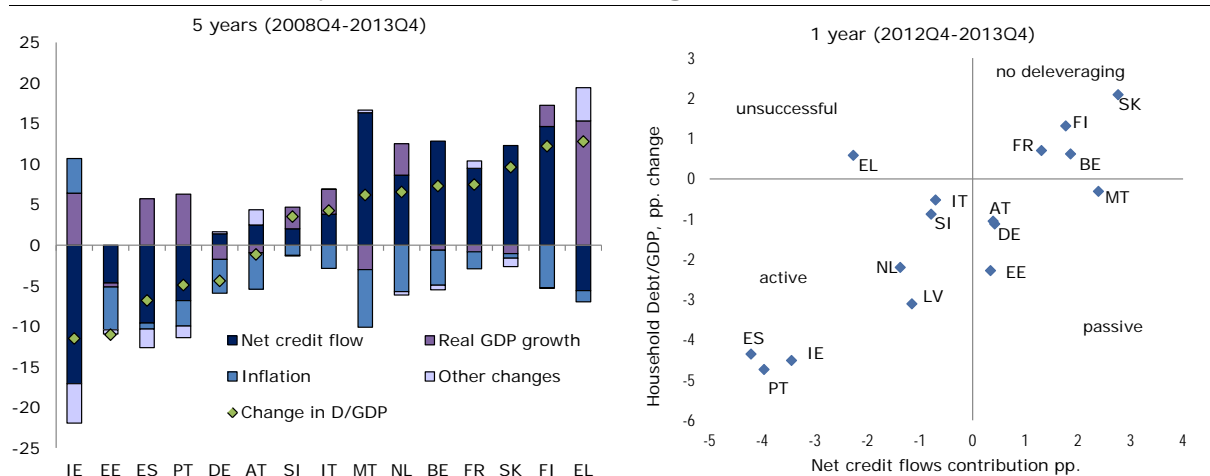


(1) Data consolidated at the sector level.

Source: Eurostat, own calculations

A notable adjustment is also apparent in the household sector. Eight Member States saw a peak in indebtedness in 2009 or 2010 and in all cases the subsequent deleveraging effort is significantly higher than when 2008 is taken as the reference year. Overall household deleveraging in excess of

Graph I.3: Drivers of the change in household debt



(1) Non-consolidated data. Cumulative change of D/GDP ratio decomposed into the contributions of i. net credit flows, ii. other changes in outstanding debt (e.g., valuation effects or write-offs), iii. real GDP growth, and iv. inflation. (2) The x-axis on the right-hand panel graph represents the contribution of net credit flows to the decrease of the D/GDP ratio over the period.

Source: Eurostat, DG ECFIN calculations

10% of GDP since the peak has been observed in Ireland, Estonia and Latvia. Indebtedness of other countries' households has so far retreated little (e.g., Netherlands, Slovenia or Italy), or not at all (e.g., Cyprus, Greece, France and Finland).

For the private sector as a whole, overall deleveraging in excess of 20 pp. since the peak has been observed, among others, in Latvia, Estonia, and Spain. A more moderate but still significant private debt reduction occurred in Ireland, while some deleveraging also occurred in Portugal, Slovenia, and Austria. Deleveraging of the private sector in other Member States has been limited.

In the unique case of Germany, both households and firms have been deleveraging since the early 2000s. Household indebtedness peaked in 2000 and has been decreasing ever since, both before and after 2008, with a total reduction of some 16 pp. over the 14-year period. The indebtedness of the German corporate sector (and also the Dutch) peaked at the beginning of the 2000s, although the total reduction in debt is milder compared to that of households. Overall, the German private sector has deleveraged by about 22% of GDP since its peak in 2001, confirming a unique indebtedness path for this country. One should note, however, that the country was among the more indebted ones in 2000, which could at least to some extent explain the trend.

1.2.3. Deleveraging is increasingly active

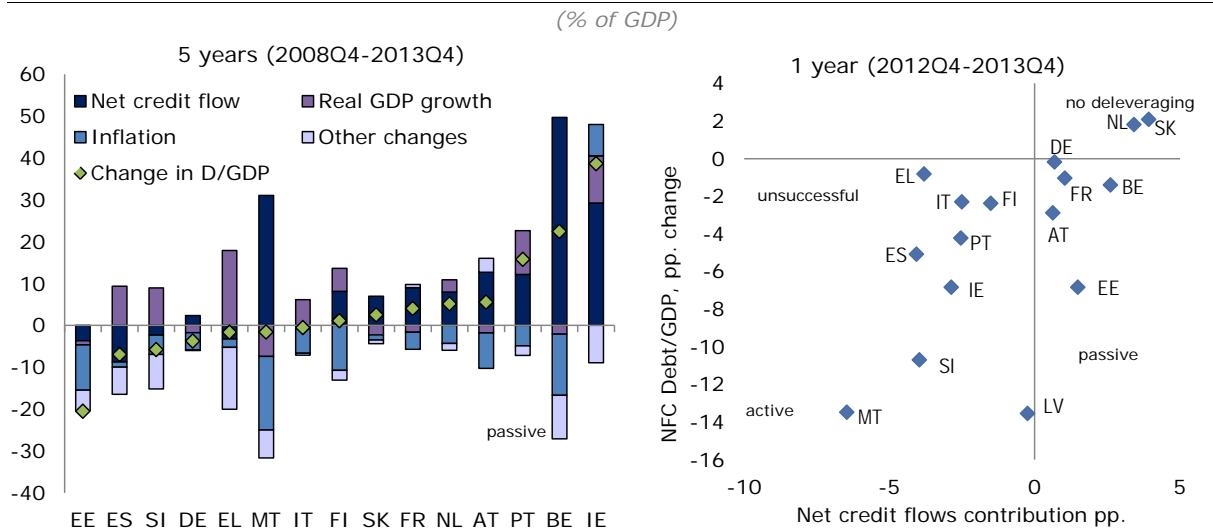
In order to identify cases of active deleveraging, the analysis proceeds by splitting the change in the debt/GDP into four underlying factors:

- net credit flows, i.e. the flows of new loans minus repayments;
- other changes in outstanding nominal debt such as valuation changes (e.g. due to foreign currency denomination), debt write-downs or restructuring,
- real GDP growth, and
- inflation (measured by the GDP deflator).

The latter two components affect the denominator of the ratio. One can identify the deleveraging mode, as defined in the introduction, by assessing the factors driving the change of the debt ratio.

First, looking at the cumulative change in the household debt/GDP ratio since 2008, negative credit flows have so far been the main driver of deleveraging. In several cases, active credit repayment faced headwinds from subdued economic activity and low inflation. For instance, indebtedness reduction in Ireland, Estonia, Spain, and Portugal has in all cases been driven by significant negative credit flows (see Graph I.3). But among these countries, the active credit

Graph I.4: Drivers of the change in corporate debt



(1) Non-consolidated data. Cumulative change of D/GDP ratio decomposed into the contributions of i. net credit flows, ii. other changes in outstanding debt (e.g., valuation effects or write-offs), iii. real GDP growth, and iv. inflation. (2) The x-axis on the right-hand panel graph represents the contribution of net credit flows to the decrease of the D/GDP ratio over the period.

Source: Eurostat, DG ECFIN calculations.

repayment has been aided by nominal GDP growth only in Estonia.

By contrast, a real contraction of the economy since 2008, accompanied by subdued inflation related to restoration of competitiveness, has led to a partial offsetting of the deleveraging effort in Ireland, Spain, and Portugal. The GDP contraction in Greece, driven by both private and public consolidation efforts, has more than offset the cumulative negative credit flows, and household debt-to-GDP has actually increased.

Despite the absence of obvious deleveraging pressures, German households have undergone passive deleveraging with only slightly positive cumulative net credit flows, outpaced by the nominal GDP growth.

The trend over the four quarters of 2013 (right panel of Graph I.4) points to an acceleration of active debt repayment by households in Spain and Portugal, while the effort continues to be partially offset by the contraction of the economy. Active deleveraging can also be seen in 2013 in Ireland, at a somewhat slower pace than in previous years. The Netherlands, Latvia and Slovenia have recently also been actively deleveraging. In Greece, the contraction of the economy continued to complicate the reduction of debt-to-GDP, but the contribution of other changes (which capture debt

write-downs) have helped to contain further increases in the ratio.

The cumulative reduction of corporate indebtedness since 2008 has been driven to a somewhat lesser extent by negative credit flows. Active corporate deleveraging efforts have been significant in Spain (see Graph I.4), while some can also be seen in Estonia and Slovenia. By contrast, Malta, Belgium and Ireland experienced strong positive cumulative credit flows over that period, which in the latter two cases led to significant increases in the corporate debt-to-GDP ratio. These developments reflect, to a certain extent, the activity of large corporate groups. (3)

The deleveraging efforts of firms have become more pronounced recently. The short-term trend over the four quarters of 2013 suggests that deleveraging accelerated in Slovenia, Ireland, and Italy (right panel of Graph I.4). Almost all countries saw their corporate indebtedness recede in 2013, led by changes of more than 10 pp. in Malta, Slovenia, and Latvia by more than 10 pp. over the year. The contribution of negative credit flows in 2013 was in general more significant than suggested by the cumulative data for the 2008-13

(3) For the analysis of deleveraging drivers, non-consolidated data are used. Eurostat quarterly sector data are only available in this format. This further exacerbates the problem of corporate groups.

period. Flows in Malta, Slovenia, Spain, Ireland and Greece were close to 4 pp. A passive deleveraging, through low but positive credit flows at a rate below nominal GDP growth (and also including other debt changes such as valuation effects and write-offs) can be seen among firms in Estonia, Austria and Belgium.

I.3. The outlook

I.3.1. Estimates of potential deleveraging needs

The objective of this section is to assess and quantify remaining potential deleveraging needs. To this end, a range of indicators of potential deleveraging needs is constructed, based on two estimation methods. ⁽⁴⁾

The first method defines a sustainable level of debt by estimating debt that is consistent with households' and firms' assets corrected for valuation effects. ⁽⁵⁾ This method takes into account country- and time-specific factors such as the starting level of debt and the extent of the asset price boom in the pre-crisis period. By cumulating from the starting point in 2000 the annual gap between changes in actual debt and in its sustainable counterpart the method yields an estimate of excess indebtedness (see box for further details).

The second method is based on the typical extent of deleveraging in past episodes, and is a function of the preceding debt increase. Bornhorst and Ruiz-Arranz (2013) provide an overview of historical deleveraging episodes and assess ongoing deleveraging in the euro area. ⁽⁶⁾ For households, they find that protracted deleveraging episodes that follow a credit boom tend to almost completely offset the increase incurred during the boom. Their analysis also reveals, however, that in the current credit cycle, U.S. households have deleveraged by only about two-thirds of the

previous debt increase. As for firms, a very similar pattern emerges from historical experience. On average, about two-thirds of the indebtedness increase during the boom phase is reduced after the bust. We, therefore, conventionally define for both firms and households, a second measure of deleveraging needs as the gap between the latest indebtedness figure (D/GDP) and the level where two-thirds of the boom-period increase has been adjusted. One should note that for both households and firms, this estimation method can overestimate deleveraging needs in the case of economies which started the period with a low indebtedness and then underwent some catching-up.

The range of potential deleveraging needs is presented separately for countries where deleveraging seemed likely at the latest peak of the credit cycle. For this purpose, the likelihood of deleveraging by households and firms is assessed using composite indicators by Cuerdo et al. (2014), simultaneously assessing several alternative indebtedness ratios (leverage as well as capacity-to-repay ratios, in both levels and changes over the accumulation phase). Countries above a judgemental cut-off threshold are considered as having had a high likelihood of deleveraging at the peak of the latest cycle.

