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# Indebtedness, Deleveraging Dynamics and Macroeconomic Adjustment

By Carlos Cuerpo, Inês Drumond, Julia Lendvai, Peter Pontuch and Rafal Raciborski

## Abstract

The current crisis revealed the unsustainability of private sector indebtedness levels, fuelled, in the recent past, by a prolonged period of rapid credit expansion in some EU Member States. The deleveraging process that is now taking place, although necessary, stands as a source of concern in terms of its implications for economic activity. Against this background, this paper aims to (*i*) identify the EU Member States that are currently facing deleveraging pressures in the non-financial private sector, making use of the informational content of various indebtedness indicators; (*ii*) assess quantitatively those pressures, using both a threshold approach, which compares the current level of households and non-financial corporations' debt with a static benchmark, and a stationarity approach, which goes a step further by taking into account valuation effects and the possibility of a time-varying "sustainable" level of indebtedness; (*iii*) refine the link between the identified deleveraging pressures and the actual adjustment of indebtedness through an analysis of the credit supply and demand conditions in each Member State; (*iv*) simulate the impact of a households' sector deleveraging shock using a dynamic stochastic general equilibrium model and assess the transmission mechanism through which such a shock influences the economic activity. Some policy implications are also discussed in the concluding section.

JEL: E21, E44, H31, C54.

## 1. INTRODUCTION

**The financial crisis has highlighted the dire implications of excessively high debt stocks and rapid credit expansion on financial stability and economic growth**, in line with a wide body of economic literature (*e.g.*, Jordà *et al.*, 2010, and Gourinchas and Obstfeld, 2012), which identifies quickly expanding credit flows as one of the best predictors of financial or banking crises.

The prolonged period of rapid credit expansion prior to the crisis led to high levels of debt in the private sector of many EU Member States (as can be seen in figures 1 and 2, for households and non-financial corporations). **These were matched, until the outburst of the crisis, by an increase in net worth.**

**Figure 1: Indebtedness of EU27 countries over the last cycle, households**

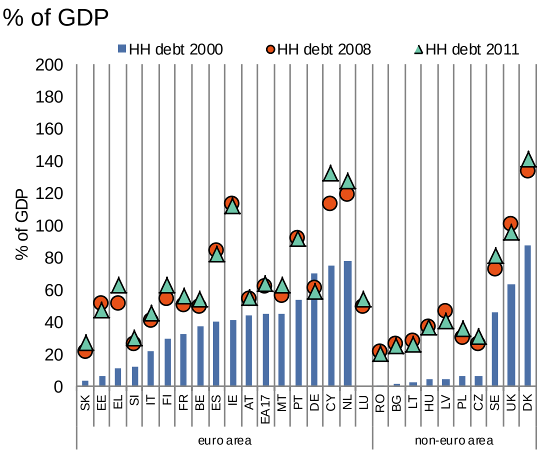
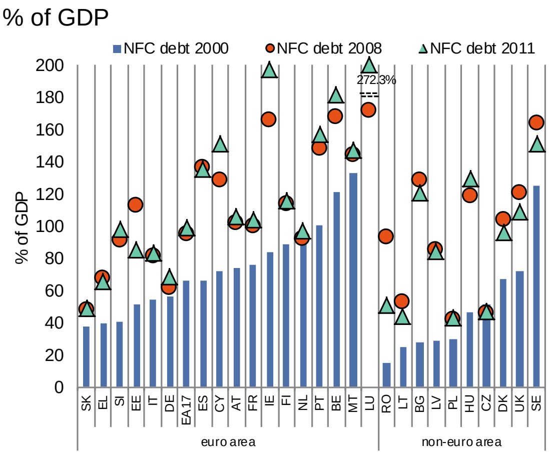


**Figure 2: Indebtedness of EU27 countries over the last cycle, non-financial corporations**



Source: Eurostat
Note: non-consolidated figures. Debt includes loans and securities other than shares.

The significant increase of private sector indebtedness was driven, at least in part, by the low levels of interest rates observed before the crisis, especially in the euro area Member States. In fact, table 1, which reports data on the households' sector, shows that **even highly indebted countries benefitted, before the crisis, from a low level of interest burden**, and that, with the exception of Greece, Cyprus and Romania, this burden decreased in 2011 (in some Member States significantly), when compared to 2008, even in the so called vulnerable countries.

**However, the crisis revealed the unsustainability of the level of debt with respect to income prospects and assets in several Member States, where a deleveraging process in the non-financial private sector, with consequences on demand, is now taking place** (see Crowe *et al.*, 2011, and Ruscher and Wolff, 2012, as examples on household and non-financial corporations deleveraging, respectively). The pace and extent of the adjustment varies across countries (figures 1 and 2), reflecting the existent heterogeneity in credit market dynamics, the variety of financial institutional frameworks, as well as different deleveraging potential needs amongst Member States.

The negative feedback loop between the sovereign and the banking sector stands as an additional differentiating factor, increasing the pressure in countries facing deleveraging needs in the public sector. Banking sector deleveraging, the contagion between sovereigns, floor effects from sovereign yields and financial market segmentation along national lines hindering the cross-country allocation of savings to the most productive investments, led to a high degree of uncertainty and to stronger amplification effects on economic activity through the banking sector.

**Table 1: Household debt and interest burden as percentage of disposable income**

| | Household debt to disposable income (%) | | | | Interest burden to disposable income (%) | | |
|---|---|---|---|---|---|---|---|
| | 2000 | 2008 | 2011 | | 2000 | 2008 | 2011 |
| BE | 62.6 | 79.9 | 89.5 | BE | 2.5 | 3.0 | 1.7 |
| DE | 108.0 | 92.0 | 87.8 | DE | 5.2 | 4.0 | 2.8 |
| IE | 114.6*** | 209.1 | 212.3 | IE | 5.1*** | 9.0 | 3.1 |
| EL | 17.3 | 70.0 | 88.4 | EL | 2.3 | 2.8 | 2.2 |
| ES | 69.1 | 127.4 | 125.4 | ES | 2.3 | 5.3 | 2.9 |
| FR | 54.2 | 74.7 | 82.9 | FR | 2.2 | 3.6 | 1.9 |
| IT | 34.0 | 58.3 | 65.3 | IT | 1.0 | 2.2 | 0.9 |
| CY | 115.0 | 156.5 | 186.3 | CY | 7.3 | 4.4 | 3.5 |
| LU | n.a. | 126.8 | 132.7** | LU | n.a. | 5.9 | 2.5** |
| NL | 163.7 | 249.8 | 266.0 | NL | 9.2 | 11.7 | 6.5 |
| AT | 73.7 | 86.6 | 89.0 | AT | 2.4 | 3.0 | 1.7 |
| PT | 84.5 | 127.8 | 126.3 | PT | 2.6 | 8.0 | 3.0 |
| SI | 23.4*** | 42.4 | 46.7 | SI | 1.7*** | 2.3 | 1.7 |
| SK | 6.9 | 36.7 | 43.2 | SK | 0.7 | 2.1 | 1.5 |
| FI | 61.2 | 98.1 | 104.2 | FI | 2.6 | 4.7 | 1.7 |
| EE | 15.0 | 94.7 | 88.4 | EE | 0.7 | 9.3 | 2.1 |
| BG | n.a. | 49.7 | 46.7* | BG | n.a. | 2.4 | 0.7* |
| CZ | 13.4 | 50.2 | 56.3 | CZ | 1.3 | 1.3 | 0.8 |
| DK | 202.5 | 293.5 | 286.1 | DK | 12.5 | 15.0 | 9.1 |
| LV | 8.6 | 72.4 | 66.5 | LV | 0.1 | 3.1 | 1.5 |
| LT | 4.8*** | 45.0 | 41.2 | LT | 0.1*** | 2.4 | 0.9 |
| HU | 9.8 | 64.6 | 64.0 | HU | 0.9 | 3.6 | 2.7 |
| PL | 9.9 | 47.9 | 58.1 | PL | 2.2 | 2.3 | 1.8 |
| RO | 1.4 | 33.4 | 39.1 | RO | 0.4 | 1.0 | 2.7 |
| SE | 103.9 | 146.3 | 159.2 | SE | 4.7 | 6.3 | 4.5 |
| UK | 103.6 | 161.0 | 145.2 | UK | 5.7 | 7.5 | 0.6 |

* corresponds to 2010, ** corresponds to 2009,*** corresponds to 2002

** 2010, latest annual data available, ** 2002 first data available. Source: Eurostat.*

**All in all, existing deleveraging pressures in the private sector, although necessary in highly indebted countries, stand as a source of concern at the current juncture, especially in the context of fiscal consolidation faced by some Member States.** Designing policy responses aimed at facilitating the correction of existing imbalances while limiting the negative impact on growth remains thus one of the key policy challenges lying ahead (see Roxburgh *et al.*, 2012 and IMF, 2012, for recent analyses on this issue).