Among countries which had a high likelihood of household deleveraging, the amount of debt that still needs to be reduced could exceed 10% of GDP in seven countries, including Greece, the Netherlands, Cyprus and Spain, and possibly Ireland (left panel of Graph I.5). However, even among other euro area Member States, particularly some of the new ones, potential deleveraging needs could be significant in a number of cases.

One should note that the gap based on the historical norm could overstate actual deleveraging needs in catching-up economies (e.g. Estonia, Latvia, and Slovakia) and economies that started at low household debt levels (like Finland). Moreover, the gap based on the sustainability analysis may understate deleveraging needs in countries that underwent abrupt housing market adjustments (this is the case for Ireland, Cyprus, and to some extent Spain).

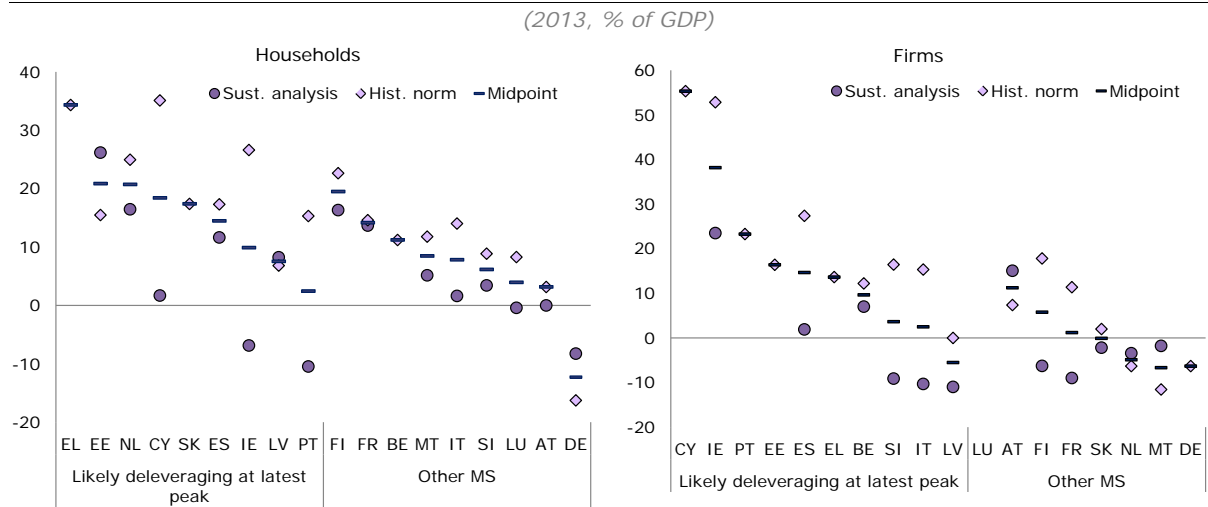
These two limitations of the estimation methods could explain the uncertainty signalled by the size of the estimated range for some countries (e.g. Cyprus and Ireland). This notwithstanding, the

⁽⁴⁾ Alternative estimation methods could have been envisaged based on fundamentals, e.g., similar to Albuquerque, B., U. Baumann, and G. Krustev (2014), "Has US Household Deleveraging Ended? A Model-Based Estimate of Equilibrium Debt", *ECB Working Paper* 1643.

⁽⁵⁾ The method was developed by C. Cuerdo, Drumond, I., Lendvai, J., Pontuch, P., and Raciborski, R. (2014). 'Private sector deleveraging in Europe', *Economic Modelling*, forthcoming.

⁽⁶⁾ Bornhorst, F. and M. Ruiz-Arranz (2013), 'Indebtedness and Deleveraging in the euro area', 2013 Article IV Consultation on euro area policies: Selected Issues Paper, Chapter 3, *IMF Country Report* 13/232.

Graph I.5: Estimated range of potential deleveraging needs



(1) The range of deleveraging needs is given by two estimation methods. The sustainability analysis is not available for a number of countries due to data limitations.

Source: DG ECFIN calculations.

analysis points to the fact that, when taken at face value, household deleveraging needs in Greece, Cyprus, Spain or Ireland, could be of a similar order of magnitude than those in the Netherlands.

The implications of these deleveraging needs, however, may be quite different in terms of the pace, of the mix between active and passive deleveraging, and of the overall implications for economic activity (discussed below).

Corporate deleveraging needs could exceed 10% of GDP in six Member States. Among these, Cyprus and Ireland are close to or above 40%, and Portugal and Estonia above 20% of GDP (see the right panel of Graph I.5). These raw estimates will be further qualified below using evidence on cross-border lending (in particular leading to downward revision of the Irish corporate over-indebtedness gap). Among countries not flagged as obvious deleveraging candidates, only the specific case of Luxembourg shows a significant indebtedness gap.

In summary, significant private sector deleveraging needs remain in several economies. Overall deleveraging needs may be well in excess of 30% of GDP in Cyprus, of which a larger part would stem from the corporate sector but where estimates for households point to a high degree of uncertainty that could conceal additional vulnerabilities. Ireland, Greece, and Spain could also face private deleveraging needs of at least 30% of GDP. A significant excess of private debt is also signalled in Portugal, the Netherlands, and Slovenia. In line with the observations from previous sections,

Germany is the only country where neither households nor firms signal indebtedness beyond sustainable levels.

However, these estimates of deleveraging have to be interpreted with caution. *First*, their materialisation through active debt repayment, as well as the speed and economic cost of this adjustment, will largely depend on the state of credit demand and supply (essentially reflecting the strength of the economy as well as the state of the financial sector).

Second, the distribution of debt across households and firms will play a central role, as the aggregate measures of indebtedness may understate, or overstate, the actual debt burden at the level of the household.

Third, deleveraging pressures in the corporate sector may be less severe if debt signalled as excessive by our aggregate measure merely reflects cross-border lending of corporate centres of large groups.

The next section explores these additional factors to refine the conclusions about expected deleveraging outcomes.

Box I.1: Deleveraging needs based on a sustainability analysis

Estimation of deleveraging needs in general requires the definition of a benchmark against which indebtedness can be compared. One of the two methods used in this focus section, proposed by Cuerpo et al. (2014), defines a sustainable level of debt inspired by the work by Arrow et al. (2004), according to which sustainability requires net worth to remain on a non-decreasing path. This definition of sustainability is made operational by requiring the leverage ratio to behave as a stationary series. In particular, leverage should not show an increasing trend, not ruling out temporary increases. Intuitively, to avoid unsustainable developments, signalled by non-stationary leverage ratios, private debt and assets should co-move in the medium-to-long term.

The selection of the relevant debt-to-assets concept to be used in the analysis hinges particularly on the choice of the denominator. A meaningful analysis of debt sustainability must take into account asset valuation effects that are subject to significant variability. To the extent possible, non-financial assets should also be included, especially for households, as the latter represent the bulk of their wealth. These considerations have a significant impact. Empirically, a denominator that includes valuation changes and uses the aggregate pool of assets generally flattens the dynamics of the normal leverage ratio. By contrast, if one adjusts the numerator and the denominator for valuation effects (by choosing a starting level in a given year and cumulating subsequent flows), the resulting notional leverage ratio turns out to be generally upward trending, i.e. unsustainable in terms of Arrow's approach.

Since notional leverage is, unlike standard leverage, able to detect debt build-up backed only by valuation changes, it is a more adequate measure of indebtedness during periods of asset price booms. We label debt as sustainable whenever it implies a stationary notional leverage. In practical terms, we calculate sustainable notional debt as the amount which would make notional leverage ratio follow the dynamics of the standard leverage ratio of debt to assets (the latter empirically behaving like a stationary series):

$$\% \Delta \frac{Debt_t}{Asset_{s_t}} = \% \Delta \frac{Not. \ debt_t^{Sust}}{Not. \ asset_{s_t}}$$

Sustainable notional debt is converted back into non-deflated terms by reincorporating debt valuation effects (although the latter are in general limited), and is calculated as a share of GDP. In order to obtain an estimate of the excess debt gap, we cumulate from 2000 on the annual gap between i. changes in actual debt-to-GDP and ii. changes in its sustainable counterpart. The choice of 2000 is motivated by the fact that this year immediately precedes the boom of the 2000s. This debt sustainability framework is used to develop a deleveraging benchmark separately for households (where financial and non-financial assets are used) and firms (only financial assets are used due to data availability, hence warranting more prudent interpretation).

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Cuerpo, C., Drumond, I., Lendvai, J., Pontuch, P., and Raciborski, R. (2014). 'Private sector deleveraging in Europe', *Economic Modelling*, forthcoming.

I.3.2. Other factors affecting the extent and acuteness of deleveraging

Credit market conditions

As discussed in a recent issue of the QREA, credit demand and supply conditions are the main driver of pressures that will determine how potential

deleveraging needs, as identified in the previous section, will ultimately materialise. (7)

The specific deleveraging pattern (i.e. the speed of deleveraging, the relative contribution of negative credit flows, possible over-/under-shooting, intensity of debt default) depends on broader

(7) See European Commission (2013). 'Assessing the private sector deleveraging dynamics', *Quarterly report on the euro area*, vol. 12(1).

economic conditions and sentiment, driving households' and firms' ability to hold debt, and on the financial sector's strength, capturing the availability of credit.

An analysis of the overall credit supply and demand conditions therefore refines the conclusions about the expected extent of deleveraging in the identified Member States, the likely deleveraging mode and the effects of this adjustment. For this purpose, indicators for credit demand and supply pressures are used and Graph I.6 presents the relative comparison of individual Member States. ⁽⁸⁾

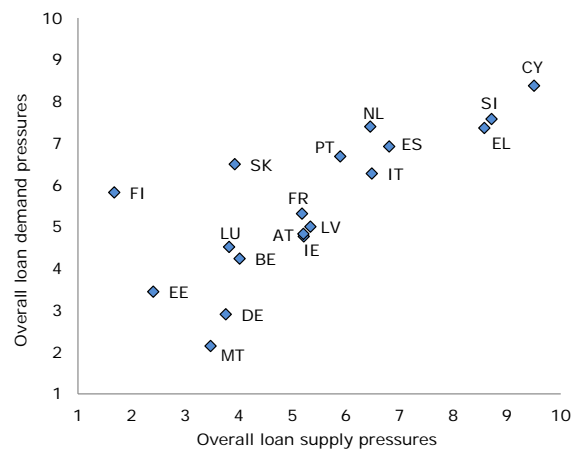
The analysis uses a set of variables that influence or reflect either credit supply or demand conditions. Although no variable is exclusively demand- or supply-related, the selected variables at least predominantly reflect one of the two sides of credit market conditions. The set of credit supply-related indicators includes variables reflecting financial soundness and direct survey data. On the credit demand side, measures of perceived economic conditions are included, together with macroeconomic variables (unemployment and housing market developments) and survey data.

The information is aggregated into composite indicators of credit demand and supply pressures based on the average ranking of Member States on each variable.

Relatively high pressures for immediate and active deleveraging can be expected to continue in the coming years in Cyprus, Greece and Slovenia. This process is likely to be characterised by negative credit flows and adverse impacts on economic activity, which may impair the adjustment process with a denominator effect via GDP. Spain, Portugal, Italy, and Ireland are in a similar situation to the previous group, albeit to a lesser extent. Negative credit flows are expected to weigh on economic growth in the near future. Within this group, Ireland appears to be more advanced in the process of credit market normalisation. The Netherlands may also continue to experience pressures for active deleveraging, but would face less immediate pressures if broader economic conditions improve in the coming quarters.