**The identification of forces at work and existing sources of vulnerability, underlying both the still high levels of indebtedness and/or deleveraging pressures, stands as a necessary first step in the definition of such policies**.

In this light, this paper **first aims at identifying those EU Member States with a highly indebted non-financial private sector and likely to face deleveraging forces**. Since the assessment of debt burden against different benchmarks may point to different conclusions, we take into account the informational content of several indicators using an encompassing metric based on clustering and composite indicator techniques. This analysis allows us to identify two sets of countries which are more prone to face deleveraging pressures, respectively in the households and non-financial corporations' sectors.

**With a view to analyse the impact of deleveraging on economic activity, we proceed by assessing quantitatively the deleveraging needs of each one of the economies**

**identified as facing high pressures**. For this purpose, we use two different approaches: (*i*) a threshold approach, which compares the current level of households and non-financial corporations debt with a static benchmark based on historical data - either the country-specific 2000 level or the third quartile of the common distribution of indebtedness rates, following the methodology underlying the Macroeconomic Imbalance Procedure (MIP) scoreboard; (*ii*) a stationarity approach, according to which net worth must be (weakly) increasing in order for debt to be sustainable. Based on the later we compute the annual deviation of the debt to GDP ratio from the "sustainable" level. The build-up of pressures is easily identified between 2002 and 2007, when the gap between the actual debt and its balanced or sustainable path increased rapidly. This period is then taken as a reference to calculate the cumulated increases in deleveraging pressures for each of the Member States concerned.

**As the deleveraging needs in the non-financial sector are highly influenced by the underlying credit market conditions**, **the former are then assessed against credit supply and demand indicators in each of the selected Member States**. This analysis allows us to take into account the potential impact of the financial sector health underlying the sustainable level of indebtedness and, therefore, differentiate the Member States under analysis based on these criteria.

Based on historical experience, the necessary reduction of the excessively high levels of non-financial private sector indebtedness identified in the paper could take many years and involve a significant negative impact on economic activity. **The final objective of the paper is thus to evaluate the extent and impact of deleveraging and underlying balance-sheet adjustment on the dynamics of the main macroeconomic aggregates.** A dynamic general equilibrium model simulates the impact of a deleveraging shock in the households sector under different scenarios, including the possibility of a simultaneous deleveraging process in the public sector. This analysis allows us to infer not only the potential impact of deleveraging in economic activity, but also the main channels through which deleveraging effects are propagated.

Against this background, section 2 presents a toolkit to assess, in a systematic way, sectoral balance sheets developments and deleveraging prospects in the non-financial private sector (taking also into account credit supply and demand dynamics) and section 3 focuses on the impact of balance sheet adjustments in the household sector on the main macroeconomic aggregates, taking into account the interlinkages between the different institutional sectors in the economy and potential spillovers across countries.

## 2. NON-FINANCIAL PRIVATE SECTOR BALANCE SHEETS: A SURVEILLANCE FRAMEWORK

For surveillance purposes, it is important to develop an analytical framework to assess, on a systematic basis, private sector balance sheet dynamics with a view of capturing, *(i)* the likelihood; *(ii)* the extent; *(iii)* the immediacy; and *(iv)* the impact on the main macroeconomic aggregates of households and firms' deleveraging processes.

This section develops the first three points and leaves the simulation of the implications of private sector deleveraging episodes for the economic activity to section 3. First, the prospects for balance sheet repair in the private sector are assessed in section 2.1 through the lens of various indebtedness and leverage indicators, relating debt to agent's income and wealth. Second, the translation of the deleveraging pressures into quantifiable "adjustment shocks" as presented in section 2.2 is based on debt sustainability analysis, comparing current levels against estimated and/or *ad-hoc* benchmarks. Third, the imminence and strength of deleveraging in the private sector is highly affected by underlying credit market conditions that reflect cross-country differences in terms of institutional settings, structural features and current macroeconomic conditions. In this line, section 2.3 offers a snapshot of credit demand and supply components that qualify the initial assessment on debt overhang, building a bridge between the estimated adjustment shock and the empirical evidence on historical deleveraging episodes in the households and non-financial corporate sectors.

### 2.1. A sectoral look at the debt overhang

This section attempts at identifying EU Member States where (non-financial) private sector debt overhang and/or current/subsequent deleveraging processes stand out as an immediate concern. In this context, special attention is given to (*i*) the definition of debt and (*ii*) the reference variable against which it is assessed:

(i) Indebtedness is defined as the sum of outstanding loans and securities other than shares.[1] It is currently based on non-consolidated data, *i.e.* including intra-sector liabilities such as intra-enterprise loans. This definition is in line with the headline scoreboard indicator on private sector debt in the MIP.

However, this concept represents our starting point and the merits of alternate definitions should also be taken into account. In this vein, this note explores two alternative developments: first, by including other items in the concept of indebtedness, such as trade credits (belonging to the category "other accounts payable"); second, by assessing the implications of using consolidated data, abstracting from intra-sector incurrence of debt.

(ii) Debt can be gauged against agents' income, evaluating their capacity to repay existent commitments, but also against financial assets as a more general concept of wealth, representing the other side of the coin of debt-generating liabilities.

The informational content of the various definitions covering these two aspects may point to diverging conclusions in terms of the degree of (over)indebtedness. In order to overcome this apparent mismatch and better understand the differences in interpretation, these two yardsticks will be further refined. On the one hand, the Gross Domestic Product (GDP), which is by default taken as the income generating benchmark, will be disaggregated into more sector-specific indicators. On the other hand, financial assets will be complemented, when available, with non-financial assets as the latter account for a significant share of existing wealth. In addition, valuation effects and the transactional value of assets, which tends to be much more volatile than debt, are also taken into account in order to provide an alternative definition of leverage.

Lastly, irrespective of the indicator at hand, the analysis of debt levels must be complemented by a flow analysis: both the pace and extent of the leverage process that took place over the last cycle in most Member States provide first-hand signals of building indebtedness pressures, which might lead to periods of balance sheet repair.

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[1] The data used in this section stem from the annual financial accounts and balance sheets (AFA) collected by Eurostat and the quarterly financial accounts (QFA) collected by the ECB.

### *2.1.1. Measures of indebtedness*

Debt is usually measured against the servicing capacity of an economy, as in the debt over GDP ratio (figure 3). Alternatively, leverage indicators, which relate the level of debt to different measures of asset positions, are also frequent in the literature (figure 4).

As mentioned above, the concept of debt is based on non-consolidated sources. As can be seen in figure 3, the gap between non-financial corporations'[2] consolidated debt-to-GDP and its non-consolidated correspondent goes from around 100 percentage points in Belgium to virtually zero in a number of countries, including Greece, the Netherlands, Slovakia and Denmark. Taking into account the merits of both sources, there are practical as well as fundamentally-grounded reasons endorsing the use of non-consolidated data.

On the practical side, only non-consolidated data is available for all Member States.[3] Moreover, quarterly data provided by the ECB are non-consolidated and these are used to complement annual data with the latest developments. Furthermore, consolidation practices and their reporting to Eurostat for data compilation differ amongst Member States and can also affect comparability. On the more fundamental side, non-consolidated data presents important information about the total indebtedness of the non-financial corporate sector: by including intra-sector debt it acknowledges that apart from bank loans, an increasingly important source of financing, especially during the crisis, may be intra-companies. Moreover, when considering debt against financial assets, consolidation of debt instruments (loans and securities) is paired by consolidation of the same instrument on the asset side (in the denominator). Therefore, the gap in the debt-to-asset indicator for firms between the consolidated and the non-consolidated version (figure 4) does not reflect first-hand differences in over-indebtedness pressures. It is rather a reflection of the extent of intra-sector activities that lie within the asset instruments (affecting the denominator) that are not included in the definition of debt (not affecting the denominator), i.e. shares, deposits and other accounts receivable.

One drawback of non-consolidated data, however, lies in its inability to assign different risk/debt profiles to countries depending on the source of the liabilities (either banks or intra-sector). This qualification is particularly important whenever intra-sector liabilities are dominated by intra-group transactions. If intra-group loans form the bulk of intra-sector credit, nonconsolidated data may be biased due to national and multinational (non-financial) corporate accounting practices.[4] High amounts of intra-enterprise loans issued for fiscal reasons might not reflect increasing deleveraging pressures, to the extent that they are purely driven by accountancy practices. It also does not reflect the potential increasing importance of intra-company loans during the crisis to compensate the existing constraints in access to financing in the banking sector.

Moreover, the definition of indebtedness adopted does not include the category "other accounts: payable" (where trade credits are considered), in line with the definition of debt agreed in the MIP procedure. As signalled in the ECB monthly bulletin of February 2012, euro area firms' liabilities consist, to a large extent, of bank loans. As the crisis developed and banks reined in supply, other sources of financing became more important for non-financial corporations, in particular securities issuance and financing between firms via inter-company loans, suggesting some buffer role. In this line, trade credit became also more relevant. Nevertheless, it exhibits high volatility and still represents a small share of liabilities, introducing excessive noise in the aggregate data.

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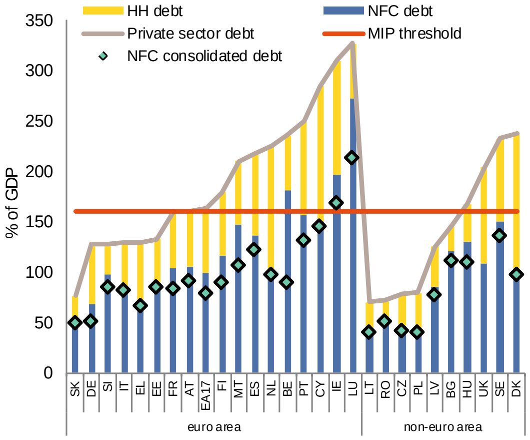
[2] Consolidated and non-consolidated debt coincide in the household sector.

[3] The United Kingdom does not report consolidated balance sheet data.

[4] For example, in Member States where each unit/branch of an enterprise-group reports on its credit/debt, the non-consolidated data would probably show higher figures than in Member States where the headquarter reports on total group consolidated credit/debt.

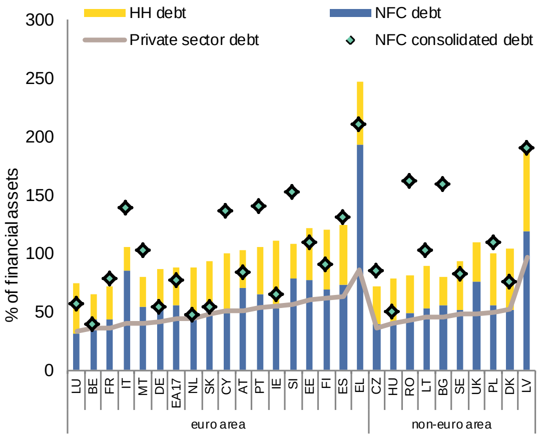
**Figure 3: Indebtedness of EU27 countries, 2011, sectoral decomposition (% of GDP)**



Source: Eurostat

Note: non-consolidated data. Debt includes loans and securities other than shares.

**Figure 4: Indebtedness of EU27 countries, 2011, sectoral decomposition (% of financial assets)**



Source: Eurostat

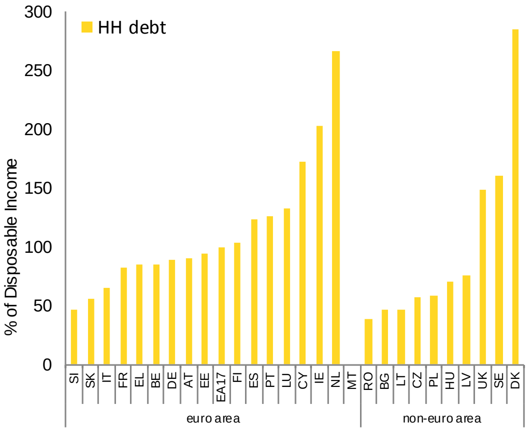
Note: non-consolidated data. Debt includes loans (F4) and securities other than shares. (F3). Financial assets include currency and deposits (F2), securities other than share (F3), loans (F4), shares and other equity (F5), Insurance and technical reserves (F6) and other accounts (F7).

As can be seen in figures 3 and 4, the assessment of debt burden against different benchmarks may point to different conclusions. As regards non-financial corporations, for example, the indicator of debt over GDP points to Belgium, Ireland or Luxembourg as being particularly highly indebted. However, if debt is related to total financial assets, Belgium and Luxembourg show rather low levels of indebtedness, while Ireland is closer to the euro area average. Paradoxically, Greek and Slovenian firms, which show very high levels of leverage, do not seem particularly highly indebted if debt is related to GDP. There are similarly sharp contrasts if one looks at households. For instance, Estonian households appear highly leveraged due to the losses in the value of their assets in recent years, although their debt is relatively small as a share of GDP. In order to reconcile the information coming from both indicators, a first attempt would simply look for refinements in their definition/benchmarks.

First, aggregated measures of affordability such as GDP might not provide an accurate picture of agents' ability to repay their debts and could be further disaggregated. On the one hand, households' disposable income could be considered as it accounts for differences in wealth redistribution within Member States and disparities in the balance of income flows with respect to the rest of the world (figure 5). On the other hand, gross operating surplus provides a better signalling of a firm's capacity to generate income and thus service its debt (figure 6). Although these alternative ratios present higher variance across the sample, the relative positioning of Member States is not altered significantly but for a few exceptions, such as Luxembourgish households or Estonian firms.

Moreover, countries with comparatively higher tax burden (DK, SE) and countries that are a hub for multinationals (LU, HU, CZ, LV) stand at the higher end of the spectrum.

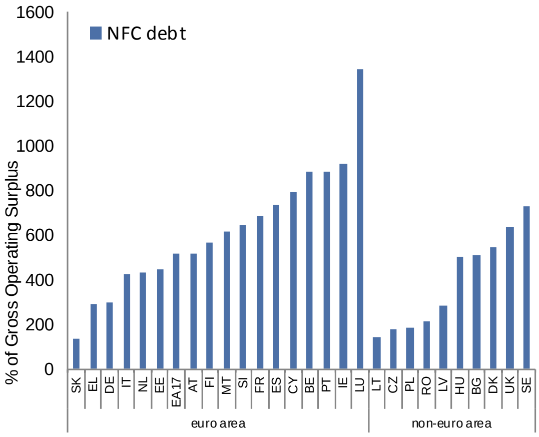
**Figure 5: Indebtedness of EU27 countries, 2011, households (% of gross disposable income)**



Source : Eurostat

Note : non-consolidated figures. Debt includes loans and securities other than shares. Data for BE, CY, SK, BG, LV, LT, HU, RO and the UK is available only up to 2010. Only 2009 is available for LU. No data are available for MT.

**Figure 6: Indebtedness of EU27 countries, 2011, firms (% of gross operating surplus)**



Source : Eurostat

Note : non-consolidated figures. Debt includes loans and securities other than shares and data for 2011 are only available for the NL, PT and SE.

Second, when considering the leverage ratio (that is, the debt to assets ratio) it is important to gauge debt with respect to both financial and non-financial assets, especially in the case of households as the latter represent the bulk of their wealth. For this purpose we use Eurostat's balance sheets for non-financial assets at current prices.[5]

Figure 7 shows that the gap between households' debt to financial assets and debt to total assets ratios is higher in Spain, Ireland, Slovakia or Latvia, where the proportion of housing in household balance sheets is also higher. On the contrary, due to specificities in their public pension system, the gap is smaller in Member States such as the Netherlands or Sweden as their asset position is more diversified.

Third, valuation effects, which affect both financial assets (mainly via shares and other equity as well as other accounts receivable and payable) and non-financial assets (e.g., house prices) should also be taken into account, given that they are much more volatile than debt instruments, especially in a downturn when indebtedness (stock) adjustments tend to last longer on average. As can be seen in figure 8, balance sheet expansion might imply constant leverage ratios for the private sector as debt grows in line with the expansion of assets. However, if we adjust assets for valuation effects[6], balance sheet growth is now asymmetric as shown in figure 9, which translates into an increasing notional leverage ratio.