Graph I.6: **Credit supply and demand deleveraging pressures**

(2013)



(1) Aggregate indicators calculated based on Cuerdo et al. (2014).

Source: DG ECFIN calculations.

More advanced adjustment of indebtedness in the two Baltic members of the euro area can be explained by an earlier peak in credit market pressures.

Finally, countries such as Belgium, Germany, Austria, Finland, and France currently face low or moderate deleveraging pressures stemming from credit supply and demand. If any deleveraging is to be expected, it is likely to be mostly passive and gradual.

Fragilities from the distribution of household debt

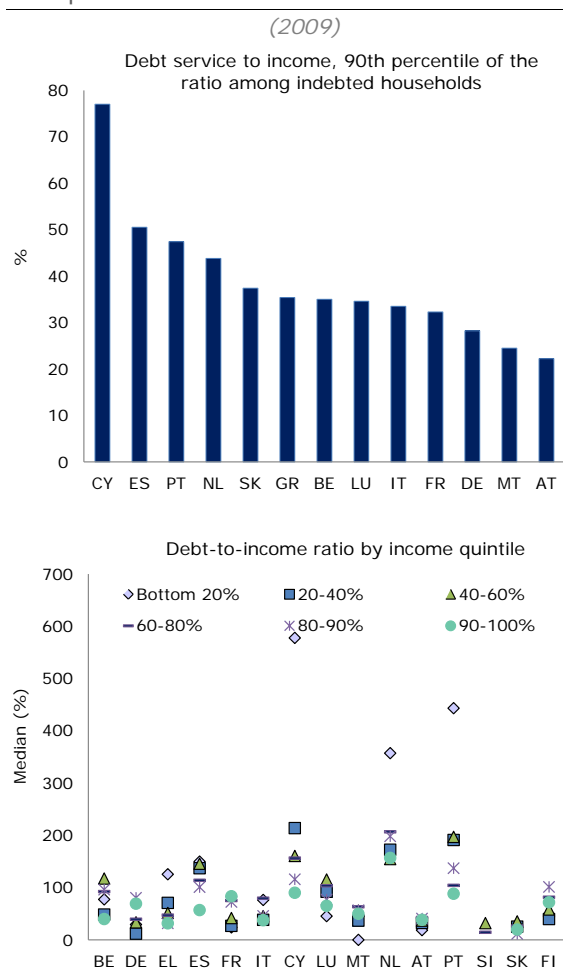
An important factor determining deleveraging among households is the distribution of debt within the sector, and more specifically, how it has matched the distribution of assets and income, in terms of both levels and shocks since the onset of the crisis.

All estimates of deleveraging needs in section I.3.1 are based on aggregate measures of debt at the level of the sector. One should recall, however, that low aggregate indebtedness may still conceal deleveraging risks if debt is concentrated among households with low-value assets and incomes under stress. Another important element is the level of debt servicing costs relative to incomes, which will drive the short-term sustainability of debt.

⁽⁸⁾ See Cuerdo et al. (2014) for details about the construction of the indicators.

To shed some light on these issues, this section uses household data from the Eurosystem Household Finance and Consumption Survey, which represents the state of households' balance sheets as of 2009 (the latest survey date). Although somewhat dated, owing to a long data production cycle, these figures still provide a relevant snapshot of balance sheet vulnerabilities at the peak of the latest credit cycle.

Graph I.7: **Distribution of household debt**



(1) Debt servicing expenses include all regular payments (principal, interest, other charges) related to a loan.
Source: Eurosystem Household Finance and Consumption Survey.

The analysis of short-term debt sustainability focuses on the top decile of the debt service-to-income ratio (i.e. the 10% of households with the highest debt burden). The top panel of Graph I.7 points to Cyprus as an outlier (debt servicing costs are above 70% of income), followed by Spain, Portugal and the Netherlands, all well above 40%.

The distribution of debt-to-income across income quintiles (bottom panel of Graph I.7) points to similar vulnerabilities in the four economies, while the debt-to-assets data provide less clear signals. The bottom income quintile's debt-to-income ratio, despite significant data variability, points to Cyprus, Portugal and the Netherlands as potentially vulnerable cases. The signals are consistent if one focuses on the next two quintiles (20-40 and 40-60), adding Spain to the vulnerable list.

The distribution of debt and the associated debt servicing burden leaves household balance sheets vulnerable in several countries with high credit market pressures, namely Cyprus, Spain, and Portugal (data for Ireland are not available in the survey). Similar fragilities are signalled for the Netherlands, which faces relatively lower credit market pressures.

Corporate cross-border lending

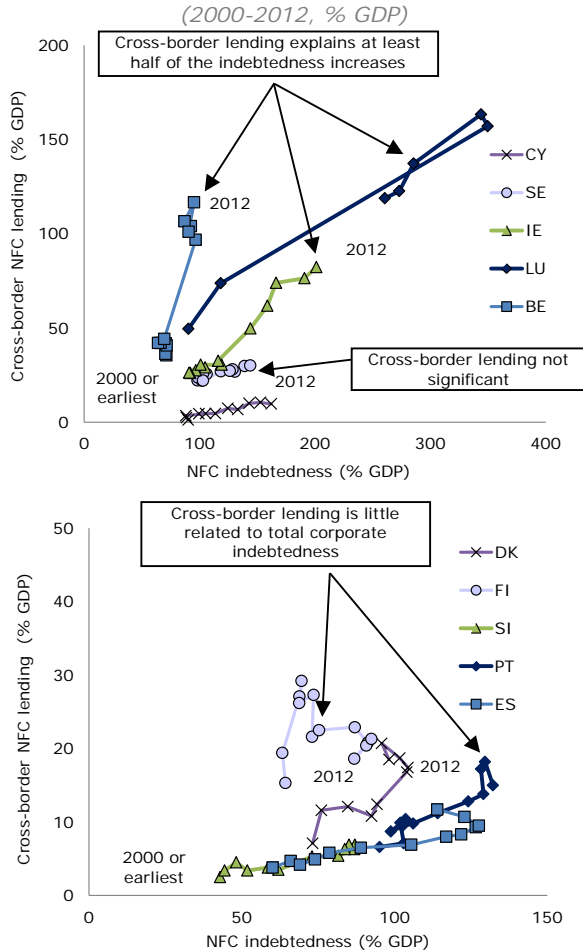
Cross-border lending and borrowing activity of large corporate groups is an important factor that needs to be taken into account when assessing the deleveraging outlook. Some countries home to the regional or global financial offices of large corporate groups report in their national statistics debt that is centrally issued by these resident entities, even though the funds raised leave the country shortly after issuance in the form of lending to foreign subsidiaries.

A simple estimate of cross-border lending can be constructed from sector financial accounts. Loan assets in the consolidated NFC sector balance sheet are loans held by NFCs against resident counterparties in the household, financial or government sectors, or against non-residents. It is reasonable to assume that the share of loans to resident non-NFC entities is very small. Hence, most consolidated loans held by NFCs are related to cross-border lending, the counterparties being most likely foreign corporates.

This proxy of cross-border lending is plotted against aggregate corporate indebtedness over several years in selected countries (Graph I.8). Cross-border lending seems to explain a significant part of the changes in corporate indebtedness seen since 2000 in Belgium, Luxembourg, and Ireland. By contrast, foreign lending was not a significant driver of corporate indebtedness in Cyprus, Spain, Slovenia, or Portugal (the latter not presented). Similarly, Finland only marginally increased its

firms' foreign lending position over the sample period.

Graph I.8: Corporate indebtedness and cross-border lending,



(1) Annual consolidated NFC indebtedness reported on the x-axis against an estimate of cross-border lending on the y-axis.

Source: Eurostat, DG ECFIN calculations.

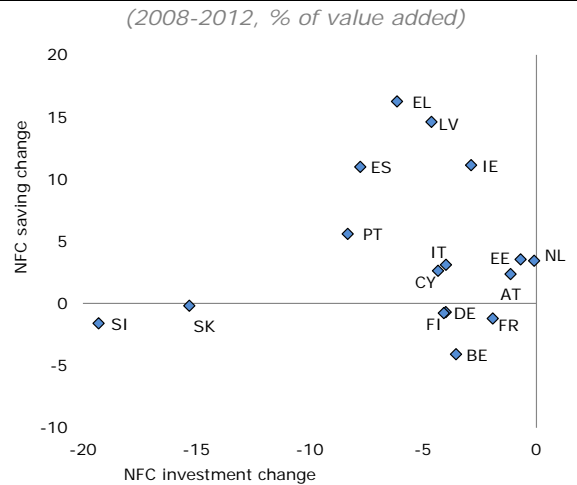
In summary, more than half of the increase in Irish corporate indebtedness since the early 2000s seems to have been driven by cross-border lending. This segment of corporate debt may be less subject to deleveraging pressures, and its impact on domestic economic activity should be less adverse. One should note, however, that excessive debt in Ireland remains high after adjusting for this factor (comparable to that of, say, Portugal or Spain). Belgium is another case where the raw estimates of corporate deleveraging needs are likely to be overstated (and appear low once corrected for cross-border lending). By contrast, the deleveraging pressures of firms in Cyprus, Spain or Portugal are not mitigated by this phenomenon, as their debt is mainly related to domestic activities.

I.3.3. Corporate saving and investment

Active deleveraging has a direct impact on a sector's net lending/borrowing position (NLB), which measures the net flow of funds from/into the sector (i.e., it includes all types of liabilities, not only debt). Actively deleveraging sectors usually are net lenders, which may require a significant effort for the corporate sector (in general in a net borrowing position). By definition, this effort may come either from increased savings or from reduced investment (or more likely from both).

A previous issue of this report, which focused on corporate balance sheet repair, observed that the investment channel had been more dominant in the euro area than in the US, while NFC savings increased less.⁽⁹⁾

Graph I.9: Saving/investment as driver of change in NFC net lending/borrowing



(1) The graph presents the change in two flow variables over the period 2008-12: corporate investment (gross capital formation) and corporate saving.

Source: Eurostat, DG ECFIN calculations.

A disaggregated look at the euro area members' split between the two main drivers of NLB is presented in Graph I.9. One can distinguish two extreme cases of an increase in NLB position between 2008 and 2012. At one extreme, Ireland (followed by Latvia and Greece) has achieved an increase in NLB by mostly improving corporate saving as a share of value added. At the other extreme, the NLB change in Slovenia has been exclusively driven by reduced investment. Spain

⁽⁹⁾ See European Commission (2014). 'Corporate balance sheet adjustment in the euro area and the US', *Quarterly report on the euro area*, vol. 13(1).

and Portugal are in an intermediate situation, balancing the net lending increase between saving and investment.

How firms decide to increase their net lending position may have an impact on the short and medium-term outcomes of deleveraging. Increases in corporate savings can be achieved either through cutting costs, most prominently labour costs, or through reduced dividend pay-outs. If the former channel is dominant, this can exacerbate short-term deleveraging pressures on households. On the other hand, if net lending increases are driven solely by reductions in investment, deleveraging may have adverse effects on medium-term productivity and growth potential. For this reason, the situation with firms is comparatively different from households, whose deleveraging via investment rather than savings may merely reflect overcapacity in the housing stock, and may therefore be a direct consequence of rebalancing.

I.4. Conclusion

This focus section provided an assessment of the state of deleveraging process in euro area members' non-financial private sectors. Most countries have already seen a peak in corporate indebtedness and the sector is now in a downward phase of the credit cycle. However, the adjustment achieved so far remains moderate compared to the increase in the period between 2000 and 2008 and to the estimated excess debt levels in most countries.

Households are also deleveraging in several euro area economies, but again, in most cases, progress has been only partial and in others it has yet to begin. Even in countries where households have already reduced their debts significantly, more is to be expected given the amount of debt built up during the pre-crisis boom.

The estimated deleveraging needs of the private sector may be in excess of 30% of GDP in vulnerable countries like Greece, Cyprus, Spain, or Ireland, and lower but significant in Slovenia. Weak credit market conditions are driving deleveraging pressures which, compounded by fragilities in household balance sheets, would suggest that this adjustment could occur over a short horizon, and through active deleveraging that will continue to weigh on economic activity in the coming years. Given the risk of knock-on effects to economic activity, asset markets, and the financial sector, this

rapid adjustment is not necessarily optimal, but credit market pressures leave few alternatives.

The Netherlands represents a borderline case, in the sense that its deleveraging needs affect only the household sector, but are considerable at face value (about 20% of GDP). The current weakness of credit market conditions suggests that the process will continue weighing on demand and growth prospects. But a bottoming-out in the housing market together with an improvement in overall economic activity would help stretch the process over a longer period of time and make it smoother and easier.

In most other Member States, including Belgium, Austria, Finland, and France, deleveraging pressures are likely to be limited. Any reductions in indebtedness are likely to occur mostly through passive and gradual adjustment, rather than active deleveraging. However, should overall economic conditions worsen in these countries (including, for instance, adverse shocks to the financial sector or the housing market) estimated excess indebtedness of households (in particular in Finland and France) or firms (Belgium and Austria) could lead to active deleveraging.

Given the extent of the deleveraging needs, one should discuss the economic and social feasibility of the adjustment needed. A previous modelling attempt of an active deleveraging shock suggests that the effect on economic activity would be significant and persistent.⁽¹⁰⁾ The adjustment to private indebtedness needed in vulnerable countries over a relatively short period, coupled with their current fragile economic and social fundamentals, suggests that further adjustment will remain challenging. Moreover, given the low inflation context in most of the EU, the contribution of nominal GDP growth to the adjustment process is likely to remain limited.

To facilitate the adjustment and minimise its implications for the economy, additional supportive policies that aim to reduce outstanding debt stocks through means other than negative credit flows, should be envisaged. At the forefront, are policy efforts to spur the euro area's growth and bring inflation back to normal levels, through demand stimulation (including via non-debt cross-

⁽¹⁰⁾ See Cuerdo et al. (2014).

border flows) as well as through improving the structural flexibility of euro area economies.

It is, however, also important to open discussion on a broader range of policy initiatives and assess their cost-benefit balance. There is, for instance, general agreement that one of the policy priorities should be to foster the recognition of actual losses by creditors through write-offs of bad debts. This would have to be accompanied by a simultaneous strengthening of banks' capital positions, in order to prevent a further contraction in credit flows to other parts of the economy. ⁽¹¹⁾

To complement this process, insolvency frameworks in many countries should be improved.

It should be also made fully accessible to both insolvent firms and households at affordable cost and in reasonable time.

For households in particular, the relief provided following insolvency or foreclosure should be a key feature in the current debate.

Going beyond the recognition of bad debts, creditors and debtors could be encouraged to adopt a forward-looking attitude and resort to preventive debt restructuring measures before actual insolvency occurs. Policy could also improve incentives for creditors to voluntarily reduce outstanding balances to close-to-insolvent debtors,, debt-to-equity swaps, and debt rescheduling (depending on the economic situation of debtors).

⁽¹¹⁾ European Central Bank (2014). 'Deleveraging patterns in the euro area corporate sector', *ECB Monthly Bulletin*, February 2014.

II. Special topics on the euro area economy

II.1. Structural reforms at the zero lower bound ⁽¹²⁾

This section discusses the impact of structural reforms on economic activity in the short term in a macroeconomic environment in which the zero bound on monetary policy rates is temporarily binding, ruling out further standard monetary expansion to accommodate supply-side policies. Comparing recent academic contributions that portray structural reforms as counter-productive at the current juncture with QUEST model results suggests that the short-term output effects of reforms can be negative because of the real interest rate effect. However, negative effects are small in a model environment such as QUEST that incorporates a larger number of transmission channels. Short-term effects also depend on the specific reform measures. QUEST results, furthermore, do not support the idea that delaying structural reforms for the foreseeable future would improve economic conditions at the zero bound. The policy implications are that warnings of adverse effects from structural reforms at the current juncture appear to overemphasise potential short-term costs and that postponing reforms is not a good alternative.

The case for structural reforms

The main rationale for advocating structural reforms in product and factor markets is their beneficial effects on output, income and employment in the medium and longer term. Recent analysis using the European Commission's QUEST model illustrates the significant medium- and long-term efficiency and per-capita income gains that can be expected from product market reforms and labour-market-related education and tax reforms. ⁽¹³⁾ Similar results have been obtained with other macroeconomic models. ⁽¹⁴⁾ Empirical

studies also show positive long-term effects from structural reforms. ⁽¹⁵⁾

A second argument for structural reforms is that structural policies strengthen the resilience of economies to macroeconomic disturbances by shortening the duration of cyclical fluctuations and reducing cumulative output losses in the aftermath of contractionary shocks. ⁽¹⁶⁾

Thirdly, simple models of aggregate supply and demand suggest that structural reforms with positive supply-side effects boost competitiveness and therefore mitigate the decline in output associated with falling domestic demand in the context of current account rebalancing. Growth of the denominator in debt-to-GDP ratios should also improve the sustainability of private and public debt and lower debt-elastic risk premia in financing costs. ⁽¹⁷⁾

Reforms at the ZLB: the sceptical view

Recent debates in academic and policy circles have questioned the desirability of structural reforms in an environment of depressed demand. While the positive impact of such reforms on long-term output, employment and debt sustainability remains undisputed, the controversy concerns their short-term effects.

In particular, it has been argued that structural reforms are counter-productive in the short- to medium-term if monetary policy is constrained at the zero lower interest-rate bound (ZLB) and, hence, unable to accommodate the supply expansion. ⁽¹⁸⁾

⁽¹²⁾ Section prepared by Lukas Vogel.

⁽¹³⁾ See Varga L., W. Roeger, and J. in 't Veld (2013): 'Growth effects of structural reforms in southern Europe: the case of Greece, Italy, Spain and Portugal', *European Economy Economic Papers*, 511 and European Commission (2013): 'The growth impact of structural reforms', *Quarterly Report on the Euro area*, Vol. 12, No 4, pp. 17-27.

⁽¹⁴⁾ For analyses with, e.g., the IMF GIMF and the ECB EAGLE models see Lusinyan L., and D. Muir (2012): 'Assessing the macroeconomic impact of structural reforms: the case of Italy', *IMF Working Papers* 13/22, and Gomes S., P. Jacquinot, M. Mohr,

and M. Pisani (2013): 'Structural reforms and macroeconomic performance in the euro area countries: a model-based assessment', *International Finance*, vol. 16(1), 23-44.

⁽¹⁵⁾ For a summary see, e.g., Bouis R., and R. Duval (2011): 'Raising potential growth after the crisis: a quantitative assessment of the potential gains from various structural reforms in the OECD area and beyond', *OECD Economics Department Working Papers*, No 835.

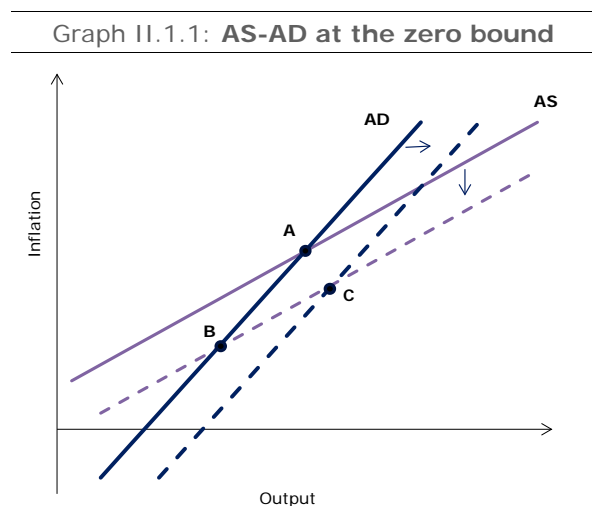
⁽¹⁶⁾ See Duval R., and L. Vogel (2008): 'Economic resilience to shocks: the role of structural policies', *OECD Journal: Economic Studies*, vol. 2008(1), 1-38.

⁽¹⁷⁾ In the short run, nominal GDP may, however, decline and debt-to-GDP ratios increase following reforms with deflationary effects. See, e.g., Vogel L. (2012): 'Structural reforms, fiscal consolidation and external rebalancing in monetary union: a model-based analysis', *Economic Modelling*, vol. 29(4), 1286-1298.

⁽¹⁸⁾ Eggertsson G., A. Ferrero, and A. Raffo (2014): 'Can structural reforms help Europe?', *Journal of Monetary Economics*, vol. 61(C), 2-22.

The contractionary short-term effect rests on the reforms' impact on real interest rates. Structural reforms that enhance aggregate supply in the economy put downward pressure on prices. The price decline pushes up the real interest rate for the given (fixed) nominal policy rate at the ZLB. If aggregate demand declines with higher real interest rates, the increase in real rates will depress rather than stimulate economic activity.

The point can be illustrated in the simple diagram of aggregate supply (AS) and aggregate demand (AD) in Graph II.1.1. The key difference between the standard AS-AD diagram and Graph II.1.1 for the ZLB environment is that the AD curve slopes upwards rather than downwards in the latter. If the ZLB is binding, higher inflation lowers real interest rates, which stimulates interest-sensitive demand. The economy's equilibrium point is the intersection of AS and AD.



Source: Based on Eggertsson *et al.* (2014)

Product or labour market reforms have two effects: First and foremost, the AS schedule shifts downwards as the upward pressure on costs and prices declines for any level of output. Second, reforms shift the AD schedule to the right, as expected increases in future income/wealth and investment profitability increase consumption and investment demand for given current levels of inflation.

It is the first effect (AS shift) that is contractionary at the ZLB. The AS shift amplifies deflationary pressures, which leads to higher real interest rates and aggregate demand contraction. The second effect (AD shift) is inflationary. Depending on the relative strength of the two effects, reforms may be

contractionary or expansionary at the ZLB in the short term. ⁽¹⁹⁾

Eggertsson *et al.* (2014) use a small-scale dynamic general equilibrium model to assess the quantitative impact of reforms. In particular, they look at price and wage mark-up reduction in the non-tradable sector in an environment with depressed demand and binding ZLB. They find substantial reform-induced downward price adjustment that increases the real interest rate significantly and amplifies the output contraction. ⁽²⁰⁾

Reforms at the ZLB: results with QUEST

The previous conclusions derive from a small-scale macroeconomic model in which the real interest rate effect of higher inflation dominates demand-enhancing wealth and price competitiveness effects.