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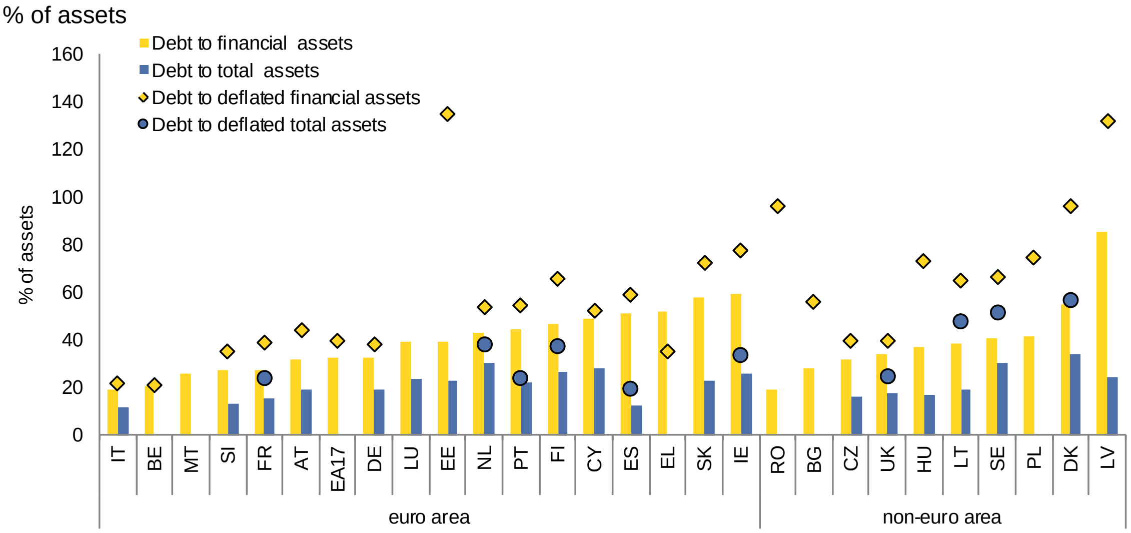
[5] The value of dwellings held by households is available for 19 countries and we extend it to 22 using national sources. However, data availability for firms is almost inexistent. Moreover, the releases are not frequent enough and 2010 data are still missing for several Member States.

[6] Valuation effects on the debt-generating instruments are minor and therefore not affecting the conclusions of the analysis.

**Figure 7: Indebtedness of EU27 countries, 2010, households (% of total assets)**



Source: Eurostat

Note: non-consolidated figures. Debt includes loans and securities other than shares. Non-financial assets for DE, IT, CY, EE, LV, HU corresponds to 2009 figures. Moreover, the accumulation of deflated transactions starts in 1999.

**Figure 8: Private sector balance sheet dynamics**

Leverage is kept constant

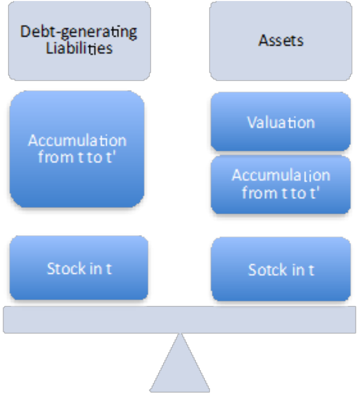
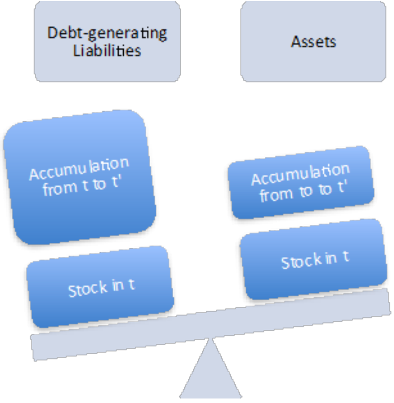

Debt-generating Liabilities
Assets
Accumulation from t to t'
Valuation
Accumulation from t to t'
Stock in t
Sotck in t

**Figure 9: Private sector balance sheet dynamics adjusted for valuation effects**

Notional leverage reflects accumulation of pressures


Debt-generating Liabilities
Assets
Accumulation from t to t'
Accumulation from to to t'
Stock in t
Stock in t

When analysing debt sustainability one should therefore take into account the transactional value of the assets, filtering for valuation effects in both financial and non-financial assets, as the concept of notional leverage represents a better indication of the ability of households and firms to incur liabilities.

We follow Bakk-Simon *et al*. (2012) and calculate notional assets and liabilities by accumulating existing transactions[7] to the corresponding stock[8] (figure 7). The selection of the starting date for the accumulation of deflated transactions is of importance. By considering the 1999 stock level as the starting point, we are assuming implicitly Member States economies as being in equilibrium/steady state in that year. This simplification allows for cross-country comparison on the evolution of notional leverage.

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[7] From the national sectoral accounts transactions data.

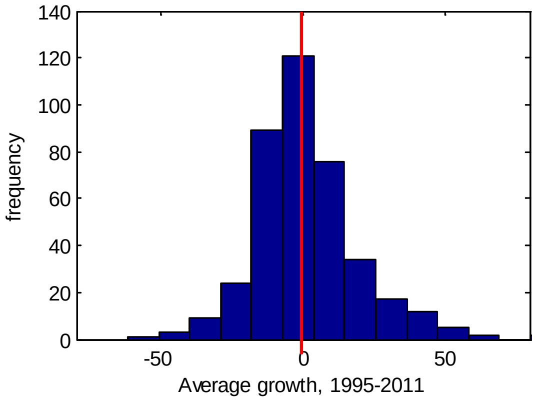
[8] Non-financial assets are deflated with relative house prices.

As expected, given the common period of asset price increases in the run up to the crisis, notional ratios are biased upwards. But the relative ranking of countries is roughly kept once comparing deflated vs. non-deflated ratios but for a few exceptions. Notably, the sharp depreciation experienced by Greek assets over the last years has turned notional leverage below its non-deflated counterpart. On the contrary, countries experiencing booms in stock markets and real estate, like Ireland, Spain, Bulgaria, Estonia, Latvia, Hungary or Romania, present striking gaps between their notional and their current leverage. These results also call for special attention to changes in debt, and not only to the levels, as an indicator of deleveraging pressure.

Similar conclusions can be drawn by looking at firms' balance sheet behaviour. As reported in figure 10, liabilities grew hand in hand with nominal assets: leverage growth rates are centred on the origin, pointing towards the non-existence of significant positive long-term trends. However, when discounting for valuation effects, liabilities grew disproportionately more when compared to assets (figure 11). Positive annual growth rates on average imply an upward trending notional leverage ratio.

**Figure 10: Non-financial corporates, leverage, EU27, average annual growth**

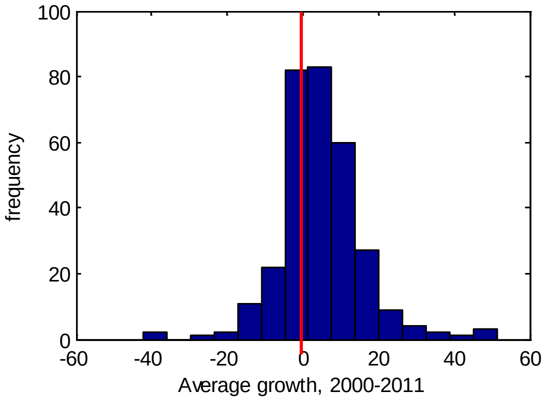
Frequency distribution



Source : Eurostat

**Figure 11: Non-financial corporates, notional leverage, EU27, average annual growth**

Frequency distribution



Source : Eurostat

### 2.1.2. Likelihood of debt overhang and deleveraging pressures

As it is difficult to extract a clear-cut conclusion on the existing debt overhang and the size of possible deleveraging pressures by looking at different indicators in isolation, an encompassing metric covering all the relevant aspects is developed in this section.

Using the basic indicators developed in the previous section as inputs, both for firms[9] and households[10], clustering and composite indicator techniques help in identifying EU Member States that are facing or are prone to face deleveraging pressures in the non-financial private sector. We focus on the evolution of the ratios over the accumulation phase (from 2000 to 2008) and on their 2011 level in order to cover for actual deleveraging potential as well as diverging starting points and catching-up processes. Indeed, the existence of catching up effects could mitigate the need for deleveraging despite rapid accumulation of debt in the past.

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[9] Debt over GDP, debt over gross operating surplus, debt over financial assets, as well as debt over deflated financial assets.

[10] Debt over GDP, debt over disposable income and debt over financial assets as well as debt over deflated financial assets, to mimic the indicators selected for the non-financial corporations. Due to the specified data issues related to non-financial assets, only financial assets are retained in the clustering analysis in order to allow for cross-country comparability across the 27 Member States and use the latest available data.

Against this background, clustering techniques are used, in a first stage, to find underlying similarities in the data and classify countries accordingly. The analysis is performed for households and firms separately, looking first at both capacity to repay indicators (their change in the upswing and their current level) and subsequently at the two different leverage ratios (including also their cumulated change as well as their current level). Each one of the four clustering exercises includes therefore four dimensions. Member States are then grouped into non-mutually exclusive clusters.

Subsequently, principal component analysis is implemented in order to reduce the dimensionality of the data and allow for a two-dimensional representation (see Box 1 for a methodological description). In all cases, the first two common factors are selected as they explain most of the variance in the sample. By looking at the factor loadings of the different indicators, the first factor could be identified as representing common dynamics to all indebtedness ratios in the build-up phase, while the second factor is associated with the level effect.

Figures 12 to 15 show the groupings of Member States around cluster centres.[11] The degree of membership to the different groups is represented by level curves, signalling the corresponding distance to the centroid. Based on these results, some preliminary conclusions on existing debt overhangs can be drawn:

- as regards households capacity to repay (figure 12), Ireland, Spain, Estonia, the Netherlands, Latvia, Denmark, the United Kingdom and, to some extent, Cyprus are amongst those that experienced a rapid increase in household indebtedness before the crisis. Despite the varying starting position in terms of household debt, the information content of the level dimension also points to the same set of countries as potentially prone to suffer from deleveraging pressures, on top of Portugal and Sweden. Ireland, Latvia and Estonia also appear as subject to high pressures when considering actual leverage as well as its build-up (figure 13). A second cluster of countries includes Member States listed above as Spain, the Netherlands (to a lesser extent), Denmark and Cyprus but also others such as Greece, Slovakia Lithuania and Poland, where the comparison of household debt against assets (figure 13) is less favourable than against income (figure 12);

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[11] The analysis is not carried out for Luxembourg and Malta due to data availability reasons.

**Figure 12: Household sector deleveraging pressures considering the capacity to repay**

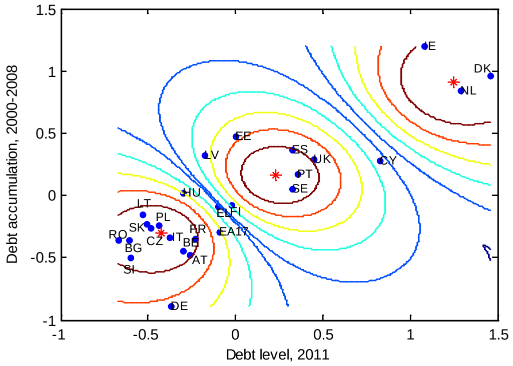
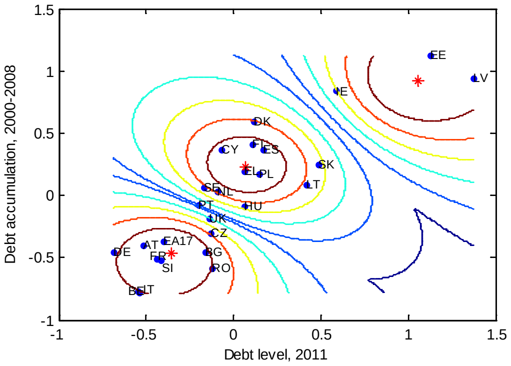


**Figure 13: Household sector deleveraging pressures considering assets**



- on the firms' side, there is also a clear positive relationship between the accumulation and the level factors when considering the capacity to repay (figure 14). Countries like Belgium, Ireland, Spain, Cyprus, Portugal and Bulgaria stand out as presenting vulnerabilities related to their firm's indebtedness. This snapshot is highly nuanced when looking at firm's asset side (see figure 15). Belgium and Cyprus present a healthier picture while firms in countries like Greece, Italy, Slovenia and Latvia appear as subject to higher pressures. As a robustness check, this exercise was also run with consolidated data and the results are consistent but for the case of Belgium[12], where the relevance of intra-company loans calls for further qualifications when assessing non-financial corporates debt sustainability.

**Figure 14: Non-financial corporates sector deleveraging pressures considering the capacity to repay**

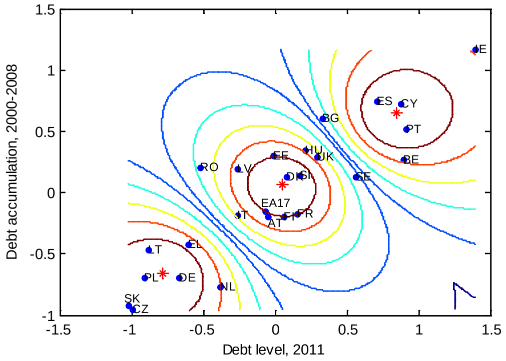
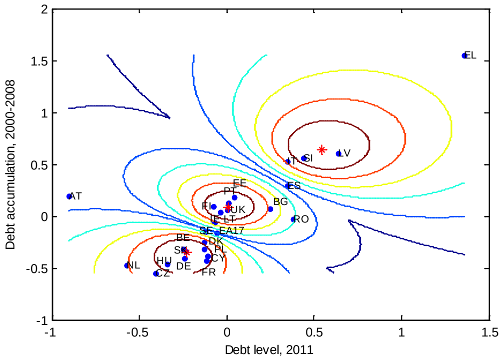


**Figure 15: Non-financial corporates sector deleveraging pressures considering assets**



In a second stage, the information obtained through principal component analysis can be further streamlined by means of the construction of composite indicators with weights based on the common factors. The selection of the factors as well as their interpretation is common to the cluster analysis. The loadings, however, are now used as intermediate weights for the individual indicators in the construction of the composite, according to the proportion of the total variance of the indicator explained by the specific factors (see Nicoletti *et al.* (2000) for an application and OECD (2008) for a deeper technical explanation).

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[12] Intra-company loans in Belgium amount to almost 100 per cent of GDP.

## Box 1: Fuzzy clustering and principal component analysis of private leverage

Cluster analysis is aimed at finding underlying similarities in the data and classifying the countries accordingly. Clusters represent groups of countries where members are more similar to one another than to non-members. Similarity is assessed mathematically as a distance measure between multi-dimensional data vectors. *Fuzzy* clustering algorithms allow for countries to belong to different subgroups in various degrees (given by boundaries or level curves), as clusters are not mutually exclusive.

The analysis for the non-financial corporations and the household sectors uses four variables. As the number of subgroups is *a priori* unknown, we use validation indices in order to determine the optimal number of clusters. Following the partition coefficient (PC) and the classification entropy (CE) criteria, we determine the optimal number of groups to be three. Once the number of clusters is determined, we apply the C-means algorithm, which yields an optimized position of the countries along the initial dimensions with respect to cluster centres, defined as weighted means of the countries belonging to the group.

As a final step, in order to reduce the dimensionality of the exercise, we perform principal components analysis on the leverage indicators according to their autocorrelation matrix and its associated eigenvectors. We select the first two components as their eigenvectors are above or close to 1 and they jointly explain more than 75 per cent of the total variance of both household and firms data (see table I).