The policy experiment of one percentage-point (pp) wage and price mark-up cuts in the non-tradables sector was replicated in a two-sector (tradables and non-tradables) and multi-region version of the QUEST model with a group of reforming euro-area countries, the rest of the euro area and the rest of the world. ⁽²¹⁾ The (purely illustrative) aggregate of reforming euro-area countries accounts for 30% of euro-area GDP, which approximately equals the proportion of euro-area GDP accounted for by Greece, Italy, Portugal and Spain combined. The mark-up reductions are implemented only in the model aggregate block of reforming euro-area countries.

The QUEST model offers a more detailed picture of the economy than the small model in Eggertsson *et al.* (2014). In particular:

QUEST includes investment in physical capital, which grows in response to profitability-enhancing structural reforms, strengthening the outward shift of the AD schedule;

⁽¹⁹⁾ As Eggertsson *et al.* (2014), *op. cit.*, state, 'the question of which effect dominates is ultimately quantitative' (p. 10).

⁽²⁰⁾ More precisely, a permanent one percentage-point (pp) reduction in wage and price mark-ups lowers the inflation rate by 0.5 pp, increases real interest rates by 0.4 pp and reduces output by an additional 0.1 pp compared with the no-reform baseline. See Table 3 in Eggertsson *et al.* (2014), *op. cit.*, for more information.

⁽²¹⁾ To replicate the Eggertsson *et al.* (2014), *op. cit.*, policy experiment, the reform is limited to a mark-up reduction, whereas nominal and real rigidities such as the degree of price and wage stickiness are held constant.

QUEST includes liquidity-constrained (LC) households as well as households that try to smooth their spending over the long term (NLC). Liquidity-constrained consumers are insensitive to changes in real interest rates, but benefit from falling price levels to the extent that the latter increase the purchasing power of wage and transfer incomes; and

QUEST includes trade with the rest of the world, which amplifies price competitiveness effects associated with lower domestic goods prices.

Table II.1.1: Impact of reforms in ‘normal times’, euro-area periphery (1)

Year	1	2	3	4	5	10
Real GDP	0.09	0.26	0.38	0.46	0.50	0.65
Employment	0.09	0.15	0.19	0.21	0.22	0.31
Consumption	-0.12	0.01	0.18	0.28	0.33	0.48
Liquidity-constrained	0.44	0.95	1.31	1.55	1.71	2.10
Intertemporally optimising	-0.32	-0.33	-0.23	-0.18	-0.16	-0.10
Investment	0.63	1.17	1.38	1.43	1.43	1.34
Exports	0.05	0.15	0.24	0.31	0.36	0.51
Imports	-0.03	-0.07	-0.06	-0.04	0.00	0.08
GDP deflator	-0.39	-0.75	-0.89	-0.93	-0.94	-1.03
Consumer price index	-0.36	-0.68	-0.80	-0.83	-0.84	-0.90
Real effective exchange rate	0.58	0.95	1.09	1.13	1.15	1.24
Nominal interest rate	-0.04	-0.04	-0.02	0.00	0.00	0.00
Real interest rate	0.43	0.16	0.05	0.01	0.01	0.02
Public debt (% of GDP)	0.05	0.03	-0.15	-0.36	-0.56	-1.18
Trade balance (% of GDP)	-0.02	-0.03	-0.02	-0.02	-0.01	-0.02

(1) Results in the upper and lower parts of the table indicate percentage and percentage-point deviations from the no-reform baseline respectively. An increase in the real effective exchange rate (REER) indicates real effective depreciation.

Source: DG ECFIN.

The combination of a 1 pp price and wage mark-up reduction in the euro-area periphery’s non-tradable (services) sector has small but positive short-term GDP effects in the QUEST model in ‘normal times’, i.e. away from the ZLB (Table II.1.1). The reform package is fully implemented in year one, but rigidities in prices and wages delay their adjustment to the new long-term equilibrium. Reacting to deflationary pressure, the central bank reduces nominal interest rates on impact, but the reduction remains moderate given the limited weight of the region (30 %) in the euro-area’s aggregate output and inflation. Consequently, the

real interest rate in the euro-area periphery increases temporarily even without ZLB. ⁽²²⁾

At the binding ZLB (Table II.1.2), the short-term impact of the reforms on output is also slightly negative in the QUEST model, but the effect is one order of magnitude smaller than in Eggertsson *et al.* (2014). ⁽²³⁾ The initial decline in real GDP relative to the pre-reform baseline is due to the contraction of interest-sensitive domestic demand.

Table II.1.2: Impact of reforms with binding ZLB, euro-area periphery (1)

Year	1	2	3	4	5	10
Real GDP	-0.01	0.13	0.29	0.38	0.43	0.57
Employment	0.01	0.06	0.13	0.16	0.18	0.26
Consumption	-0.28	-0.20	0.01	0.15	0.22	0.38
Liquidity-constrained	0.35	0.76	1.09	1.34	1.51	1.92
Intertemporally optimising	-0.51	-0.54	-0.38	-0.28	-0.24	-0.16
Investment	0.27	0.71	1.02	1.19	1.24	1.24
Exports	0.02	0.08	0.16	0.22	0.27	0.41
Imports	-0.06	-0.16	-0.19	-0.18	-0.14	-0.02
GDP deflator	-0.46	-0.91	-1.11	-1.19	-1.22	-1.39
Consumer price index	-0.43	-0.84	-1.01	-1.08	-1.11	-1.25
Real effective exchange rate	0.40	0.85	1.05	1.11	1.13	1.21
Nominal interest rate	0.00	0.00	-0.01	-0.02	-0.02	-0.01
Real interest rate	0.59	0.27	0.10	0.03	0.01	0.02
Public debt (% of GDP)	0.17	0.32	0.20	-0.01	-0.22	-0.98
Trade balance (% of GDP)	-0.03	-0.03	-0.02	-0.01	-0.01	-0.02

(1) Results in the upper and lower parts of the table indicate percentage and percentage-point deviations from the no-reform baseline respectively. An increase in the real effective exchange rate (REER) indicates real effective depreciation.

Source: DG ECFIN.

The negative short-term response of output to a deflationary mark-up reduction remains small and limited to the initial year. However, given the additional and countervailing mechanisms in the QUEST model highlighted above:

Corporate investment increases in the QUEST simulations in the short term also at the ZLB, as the decline in mark-ups reduces firms’ profit requirements for new projects; ⁽²⁴⁾

⁽²²⁾ The situation of a small country in monetary union is in this sense similar to that of a country with independent monetary policy at the ZLB, so that small unilateral reformers find themselves continuously in a quasi-ZLB environment.

⁽²³⁾ In the simulations underlying Table II.1.2, the ZLB is binding for euro-area monetary policy for the initial two years.

⁽²⁴⁾ Comparison between Tables II.1.1 and II.1.2 shows that investment increases less strongly at the ZLB given the larger increase in real interest rates. Even at the ZLB, investment

Liquidity-constrained households' consumption increases in QUEST and dampens the decline in private consumption caused by the falling demand from intertemporally optimising households. Liquidity-constrained households consume their disposable period income (after-tax wage and transfer income) and do not respond directly to changes in the real interest rate. For them, the positive effect of falling goods prices and increasing employment on real household income translates into higher consumption; and

The reforms in Tables II.1.1 and II.1.2 improve the price competitiveness of the periphery relative to the rest of the euro area and the rest of the world as a result of declining production costs. The export volume increases and the import volume declines, giving a positive trade impact on output. ⁽²⁵⁾

Hence, the QUEST results suggest a more positive assessment of the short-term effects of structural reforms than Eggertsson *et al.* (2014) and related contributions. The mark-up reductions considered here have only small negative initial output effects in the simulations at the ZLB. ⁽²⁶⁾ Non-standard monetary policy measures, which are absent in the model simulations, should further mitigate possible negative demand and output effects of structural reforms at the ZLB.

Given the nominal and real rigidities in goods and factor markets, it takes time for the long-term effects of structural reforms to materialise fully. ⁽²⁷⁾

Reforms at the ZLB: which measures?

The previous discussion has argued that elements of economic structure that are embedded in more complex macroeconomic models such as QUEST mitigate the contractionary effects of deflationary product and factor market reforms at the ZLB.

Besides the impact of economic structure, short- and long-term effects also depend on the type of individual reform measures that are implemented.

The mark-up reductions in Eggertsson *et al.* (2014) and Tables II.1.1 and II.1.2 are short-cuts for structural reforms with strong deflationary effects. To replicate the Eggertsson *et al.* (2014) policy experiment, reforms in Tables II.1.1 and II.1.2 are restricted to mark-up reductions, while adjustment frictions such as the degree of price and wage stickiness are kept constant.

Structural reform packages that increase price and wage flexibility in addition to mark-up reductions could dampen, or even prevent, contractionary short-term effects of deflationary supply-side reforms at the ZLB. Reducing adjustment frictions would, in particular, accelerate the speed at which enhanced competition led to gains in the purchasing power of wages, lower investment prices and improved price-competitiveness for domestically produced goods.

Furthermore, other structural measures have smaller short- and medium-term price effects and are, hence, less exposed to the adverse real interest effect at the ZLB. Such measures include a number of tax reforms, such as a tax shift from labour to consumption, R&D policies and policies to improve labour-market matching. ⁽²⁸⁾ The weaker the deflationary impact in the short term, the

demand still increases in response to the reforms and mitigates the demand decline.

⁽²⁵⁾ Compared with the 'normal times' scenario (Table II.1.1), exports increase by less and imports decline by more at the ZLB (Table II.1.2). Monetary accommodation in 'normal times' leads to exchange rate depreciation, which strengthens export demand, but stronger domestic demand also dampens the import decline in this case. The real effective exchange rate (REER) depreciation is weaker given the lack of monetary accommodation at the ZLB, implying less short-term export growth. Weaker domestic demand also reduces import volumes at the ZLB, however.

⁽²⁶⁾ An additional channel through which reforms may support demand in the short term is the value of collateral. Andrés J., Ó. Arce, and C. Thomas (2014): 'Structural reforms in a debt overhang', Banco de España, *Documentos de Trabajo*, No 1421, show in a model-based analysis that structural reforms can shorten the duration of deleveraging and binding credit constraints by improving the value of collateral. The endogenous shortening of private demand compression would also tend to shorten the ZLB duration, adding to the gains from structural reforms. The version of QUEST used in this section does not incorporate this additional channel. The authors also stress that negative demand effects of debt deflation (a common argument against deflationary reform in high-debt environments) are less relevant when debt is predominantly long-term.

⁽²⁷⁾ For an empirical characterisation of the sluggish pass-through see Bouis R., O. Causa, L. Demmou, R. Duval, and A. Zdzienicka, (2012): 'The short-term effects of structural reforms: an empirical analysis', *OECD Economics Department Working Papers*, No 949.

⁽²⁸⁾ The beneficial effects of, for example, a shift in taxation from labour-based social security contributions to consumption also take time to fully materialise given nominal and real rigidities in the economy. However, the tax shift does not show the temporary output contraction observed for the deflationary mark-up reduction at the ZLB in Table II.1.2, because the deflationary impact of falling labour costs is accompanied by an inflationary impact of higher consumption taxes.

smaller the ZLB-related real interest rate effect is, with its negative impact on demand and output. ⁽²⁹⁾

Current versus future reforms

Lags in the pass-through of structural reforms to real variables are a function of nominal and real rigidities in the economy. Rigidities in prices and wages, in particular, slow their adjustment and dampen the real interest rate increase at a temporarily binding ZLB. These lags in the pass-through are incorporated in the model simulations in Tables II.1.1 and II.1.2. ⁽³⁰⁾

Another type of lag is the delayed implementation of reforms. Following the Eggertsson *et al.* (2014) model, delayed implementation is a virtue rather than a vice as long as the reform announcement is credible.