Table I. Eigenvalues of the leverage indicators

| | Households | | | | Firms | | | |
|---|---|---|---|---|---|---|---|---|
| | Dimension I | | Dimension II | | Dimension I | | Dimension II | |
| | Eigenvalue | Vaiance(%) | Eigenvalue | Vaiance(%) | Eigenvalue | Vaiance(%) | Eigenvalue | Vaiance(%) |
| Factor 1 | 2.93 | 0.73 | 2.87 | 0.72 | 2.98 | 0.74 | 2.85 | 0.71 |
| Factor 2 | 0.90 | 0.23 | 0.73 | 0.18 | 0.76 | 0.19 | 0.86 | 0.21 |
| Factor 3 | 0.15 | 0.04 | 0.35 | 0.09 | 0.22 | 0.06 | 0.25 | 0.06 |
| Factor 4 | 0.02 | 0.01 | 0.06 | 0.01 | 0.04 | 0.01 | 0.04 | 0.01 |

Note: Dimension I refers to the capacity to repay while dimension II relates debt to assets.

In order to give an economic meaning to the common components, we interpret their loadings with respect to the different indicators (after performing a standard VARIMAX rotation). The first factor represents the common dynamics of all the leverage indicators in the pre-crisis phase (until 2008), while the second one refers to the joint level effect. The loadings are then used to project the initial position of the different countries in the multi-dimensional space (four dimensions in each one of the cases) into the two-dimensional space given by the factors.

Along these lines, figures 16 and 17 characterise (for households and firms, respectively) all the relevant information on existing deleveraging pressures according to the two dimensions at stake (capacity to repay and leverage). To make the interpretation of the figures easier through quadrants, *ad-hoc* lines are drawn signalling the countries for which at least one of the dimensions of the composite indicator is above the 0.5 level. The following countries can be identified as more prone to face deleveraging pressures in the household and non-financial corporation sectors: Cyprus, Denmark, Spain, Ireland, the Netherlands, Portugal, Estonia, Latvia, Slovakia, Sweden and the United Kingdom on the household side and Belgium, Bulgaria, Cyprus, Greece, Spain, Hungary, Ireland, Italy, Portugal, Estonia, Latvia, Slovenia, Sweden and the United Kingdom on the corporate side.

**Figure 16: Composite indicator on deleveraging pressures for EU27 Member States, Households**

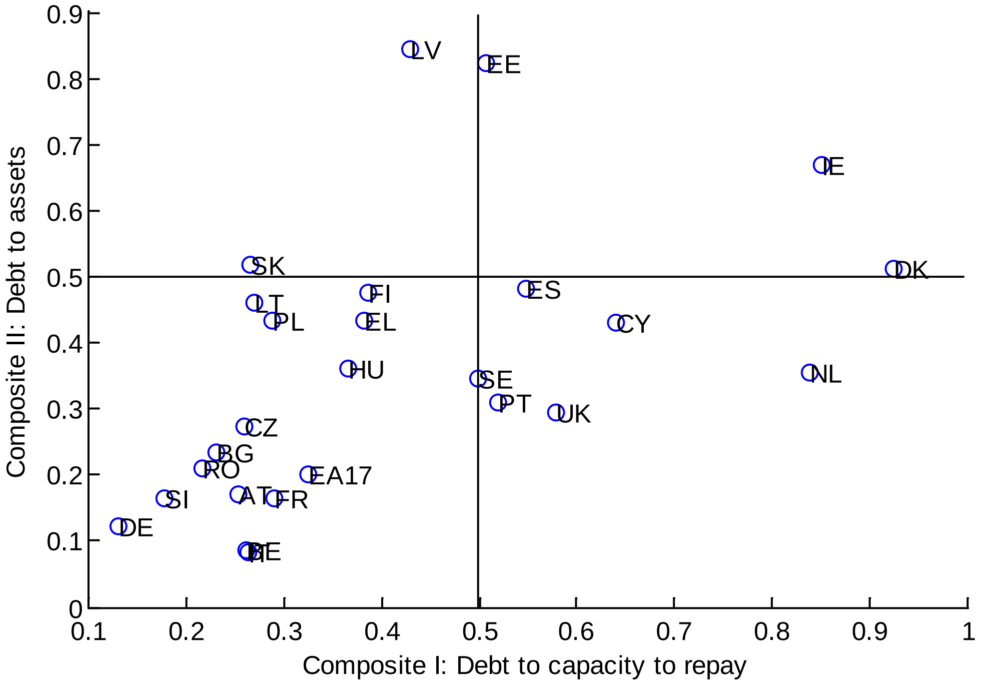
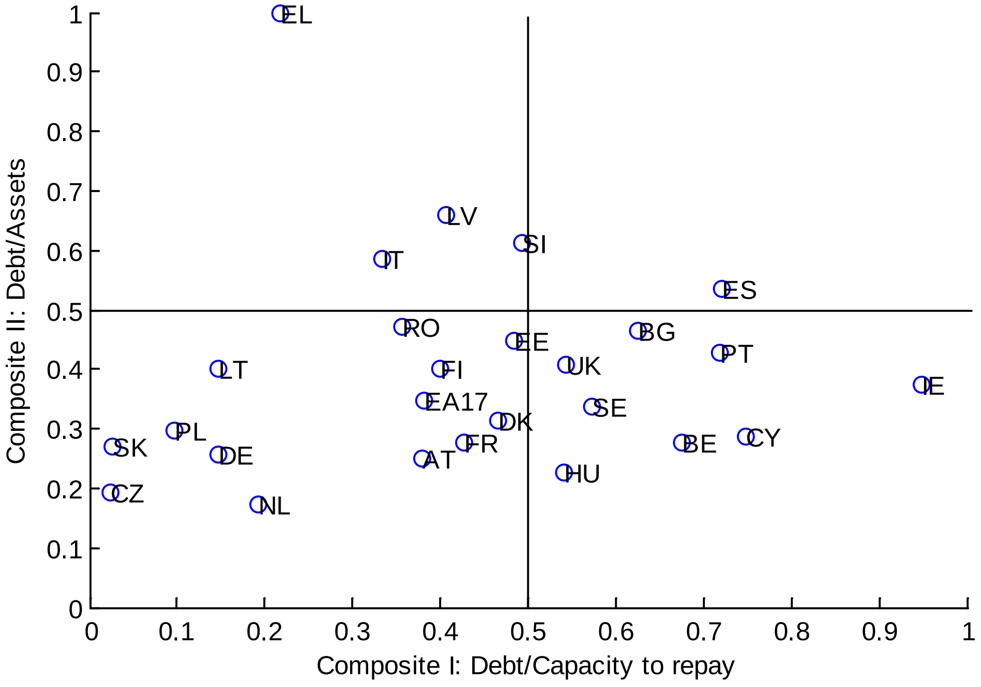


**Figure 17: Composite indicator on deleveraging pressures for EU27 Member States, Non-financial corporates**



Nevertheless, the assessment of the deleveraging pressures faced by the identified economies requires the definition of a benchmark against which the indebtedness levels can be measured. In other words, one needs to define a sustainable or long run equilibrium level of debt for each country, taking into account, to the extent possible, the factors that may influence it over time (e.g., valuation effects and prevailing conditions in the financial sector). This is the main focus of the following two sections.

## 2.2. Deleveraging potential based on a sustainability analysis

With a view to analyse the impact of deleveraging on economic activity, the needs of each one of the economies identified as suffering from high pressures are now assessed quantitatively.

As mentioned, this assessment requires a benchmark against which to gauge actual developments in indebtedness: a long-run equilibrium or sustainable level. This analysis would yield an approximation of the shock needed, in each country under scrutiny, to achieve a more sustainable debt to GDP ratio.

A significant amount of research has been conducted on external and public debt sustainability (notably by the European Commission, the IMF and the ECB).[13] As mentioned by Wyplosz (2007), different definitions of external or public debt sustainability could be used, including *(i)* one based on solvency, requiring net worth to be always positive, *(ii)* an IMF definition, according to which debt is sustainable if it satisfies the solvency condition without a major correction given the cost of financing, and *(iii)* the definition underlying Arrow *et al.* (2004) according to which net worth must be (weakly) increasing (therefore not ruling out the possibility of net worth being initially negative as long as it is rising and eventually becoming non-negative, thus meeting the solvency condition).

The IMF concept is made operational by requiring debt not to exceed a specific *ad-hoc* threshold. Arrow *et al.*'s definition does not imply any specific threshold for debt and can be made operational by ignoring the unobservable present value of primary balances and requiring the debt-to-GDP ratio to be stationary, or, since stationarity is difficult to assess in practice, by requiring debt ratio to be on a non-increasing trend, which does not rule out occasional but temporary increases.

### *2.2.1. Debt Sustainability based on Thresholds*

Some recent studies follow the first approach: Cecchetti *et al.* (2011) derive implicitly thresholds for the debt ratios by concluding that beyond a certain level household debt (85% of GDP) has a negative effect on growth.[14] In the same line, Arcand *et al.* (2012) conclude that the marginal effect of financial depth on output growth becomes negative when credit to the private sector reaches 100% of GDP. According to the authors, a similar threshold was found by Easterly *et al.* (2000) when focusing on output volatility: output volatility starts increasing when credit to the private sector reaches 100% of GDP. However, this figure seems to be quite small (for the private sector as whole), especially in countries where financial innovation and institutional developments may justify higher levels of equilibrium/sustainable private sector indebtedness. This issue is also raised in a forthcoming OECD study (Bouis *et al.* 2013) which, to assess the need for debt reduction, compares the current levels of the debt ratios with their pre-boom levels of

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[13] On public debt sustainability see, for instance, the European Commission Sustainability and Public Finances Reports, Ostri *et al.* (2010) and the European Central Bank (2011).

[14] However, the authors also mention that the impact, in the case of households, is very imprecisely estimated.

2000 (based on the finding that increases in debt-to-GDP ratio preceding financial crisis have tended to be reversed subsequently).

Based on the historical experience on deleveraging, Tang and Upper (2010) found that financial crises tend to be followed by a prolonged period of debt reduction in the non-financial private sector and that private sector debt to GDP ratios fell by an average of 38 p.p., returning to approximately the levels seen before the boom. In the same line, the IMF's World Economic Outlook (April 2012) suggests that household deleveraging tends to be more pronounced following busts preceded by a larger build-up in household debt and that deleveraging takes time (pointing to a median duration of household deleveraging episodes of seven years, with a reduction in the debt-to-income ratio of 23 p.p.). In contrast, there is no decline in the debt-to-income ratio following low-debt housing busts. Instead, there is a small and statistically insignificant increase.

In this vein, tables 2 and 3 report (*i*) the evolution of household and firm debt ratios (as percentage of GDP), for the Member States identified as subject to high sectoral deleveraging pressures, and (*ii*) the adjustment required for each one of the countries to return to either their 2000 debt ratio or to reach a statistical threshold.[15]

The tables show that debt reduction is now taking place in several countries (*e.g.* households in IE, ES, PT, EE, DK and UK as well as firms in BG, EL, ES, IT, EE, LV and the UK), but the shock needed to achieve the two thresholds defined above is still quite significant and even unrealistic for most of them, taking into account the evidence on past episodes of adjustment summarized above. The table also captures the "catching up" countries for which debt ratio levels are significantly lower when compared to the statistical threshold, despite large increases before the crisis. This effect is reflected by the gap between the required adjustment needed to return to the 2000 level of debt-to-GDP ratio and to achieve the "MIP style" statistical threshold (SK, LV and EE for households and LV, EE as well as SI, BG and HU although to a lesser extent, for firms). The case for EL and IT firms is less clear-cut as they were selected according to their high debt with respect to assets. Their sustainability should thus involve debt and also asset considerations.

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[15] Computed as the upper quartile of the distribution of the indicator, using 1994-2007 data.

## Table 2. Household debt to GDP ratio

| | | | | | | | | | | | | | | | | | | Required adj (p.p.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2000 | threshold |
| IE | | | | | | | 41.6 | 47.8 | 54.0 | 61.4 | 74.0 | 93.5 | 120.3 | 129.9 | 126.5 | 116.5 | 113.1 | 71.5 | 54.4 |
| ES | 27.9 | 28.6 | 30.2 | 33.0 | 36.5 | 39.9 | 41.8 | 45.1 | 49.6 | 55.0 | 62.0 | 71.8 | 83.7 | 86.9 | 84.4 | 84.7 | 82.0 | 42.0 | 23.3 |
| CY | 62.4 | 62.9 | 64.1 | 65.2 | 71.1 | 75.6 | 73.6 | 73.5 | 70.9 | 72.5 | 92.1 | 85.1 | 101.3 | 112.5 | 118.3 | 126.7 | 129.7 | 54.1 | 71.0 |
| NL | 52.8 | 56.5 | 61.5 | 66.0 | 71.6 | 78.1 | 84.2 | 90.1 | 95.7 | 98.0 | 102.4 | 106.9 | 117.9 | 120.3 | 121.8 | 124.7 | 123.8 | 45.7 | 65.2 |
| PT | 22.7 | 26.0 | 34.8 | 40.7 | 48.3 | 54.0 | 59.0 | 63.5 | 67.4 | 71.4 | 74.6 | 80.7 | 89.1 | 91.4 | 94.0 | 97.8 | 93.5 | 39.6 | 34.8 |
| SK | 3.9 | 4.0 | 4.3 | 4.7 | 4.3 | 5.1 | 5.7 | 7.0 | 8.5 | 8.8 | 13.0 | 16.8 | 24.0 | 28.9 | 32.0 | 33.1 | 27.2 | 22.1 | -31.5 |
| EE | 1.1 | 2.5 | 5.3 | 4.8 | 5.4 | 6.9 | 8.7 | 11.4 | 14.3 | 17.5 | 22.5 | 34.7 | 54.6 | 58.7 | 50.5 | 46.4 | 47.6 | 40.8 | -11.1 |
| LV | | | | 2.2 | 2.7 | 4.6 | 4.9 | 7.0 | 9.9 | 13.0 | 18.9 | 30.9 | 53.9 | 58.7 | 47.4 | 42.1 | 40.0 | 35.5 | -18.6 |
| DK | 74.4 | 78.5 | 82.1 | 83.8 | 84.2 | 87.7 | 91.5 | 93.7 | 94.9 | 98.5 | 106.8 | 113.9 | 131.9 | 133.2 | 136.8 | 135.2 | 133.2 | 45.5 | 74.5 |
| SE | 43.0 | 42.0 | 42.2 | 42.2 | 44.2 | 46.5 | 48.5 | 50.1 | 52.5 | 54.5 | 56.9 | 61.8 | 69.8 | 70.1 | 72.4 | 76.8 | 78.1 | 31.5 | 19.4 |
| UK | 57.8 | 56.9 | 57.6 | 58.7 | 60.9 | 63.3 | 66.1 | 70.8 | 76.3 | 82.3 | 82.7 | 89.6 | 100.1 | 99.3 | 95.6 | 93.0 | 89.3 | 26.0 | 30.6 |

Threshold: 58.7%; * For IE the year 2002 was used as a reference. Source: Eurostat. The last two columns in each table provide information about the deleveraging effort in the end of 2011 needed for each Member State to return to the 2000 indebtedness level or to reach the statistical threshold.