Credible commitment to future reforms — so the argument goes — raises expectations of future output and income levels, generating a positive wealth effect. Intertemporally optimising households will step up consumption immediately in response to higher expected future wealth, thus stimulating current demand and output. The positive impact of the wealth effect might even be larger at the binding ZLB where it will not be dampened by the monetary tightening that would typically occur in normal times. ⁽³¹⁾

The case for commitment to future reforms seems problematic already on political grounds, because it would require economic agents to have correct expectations about a fully credible commitment to reform. Time inconsistency problems or simple

doubts in the private sector would substantially weaken, or even invalidate, the argument. ⁽³²⁾

Even in the case of credible commitment and full anticipation, however, the advantage of a credible future over current reforms rests on the strength of the wealth effect and intertemporal substitutability. In this context, the factors that mitigate the negative short-term effects of structural reforms at the ZLB in the richer structure of the QUEST model also reduce the *current* benefits from *future* reforms.

Table II.1.3 shows QUEST results for a scenario with credible commitment to future reforms. More precisely, the wage and price mark-up reductions of the same size as in Tables II.1.1 and II.1.2 (1 pp) are implemented now in year three rather than year one. The announcement is credible, so that households and firms anticipate and react to the future impact of reforms. ⁽³³⁾

Table II.1.3: Impact of future reforms with current ZLB, euro-area periphery (1)

Year	1	2	3	4	5	10
Real GDP	-0.08	0.00	0.21	0.37	0.45	0.61
Employment	-0.09	-0.09	0.08	0.16	0.19	0.26
Consumption	-0.33	-0.38	-0.14	0.10	0.23	0.43
Liquidity-constrained	0.04	0.27	0.76	1.17	1.44	1.97
Intertemporally optimising	-0.46	-0.62	-0.46	-0.28	-0.20	-0.12
Investment	0.50	1.00	1.28	1.41	1.43	1.31
Exports	0.04	0.12	0.20	0.28	0.34	0.48
Imports	-0.03	-0.09	-0.12	-0.11	-0.07	0.06
GDP deflator	-0.14	-0.38	-0.68	-0.84	-0.89	-0.99
Consumer price index	-0.11	-0.32	-0.60	-0.74	-0.79	-0.87
Real effective exchange rate	0.31	0.59	0.91	1.07	1.12	1.20
Nominal interest rate	0.00	0.00	-0.01	-0.02	-0.01	0.00
Real interest rate	0.23	0.31	0.21	0.06	0.01	0.03
Public debt (% of GDP)	0.14	0.30	0.29	0.09	-0.15	-1.05
Trade balance (% of GDP)	0.00	0.00	0.01	0.01	0.01	-0.02

(1) Results in the upper and lower parts of the table indicate percentage and percentage-point deviations from the no-reform baseline respectively. An increase in the real effective exchange rate (REER) indicates real effective depreciation.

Source: DG ECFIN.

The results shown in Table II.1.3 do not support the idea that the credible announcement of future reforms would prevent the negative short-term effects of contemporaneous reforms at the ZLB.

⁽²⁹⁾ On the other hand, some reform measures, such as a reduction in job protection, can have negative short-term effects for output even under normal monetary conditions. See Varga *et al.* (2013), *op. cit.*, for a comparison of short-, medium- and long-term effects of different structural policy measures in QUEST. Differences in the impact of particular reform measures on prices in a dynamic macroeconomic model are also stressed by Cacciatore M., R. Duval, and G. Fiori (2012): ‘Short-Term Gain or Pain? A DSGE model-based analysis of the short-term effects of structural reforms in labour and product Markets’, *OECD Economics Department Working Papers*, No 948. See Bouis *et al.* (2012), *op. cit.*, for an empirical analysis of the effects of various labour and product market reforms over different time horizons.

⁽³⁰⁾ For an empirical characterisation of these lags see Bouis *et al.* (2012), *op. cit.*

⁽³¹⁾ In the words of Eggertsson *et al.* (2014), *op. cit.*, delayed implementation ‘retains the long-run benefits of structural reforms without imposing the short-term costs in terms of deflation’ (p. 19). The same argument is made in Fernández-Villaverde, J., P. Guerrón-Quintana, and J. Rubio-Ramírez (2011): ‘Supply-Side Policies and the Zero Lower Bound’, *NBER Working Papers* 17543.

⁽³²⁾ Full *ex-ante* legislation of future reforms may provide a (partial) remedy to the commitment problem.

⁽³³⁾ As before, the ZLB is binding in years 1 and 2.

Instead, the short-term output and employment effects in Table II.1.3 are more negative than the corresponding results in Table II.1.2.

The real interest rate increases less strongly in the short term in the case of credibly pre-announced future reforms than in the case of current reforms, stabilising the consumption demand from intertemporally optimising households compared with the case of current reforms.⁽³⁴⁾ Investment also reacts more positively in the short term to the expected increase in profitability given the more moderate counteracting real interest rate effect.

However, these two elements are outweighed by other factors. First, future reforms do not increase the purchasing power of current income. The increase in consumption by liquidity-constrained households is delayed, which undoes its strongly positive short-term contribution in Table II.1.2.

Second, postponing the implementation of reforms also delays improvement in price competitiveness and the resulting switch in spending from imported towards domestic goods. The delay in the improvement of net trade volumes also weighs negatively on the short-term response of domestic output.

Taken together, simulations with a model that incorporates various countervailing channels do not support the idea that postponing reforms is better than implementing them at the ZLB.

Conclusions

This section has discussed the impact of structural reforms at the zero lower bound (ZLB) based on recent literature and simulations with the QUEST model, with a particular focus on negative short-term effects on economic activity.

The binding ZLB tends to reduce the short- and medium-term gains from structural reforms. Reforms with strong deflationary impact may even

lead to temporary output losses as a consequence of rising real interest rate in the absence of monetary accommodation. Small countries in a monetary union that implement structural reforms unilaterally face a similar situation.

However, the small-scale economic models that suggest significant contractionary short-term effects from structural reforms tend to neglect a number of mitigating channels which dampen the negative effect of rising real rates on economic activity. These channels include the impact of reforms on the profitability of investment, the disposable income of liquidity-constrained households and the competitiveness effect in external trade.

Simulations with DG ECFIN's QUEST model, which incorporates the channels mentioned above, suggest that short-term effects can indeed be negative. However, the negative impact is smaller than suggested by related results in the recent literature. The impact also depends on the precise nature of the reform measures. Mark-up reduction, which has been the focus of the analysis, has relatively strong deflationary effects, which amplifies the contractionary real interest effect at the ZLB. Non-standard monetary policy measures, which are absent in the model simulations, should furthermore mitigate negative demand and output effects at the ZLB.

Beyond the problem of credible commitment, judging by the impact on economic activity the results do not, in the end, support the idea that commitment to future reforms would outperform implementing them now at the ZLB. Elements that counteract the real interest rate effect of current reforms at the ZLB, such as the presence of liquidity constraints and price competitiveness, also dampen the expansionary effect of expected future reforms and income gains.

The policy implication of the analysis is that recent warnings of adverse effects from structural reforms at the current juncture overemphasise potential short-term costs. While it is certainly true that an accommodative monetary policy stance facilitates the adjustment in 'normal times', reforms in a ZLB environment do not seem to imply significant short-term costs in terms of economic activity. The results also suggest that postponing reforms (even with fully credible commitment) is not a good alternative.

⁽³⁴⁾ This is the channel emphasised by Eggertsson *et al.* (2014), *op. cit.*. The presence of price and wage stickiness in the model is the reason for the real interest rate to increase at the ZLB even in the case of *future* reforms. Households and firms anticipate the impact of future reforms on future wage and price levels. With wage and price stickiness (due either to binding wage and price contracts or a desire to smooth price and wage adjustments over time), current wage- and price-setting already incorporates these expectations and leads to partial downward adjustment of wages and prices even in pre-reform periods.

II.2. Member State vulnerability to changes in the euro exchange rate ⁽³⁵⁾

There have been significant fluctuations in the euro exchange rate since the start of the monetary union. This section assesses Member States' different degrees of vulnerability to changes in the exchange rate. It looks in particular at possible differences in the pass-through of the nominal exchange rate into import and consumer prices, and at differences in the price elasticity of export volumes. Overall, empirical results show a higher sensitivity of Spain's inflation, and export price elasticities, that are significantly higher in Italy, Portugal, Spain, Austria and France. However, in terms of overall impact on activity, differences in export elasticities tend to be offset, at least in part, by differences in trade openness and in integration in global value chains.

Introduction

There have been significant fluctuations in the euro exchange rate since the start of the monetary union. ⁽³⁶⁾ Fluctuations in nominal exchange rates affect the economy via various channels. Changes in the nominal exchange rate can affect import prices and inflation. To the extent that it affects the real exchange rate, a change in the euro nominal exchange rate can also affect export volumes. In addition to direct output effects, nominal exchange rates can have an impact on output via changes in domestic income and through import substitution. If vulnerability to euro fluctuations varies across Member States, changes in the euro exchange rate could constitute a common shock with asymmetric effects that could complicate macroeconomic policy in the euro area. Therefore this section explores various dimensions of the impact of euro exchange rate fluctuations in order to assess whether some Member States are more vulnerable than others.

⁽³⁵⁾ Section prepared by Narcissa Balta, Karin Fischer, Plamen Nikolov and Lauri Vilmi.

⁽³⁶⁾ For example, the aggregate nominal effective exchange rate (NEER) in the euro area appreciated by more than 12% between August 2012 and March 2014, although this appreciation has been partly reversed since then. There are a number of factors behind nominal euro exchange rate movements, including investors' risk perceptions, differences in monetary policy strategies and the euro's status as a reserve currency.

Impact of exchange rate fluctuations on inflation

A change in the nominal exchange rate can lead to a change in import prices in euro terms and may therefore have an impact on consumer price inflation. Furthermore, it can affect the competitiveness of domestic goods relative to foreign ones and the cost of intermediate inputs. This may lead to changes in domestic production costs, mark-ups and producer prices and thereby to second-round effects on domestic consumer prices.

Econometric results show that in all euro area Member States import prices react relatively fast and strongly to a permanent change in the nominal effective exchange rate (NEER) (Box II.2.1). ⁽³⁷⁾ Most of the response of import prices occurs immediately (during the same quarter). ⁽³⁸⁾ However, it takes around three quarters after a shock before these price changes are passed on to consumer prices and there are some differences across Member States in the reaction of consumer prices which are partly explained by the different compositions of consumption baskets (high proportion of services in some countries). ⁽³⁹⁾ For example, in Spain, where the pass-through is the highest, a 1 % depreciation of the NEER would lead to a rise of about 0.15 pp in the inflation rate in the following four quarters. ⁽⁴⁰⁾ ⁽⁴¹⁾

⁽³⁷⁾ The econometric exercises presented in this section cover the following countries: Austria, Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal and Spain. The response of import and consumer prices to exchange rate fluctuations is calculated for the period from 1 January 2002. When studying the response of import prices, the currency in which products are priced is important; see discussion in Campa, J.M. and L. Goldberg, (2002), 'Exchange rate pass-through into import prices: a macro or micro phenomenon?', *NBER Working Paper*, 8934. The adoption of physical notes may have changed pricing of imports from producer currency pricing into local currency pricing (i.e. into euro, and making the two equivalent for imports within the euro area), which may have had an impact on pass-through rates.

⁽³⁸⁾ For individual Member States, import prices for extra-euro area trade are used as an import price index.

⁽³⁹⁾ The differences in pass-through rates into import and consumption prices can also be partly explained by the different compositions of trade and by different trade partners across Member States. For example, Di Mauro *et al.* (2008) find that pass-through rates differ significantly across sectors; see Di Mauro, F., R. Ruffer and I. Bunda, (2008) 'The changing role of the exchange rate in a globalised economy', *Occasional Paper Series*, 94, European Central Bank.

⁽⁴⁰⁾ Pass-through rates are also low in France and Italy, but these results are partly explained by tax changes which bias estimations. If rates for these countries are estimated using the HICP index with constant taxes, the pass-through rises to 0.05 for France and

Box II.2.1: Estimating exchange rate pass-through rates into prices

Exchange rate pass-through rates are estimated by using a vector autoregression (VAR) methodology with quarterly data for the period 2002Q1-2014Q1. By using the VAR with exogenous variables, some second-round effects on consumer prices can also be taken into account. Previously, An and Wang (2012), *inter alia*, have used VAR methods to study exchange rate pass-through. In our pass-through estimations, we estimate the following reduced form VAR(λ) with exogenous variables:
$$Y_t = \sum_{i=1}^{\lambda} A_i Y_{t-i} + \sum_{j=0}^{\lambda} B_{t-j} X_{t-j} + E_t$$

Here the vector of endogenous variables, Y, consists of the output gap, the nominal effective exchange rate, consumer, producer and import price indexes and the EONIA rate. Exogenous variables X are oil prices, a foreign cost measure, calculated as (nominal effective exchange rate * unit labour costs)/real effective exchange rate and domestic unit labour costs. Treating unit labour costs as an endogenous variable does not change results. Lag lengths λ, λ are chosen based on the model selection criteria and are typically two or three quarters for endogenous variables and one quarter for exogenous variables. The model is estimated by using either HICP or core HICP as a measure for changes in consumer prices. Error terms, E, are assumed to be serially uncorrelated and to follow a normal distribution. The exchange rate shock is identified by the Cholesky decomposition, using the ordering of endogenous variables described above.

Results of 1% depreciation of the euro area NEER on price indexes

	Import prices		HICP		HICP core	
	Short-run(1)	Long-run(2)	Short-run	Long-run	Short-run	Long-run
Euro area	0.55*	1.05*	0.01	0.05	0.00	-0.01
Spain	0.74*	1.23*	0.00	0.15*	0.00	0.13*
Portugal	0.86*	0.93	0.05	0.10	0.04	0.09
Ireland	0.63*	0.83	0.01	0.09	0.00	0.03
Netherlands	0.68*	0.41	0.03	0.08	0.01	0.05
Finland	0.58*	1.05*	0.00	0.08	0.00	0.02
Belgium	1.09*	0.78*	0.05*	0.06	0.00	-0.03
Austria	0.33*	0.82*	-0.03*	0.05	-0.04	-0.01
Germany	0.35*	0.72*	0.04*	0.03	0.01*	-0.20
France	0.86*	1.11*	0.00	0.03	-0.03	-0.06
Italy	0.78*	1.30*	-0.01	0.01	-0.03	-0.06

Note: Short-run pass-through rate measures initial response during the same quarter. Long-term response stands for the cumulative response four quarters after a shock.

* Significantly different from zero at 5 % level.

References:

An L. and J. Wang (2012), 'Exchange Rate Pass-Through: Evidence Based on Vector Autoregression with Sign Restrictions', *Open Economy Review* 23, pp. 359-380.

Most of the effect of exchange rate fluctuations on HICP inflation seems to stem from the reaction of energy prices and unprocessed food, whereas in the majority of Member States core inflation does not seem to respond significantly to exchange rate shocks. Estimations find positive and significant

long-run exchange rate pass-through rates into core inflation only in Spain. ⁽⁴²⁾

In Portugal and Spain, the rates of pass-through into core inflation are of similar magnitude to those of pass-through into the headline index, though they are statistically significant only in Spain. One possible factor explaining the high pass-through rate in Spain could be the higher proportion of energy and food in the HICP basket combined with a higher correlation of prices in all categories

0.08 for Italy. Long-run pass-through rates into the HICP index with constant tax rates are very similar to the results with headline index in other Member States, but slightly lower in Belgium (0.04), Finland (0.03), Portugal (0.03) and Spain (0.12).

⁽⁴¹⁾ The relatively limited effect of nominal exchange rate changes on consumer prices in the euro area is explained by the fact that imports from the non-euro area countries are only around 25% of euro area GDP.

⁽⁴²⁾ Estimated pass-through rates are also positive in Finland, Ireland, the Netherlands and Portugal, but in these countries estimations cannot reject rates being statistically different from zero.

of core inflation with energy and food prices, possibly reflecting, *inter alia*, the prevalence of wage indexation. ⁽⁴³⁾ Nevertheless, the indexation clauses of many contracts have recently been significantly relaxed as part of structural reforms, which may in the future dampen the second-round effects of exchange rate changes in Spain.

Overall, nominal exchange rate fluctuations cause relatively large swings in import prices, but have rather a small effect on HICP, especially if energy and food prices are excluded. With the exception of Spain, potential differences among Member States in the inflation response to euro exchange rate fluctuations are small.

Export vulnerability to exchange rate changes

Once nominal exchange rate movements are fed into the real exchange rate, they can also impact sales of domestic goods and services abroad. The econometric estimations of export demand equations presented in Box II.2.2 show that the elasticity of export demand to the real exchange rate is significantly higher in countries such as Italy and Portugal (Table II.2.1). ⁽⁴⁴⁾ To a lesser degree, Austria, France and Spain also post high elasticities.

These differences in the elasticity can, to some extent, be related to differences in the product structure of exports. For instance, exports of differentiated products will tend to be less reactive to exchange rate fluctuations than exports of more homogenous products. Portugal, Spain and, to some extent, Italy have relatively low proportions of capital goods (which tend to have fewer close substitutes) in total exports (Table II.2.1). Conversely, Ireland, where the proportion of exported services (which tend to be more differentiated than goods) is high, has lower export price elasticity than is suggested just by looking at

the structure of its goods exports. Export price elasticities are high in Austria and France, which export relatively high proportions both of capital goods and of services, suggesting that other factors also play an important role in the cross-country elasticity differences. These might relate to other aspects of these economies' sectoral specialisation (beyond the importance of capital goods or services), but also to the quality of the products and services exported.

The estimated country elasticities should be treated with some caution. Estimates for the euro area as a whole indicate that the responsiveness of export demand to changes in the real exchange rate and foreign demand may have increased since the start of the global financial crisis in 2008 (see Box II.2.2). ⁽⁴⁵⁾ At this stage, it is impossible to say whether such a change is cyclical (reflecting, for instance, a higher sensitivity of foreign demand to prices due to depressed cyclical conditions) or of a more lasting nature.

Table II.2.1: Estimated exchange rate impact on export volumes

	REER elasticity	Share of capital goods ⁽¹⁾	Share of services in exports ⁽²⁾
BE	-0.40	8.9	21.2
DE	-0.81	21.1	14.6
IE	-0.76	13.8	38.4
ES	-1.61	10.6	32.3
FR	-1.44	19.2	21.7
IT	-2.56	17.4	19.3
NL	-0.47	17.3	21.5
AT	-1.67	19.6	27.7
PT	-2.14	9.4	24.8

(1) Average as a proportion of total goods exports in 2000M1-2014M5.

(2) Total exports, average 1999-2012.

Source: Eurostat, DG ECFIN calculations.

The effect of the real exchange rate on a country's GDP depends not only on the degree of export price elasticity, and the resulting changes in export market shares, but also on the size of the import substitution effect, ⁽⁴⁶⁾ and the extent to which

⁽⁴³⁾ Du Caju *et al.* (2008) find that in Spain a large proportion of workers were covered by wage indexation clauses; see Du Caju, P. Gautier, E. Momferatou, D. and Ward-Warmedinger, M., 'Institutional features of wage bargaining in 23 European countries, the US and Japan', *ECB Working Paper Series*, No 974.

⁽⁴⁴⁾ The export volume elasticities are estimated for the period starting in the first quarter of 1994 (to coincide with the start of the second stage of the EMU), when the nominal exchange rates of the Member States became effectively fixed to each other (only Italy and Finland were briefly outside the Exchange Rate Mechanism after 1994). It should be stressed that the estimated export price elasticities measure the reaction of export volumes to changes in real exchange rates (and thus the reaction to both nominal exchange rates and relative prices). For example, when trade within the euro area is considered, it is only the movement of relative prices that affects export volumes.

⁽⁴⁵⁾ Data limitations only allow the estimation of a pre-crisis export equation for the euro area as a whole. Available samples are too short for such an exercise in the case of estimations for individual countries.

⁽⁴⁶⁾ Attempts to estimate import demand equations based on the same econometric method, countries and time period as the export equations produced disappointing results. However, the available empirical literature (based on alternative econometric methods) suggests that import price elasticities in European countries are significantly lower than the export price elasticities

rising or falling exports affect domestic demand and thereby imports. The overall effect on activity therefore depends on assumptions, notably regarding domestic demand behaviour. In general, GDP will be more sensitive to real exchange rate fluctuations in countries that are more open to trade and comparatively more protected from these fluctuations in countries that are well integrated in global value chains. For the latter, a high degree of integration means that the activity effect of any shock to exports (notably due to exchange rate fluctuations or relative prices) will be partly transmitted to other countries via changes in imported inputs, reducing the effect on activity.

Table II.2.2: Additional factors behind the exchange rate impact on output

	REER elasticity	Exports of goods and services to GDP ⁽¹⁾	Foreign value added content of exports to exports ⁽²⁾
BE	-0.40	79.3	35.0
DE	-0.81	42.0	26.6
IE	-0.76	82.0	42.3
ES	-1.61	27.0	20.7
FR	-1.44	26.4	24.7
IT	-2.56	26.5	20.1
NL	-0.47	70.9	35.9
AT	-1.67	52.4	31.6
PT	-2.14	29.8	32.4

(1) Average 1999Q1-2013Q4, except IE and PT 1999Q1-2013Q3.

(2) Data on the foreign value added of exports are for 2009.

Source: Eurostat, OECD, DG ECFIN calculations.

The share of exports of goods and services to GDP in the different Member States shown in the second column of Table II.2.2 suggests that, with the exception of Austria, countries that have high price elasticity of export demand also tend to export relatively less as a share of GDP. This is likely to mitigate country differences in vulnerability to the exchange rate that can be assumed from the estimated export price elasticities.

For Ireland, Belgium and the Netherlands, the effect of low export elasticities is counterbalanced by very high export-to-GDP ratios, but somewhat further dampened by a stronger integration in global value chains. Portuguese exports also contain a relatively high proportion of foreign value added, which, together with its low degree of

presented here (they vary between -0.38 and -0.06) and the cross-country dispersion is smaller; see Senhadji, A., (1998), 'Time-series estimation of structural import demand equations: a cross-country analysis', *IMF Staff Papers*, Vol.45, No 2. Moreover, countries with high export price elasticities, according to the estimates presented in this chapter, tend to be those with high import price elasticities in Senhadji (1998).

openness to trade, mitigates the output effect of its high export price elasticity (third column of Table II.2.2). Overall, large asymmetric effects on output through export volumes are unlikely.

The degree of vulnerability to the euro exchange rate also depends on export price behaviour

When assessing vulnerability to nominal exchange rate fluctuations, the above estimates of price elasticity of exports are subject to an important caveat. The effect of a nominal exchange rate shock on exports and growth depends not only on the elasticity of exports to the real exchange rate, but also on the extent to which fluctuations in the nominal exchange rate are transmitted to the real exchange rate. The greater the pass-through from nominal to real exchange rates, the bigger the impact of a given nominal exchange rate shock on exports and output.

Table II.2.3: Potential asymmetric response to exchange rate shocks

	Pass-through to real exchange rates ⁽¹⁾	Extra-euro area VA in exports as a share of total exports ⁽²⁾	REER elasticity
IT	97.5	12.5	-2.56
PT	89.6	14.8	-2.14
AT	95.3	15.5	-1.67
ES	89.6	12.8	-1.61
FR	98.4	14.5	-1.44
DE	96.5	16.9	-0.81
IE	78.7	31.0	-0.76
NL	81.2	24.7	-0.47
BE	91.3	17.6	-0.40

(1) Correlation between the quarterly contemporaneous change in nominal and real effective exchange rates, export price deflator, 1999Q1-2014Q2.

(2) Data on the extra-euro area value added of exports are for 2009.

Source: Eurostat, OECD, DG ECFIN calculations.

In general, the pass-through from nominal to real exchange rate (based on export price deflators) in the euro area is high (Table II.2.3). There are some differences among Member States – for example, since 1999, the correlation between the quarterly contemporaneous change in nominal and real effective exchange rates has been quite high in France (98.4 %) and Italy (97.5 %) and lower in Ireland (78.7 %), the Netherlands (81.2 %), Spain (89.6 %) and Portugal (89.6 %). This means that, except in Ireland and the Netherlands, a very large part of nominal exchange rate shocks tends to be passed through to the real exchange rate and export prices are

Box II.2.2: Export demand equations for the euro area Member States

Standard export demand equations are estimated in a fractionally cointegrated vector autoregressive model, applying recent concepts of inference for non-stationary time series developed by Johansen and Nielsen (2012). The methodology offers a unified framework for cross-country comparison of estimated export demand elasticities allowing at the same time for country-specific degrees of persistence in the data.

Though the original idea of cointegration in time series as presented by Engle and Granger (1987) allows for fractional orders of cointegration, most of the subsequent empirical work has focused on integer degrees of differentiation of non-stationary time series (ARIMA models). Such models have been widely used to analyse long-run economic relations and short-run adjustments following an over-shooting or under-shooting of the long-run equilibrium conditions. Only in recent years have fractional values for the order of integration also been taken into account (ARFIMA models).

Fractional processes are useful for describing time series with slowly decaying autocorrelation functions, i.e. long memory processes and/or processes for which shocks can have very long but not permanent effects. Long memory processes imply different long-run predictions and effects of shocks. The higher the value of the memory parameter (d), the higher the persistence of the process: i) for d = 0, the process X_t is stationary, with a short memory (i.e. the autocorrelation functions are decaying very fast); ii) for $d \in (0, 0.5)$, the process X_t is stationary, with a long memory (i.e. the autocorrelation functions take far long to decay); iii) for $d \in (0.5, 1)$, the process X_t is non-stationary and mean-reverting, but shocks do not have a permanent effect (long lasting but not permanent); and iv) for $d \geq 1$, the process X_t is non-stationary and shocks have a permanent effect.

The long-run equilibrium relations are identified as a fractionally cointegrated (or cofractional) vector, while the short-run dynamic correlations and the speed of adjustment towards the long-run are given by a fractionally cointegrated vector autoregressive model (i.e. a fractional VECM). On the basis of this unified framework that nests the more commonly used case of integration of order one, estimates of long-run export price and income elasticities for selected euro area countries are presented below, using quarterly data between 1994Q1-2014Q1. Exports are defined as total exports of final and intermediate goods and services, deflated by export price indices. Foreign income is defined as the average of imports by major trading partners, weighted with the proportion of the Member State's exports going to a particular importing country in 2005. The choice of weightings for a single year avoids the possible endogeneity problem inherent to using standard export shares as weightings, as in the literature. Finally, relative export prices are measured by the real effective exchange rate (REER). An export prices-based REERs is used, computed by DG ECFIN vis-à-vis 37 main trading countries.

The resulting baseline specification is:

$$\Delta^d X_t = \Delta^{d-b} L_b \alpha \beta' X_t + \sum_{i=1}^k \Gamma_i \Delta^d L_b^i X_t + \varepsilon_t,$$

where t indexes time and the usual lag operator, $L=1-\Delta$ and the difference operator Δ have been replaced by the fractional lag and difference operators, $L_b=1-\Delta^b$, and $\Delta^b=(1-L)^b$. X_t is a multivariate time series vector, including real exports, foreign income and REER (in natural logarithm) and ε_t is an i.i.d. vector of disturbances with positive definite variance covariance matrix. X_t is fractional of order d, and cofractional of order d-b (i.e. $\beta'X_t$ is fractional of order d-b, with $d-b < 0.5$, so $\beta'X_t$ is stationary). The estimated vector of coefficients of β have the usual interpretation of the long-run elasticities, while α describes the adjustment towards the long-run equilibria and the common stochastic trends, which are fractional of order d. Matrices Γ_i give the short-run dynamic correlations. For the special case of $d=b=1$, the specification gives the usual cointegrating vector autoregressive model (VECM), where $\beta'X_t$ is the I(0) error correction term (i.e. $d-b = 0$).

Results

Results show that for total exports long-run elasticities to the REER range between 0.4 to 2.6 in absolute value and the elasticity of exports to changes in foreign income is closer to 1 in most countries (with the exception of FR and IE). The euro area average export price elasticity is close to 0.8 in absolute value, while the elasticity of exports to changes in foreign income is close to 1, indicating a rather high degree of

(Continued on the next page)

Box (continued)

heterogeneity among euro area countries in terms of exports' response to exchange rate fluctuations. For most euro area countries, except for DE, ES and IT, shocks seem to have long-lasting rather than permanent (i.e. $0.5 < d < 1$) effects. Results should be interpreted with care for the countries for which there are some data limitations, such as IE.

Export demand elasticities, euro area exports, 1994q1-2014q1

Country	REER (export prices)	foreign demand	d	b
DE	-0.81	1.18	1.02	1.02
FR	-1.44	0.37	0.99	d=b
BE	-0.40	0.73	0.99	0.95
AT	-1.67	0.66	0.97	0.95
NL	-0.47	0.94	0.99	d=b
ES*	-1.61	1.22	1.01	1.01
IT	-2.56	1.18	1.01	0.99
IE**	-0.76	0.41	0.79	d=b
PT*	-2.14	0.92	0.99	d=b
EA	-0.77	0.91	1.02	d=b
EA pre-crisis (1994q1- 2008q4)	-0.52	0.84	0.995	d=b

Note:

*1995q1-2013q3; ** 1997q1-2013q3;

Inference based on Johansen and Nielsen (2012), and MacKinnon and Nielsen (2014).

References:

Johansen S. and M.O. Nielsen (2012). 'Likelihood inference for a fractionally cointegrated vector autoregressive model', *Econometrica*, Vol. 80, Issue 6, pp. 2 667-2 732.

MacKinnon, J.G. and M.O. Nielsen (2014), 'Numerical distribution functions of fractional unit root and cointegrations tests', *Journal of Applied Econometrics*, Vol. 29, Issue 1, pp. 161-171.

adjusted only to a limited degree when the euro exchange rate fluctuates.

The extent of the pass-through from nominal to real exchange rates can be explained by a range of factors, including pricing-to-market behaviour by firms, local-currency pricing strategies, use of financial hedging instruments, changes in the sectoral composition of exports and integration in global value chains. ⁽⁴⁷⁾

This section looks into the particular role of global value chains. Country differences in the pass-through from nominal to real euro rates can be attributed partly to the effect of the nominal exchange rate on the prices of imported inputs. To give an example, currency appreciation need not be fully reflected in higher export prices (quoted in the currency of the buying country) when prices of imported inputs fall with the cheaper foreign currency. In such situations, profit margins can be kept even if the final price of the exported good (quoted in the currency of the exporting country) is lowered. ⁽⁴⁸⁾ All else being equal, a country with a

⁽⁴⁷⁾ See, for instance, Dong (2012) and Di Mauro *et al.* for a discussion. There is empirical evidence that the pass-through of exchange rates to export prices may have declined in recent decades. However, the decline seems to have been more pronounced in the United States than in the euro area.

Dong, W., (2012) 'The role of expenditure switching in the global imbalance adjustment', *Journal of International Economics*, Vol. 86, pp. 237-251.

Di Mauro, F., R. Ruffer and I. Bunda, (2008), 'The changing role of the exchange rate in a globalised economy', *Occasional Paper Series*, 94, European Central Bank.

⁽⁴⁸⁾ See, for example, Amiti, M., O. Itskhoki, and J. Konings, (2014), 'Importers, Exporters, and Exchange Rate Disconnect', *American Economic Review*, Vol. 104(7), pp. 1942-1978, who highlight the importance of intermediate inputs for explaining the incomplete pass-through of exchange rate changes to international prices.

larger proportion of intermediate inputs in exports coming from outside the euro area will tend to be more sheltered from nominal exchange rate fluctuations and to experience lower pass-through from nominal to real exchange rates. ⁽⁴⁹⁾

In general, imported inputs from non-euro area countries represent about 15 % of exports (second column of Table II.2.3). For Ireland and the Netherlands, the proportion is considerably higher, at 31.0 % and 24.7 % respectively. All else being equal, the higher proportion allows these two countries to benefit from a lower pass-through from nominal to real exchange rates; the lower pass-through between the real and the nominal exchange rate is confirmed by the simple correlations in the first column of Table II.2.3.

Conclusion

Since the inception of the euro in 1999, its nominal effective exchange rate has been subject to large fluctuations. This section has provided a quantitative assessment of differences in the extent to which Member States are vulnerable to changes in the euro exchange rate. It has looked in particular at possible differences in the pass-through of the nominal exchange rate into import and consumer prices, and at differences in the price elasticity of export volumes.

The pass-through of nominal exchange rate into core inflation is found to be very low. Pass-through into the headline index is somewhat higher but, except for Spain, differences among Member States are generally small.

In line with the previous literature, estimates of the elasticity of export volumes to the real exchange rate tend to vary significantly across countries. Among the countries analysed in this section, estimates appear comparatively high in Italy and Portugal and, to a lesser degree, in Austria, France and Spain. Nevertheless, in terms of output effect, these differences tend to be offset, at least in part, by differences in trade openness (Italy, Portugal, France and Spain). The cases of Ireland, the Netherlands and Belgium are less clear-cut, as low export elasticities and comparatively closer integration in global value chains should dampen the output effect of exchange rate fluctuations, but these countries also post much higher trade openness than the rest of the euro area, which has the opposite effect. Overall, the output impact of exchange rate shocks through export volumes is unlikely to be strongly asymmetric across the euro area.

They show that large exporting firms also tend to be the largest importers, which reduces the proportion of the exchange rate change that is passed on to export prices.

⁽⁴⁹⁾ The potential effect of imported inputs on the export price pass-through also depends on the invoicing currency. Previous research has shown that industry structure, macroeconomic volatility and the bargaining strength of the importing firm affect invoicing choices, see Tille, C. and Goldberg, L., (2009), 'What drives the invoicing of international trade?', *VOX EU*.

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