## Table 3. Non-financial corporations debt to GDP ratio

| | | | | | | | | | | | | | | | | | | Required adj (p.p.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2000 | threshold |
| BE | 75.9 | 77.5 | 87.7 | 92.5 | 103.2 | 121.1 | 133.1 | 130.9 | 154.1 | 147.8 | 142.1 | 148.1 | 156.5 | 168.2 | 176.9 | 179.6 | 181.4 | 60.3 | 90.6 |
| BG | | | | | | 28.1 | 37.5 | 36.1 | 51.3 | 62.9 | 75.7 | 82.1 | 108.8 | 128.0 | 146.3 | 142.6 | 120.5 | 92.3 | 29.6 |
| IE | | | | | | | 83.7 | 92.1 | 91.0 | 98.4 | 106.6 | 121.9 | 120.7 | 165.7 | 188.8 | 197.2 | 197.1 | 113.3* | 106.2 |
| EL | 25.9 | 26.1 | 27.4 | 29.9 | 33.7 | 39.4 | 40.9 | 40.0 | 47.6 | 48.8 | 53.4 | 55.8 | 59.4 | 67.5 | 69.8 | 66.0 | 65.6 | 26.3 | -25.2 |
| ES | 40.5 | 39.6 | 40.3 | 42.0 | 46.4 | 65.7 | 73.3 | 75.8 | 90.2 | 95.5 | 104.7 | 121.2 | 131.8 | 136.5 | 140.4 | 141.4 | 135.8 | 70.0 | 44.9 |
| IT | 49.3 | 48.4 | 48.2 | 47.1 | 50.8 | 53.9 | 57.7 | 58.6 | 65.0 | 66.6 | 69.3 | 73.0 | 78.7 | 81.6 | 84.3 | 84.0 | 83.1 | 29.3 | -7.7 |
| CY | 53.4 | 57.6 | 60.4 | 64.3 | 65.2 | 71.9 | 75.3 | 77.6 | 87.8 | 84.6 | 95.1 | 98.6 | 112.7 | 128.2 | 137.0 | 145.8 | 150.9 | 79.0 | 60.1 |
| HU | 24.0 | 27.3 | 31.7 | 33.3 | 36.3 | 46.8 | 47.9 | 49.5 | 68.0 | 66.5 | 78.7 | 84.6 | 95.4 | 119.1 | 132.5 | 114.2 | 129.8 | 83.0 | 39.0 |
| PT | 49.8 | 48.4 | 81.8 | 88.2 | 92.4 | 100.6 | 113.4 | 113.4 | 120.2 | 116.2 | 118.4 | 123.0 | 134.2 | 148.6 | 156.9 | 155.7 | 157.0 | 56.4 | 66.2 |
| EE | 20.9 | 27.0 | 39.6 | 44.8 | 43.5 | 51.0 | 56.3 | 61.3 | 79.1 | 86.9 | 90.1 | 107.9 | 111.6 | 112.8 | 116.1 | 94.2 | 85.2 | 34.1 | -5.6 |
| LV | | | | 20.7 | 22.2 | 28.3 | 35.2 | 34.8 | 47.8 | 55.0 | 63.8 | 77.4 | 79.6 | 85.6 | 96.0 | 91.7 | 84.7 | 56.4 | -6.1 |
| SI | | | | | | | 40.2 | 43.6 | 54.6 | 58.8 | 66.1 | 69.0 | 80.9 | 91.4 | 97.5 | 97.2 | 97.8 | 57.5* | 6.9 |
| SE | 102.9 | 102.4 | 105.7 | 110.8 | 113.3 | 125.4 | 138.7 | 143.5 | 150.0 | 123.4 | 128.1 | 125.6 | 141.0 | 163.8 | 167.5 | 151.4 | 150.7 | 25.3 | 59.8 |
| UK | 54.7 | 52.8 | 54.8 | 60.9 | 66.6 | 71.9 | 75.0 | 78.3 | 88.3 | 91.5 | 102.0 | 109.4 | 106.3 | 120.1 | 116.4 | 109.9 | 108.4 | 36.5 | 17.6 |

Threshold: 90.83%; * For IE and SI the year 2001 was used as a reference. Source: Eurostat. The last two columns in each table provide information about the deleveraging effort in the end of 2011 needed for each Member State to return to the 2000 indebtedness level or to reach the statistical threshold.

In fact, this kind of analysis ignores not only asset considerations but also (*i*) country specific factors (*e.g.* catching-up processes and adjustment capacity) and *(ii)* the possibility of a dynamic threshold, which would take into account the influence of valuation effects on debt sustainability. In order to cover for these two deficiencies, a stationarity approach to debt sustainability is developed in the next subsection.

### *2.2.2. Debt Sustainability based on the Stationarity Approach*

Following Arrow *et al*. (2004), private debt will be sustainable whenever it evolves in line with the Present Discounted Value (PDV) of net revenues (*i.e.*, the net worth[16] follows a non-decreasing trend). In this context, solvency could be defined in more restrictive terms as requiring net worth to be positive. As mentioned before, the stationarity approach does not imply any specific threshold for the debt: it can be made operational by requiring household leverage (debt/assets) to be stationary. Private debt evolution should therefore match the dynamics of total assets as two sides of a coin so as to avoid unsustainable developments (non-stationary leverage ratios).

Following the analysis made in the previous section, we now focus on the group of countries which were identified as facing significant deleveraging pressures. Moreover, taking account of the lack of data on the non-financial assets held by non-financial corporations and the fact that the next section focuses on the impact of households' deleveraging on the economic activity, we will concentrate on the household sector debt sustainability gauging debt with respect to total assets (thus focusing on the following subset of countries: IE, ES, CY, NL, PT, DK, SE and UK, *i.e.* excluding the catching-up economies).[17]

As can be seen in figure 18 for the United Kingdom (taken as an illustrative example), the consideration of the aggregate pool of assets implies not only a downward shift in leverage but also a flattening impact on its dynamics when compared to the debt to financial assets ratio. Indeed, households' balance sheet growth on the liabilities side came together, in many Member States, with expanding non-financial assets due to overheating housing markets, implying non-increasing dynamics in the debt-to-total assets leverage indicator (dashed line).

However, account should also be taken of the impact of valuation effects on leverage evolution as the concept of notional leverage ideally represents a better indication of the ability of households to incur liabilities, as detailed before. Indeed, when considering assets adjusted for valuation, the expansion of households' balance sheet seems now imbalanced in the case of UK and notional leverage turns out to be upward trending, i.e. non-sustainable in Arrow's terms (see figure 18).

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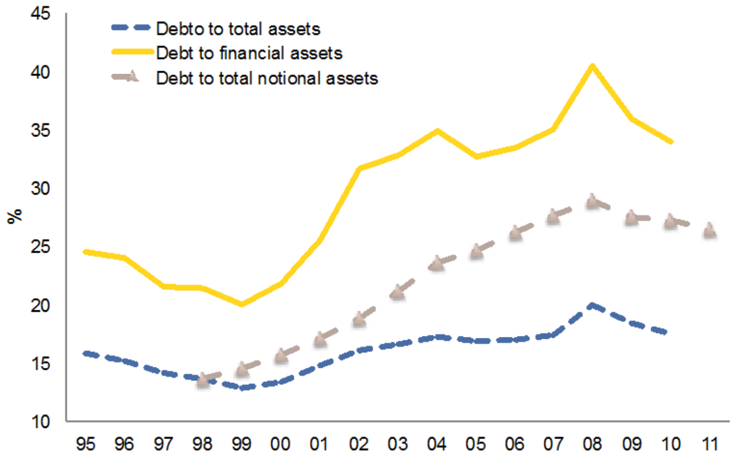
[16] Defined as the PDV of net revenues less the current debt.

[17] Firms' analysis available from the authors upon request.

Figure 18: Household leverage indicators, UK



Source: ESTAT and own calculations.

In order to quantify the extent of the deleveraging needs for each one of the selected Member States, notional leverage (i.e., debt to total notional assets) is gauged against its non-deflated version. The latter is considered as a benchmark as it generally satisfies stationarity requirements. Therefore, taking deflated assets as given, a sustainable level of debt must pair the evolution of notional leverage with its balanced benchmark (*i.e.*, the sustainable debt to total notional assets ratio will match debt to total assets dynamics). It is thus possible from this analysis to derive the path of debt underlying a stationary debt to notional or deflated assets ratio.

*Definition*:

Household debt is considered sustainable whenever it implies stationarity in terms of notional leverage. In practical terms, debt must evolve in line with total deflated assets.

A diverging positive trend of the notional leverage ratio from a balanced path imply increasing deleveraging pressures as debt effectively becomes less sustainable (and *vice versa*). The ultimate objective of this section of the analysis thus lies in the quantification of these pressures and their corresponding translation into an expected deleveraging shock.

Figures 19 to 26 report the annual deviation of the debt to GDP ratio from the sustainable path as well as the cumulated changes since the beginning of the sample. Debt is presented in terms of GDP to facilitate the interpretation of the numbers. Looking at the figures, the build-up of pressures is easily identified between 2002 and 2007, when the gap between the actual debt and its balanced or sustainable path increased rapidly. Using this period to calculate the cumulated increases in "excessive debt", these range from 7.2% of GDP in Portugal to 44.8% of GDP in Denmark.

The rebalancing of household sector balance sheets towards a more sustainable level implies the closure of the gap between the actual and the balanced or sustainable debt ratios as we saw earlier. This movement depends, on the one hand, on the actual level of debt to GDP going down (deleveraging efforts from households reducing their liabilities) and, on the other hand, on the benchmark going up (through corrections or negative valuation effects in asset prices that will allow for an increase in the sustainable level of debt).[18] The pace of the adjustment towards a more sustainable level of indebtedness will crucially depend on the interaction between these two forces. As can be seen in the case of Spain and Ireland, where both factors have been at play (house prices bust and actual deleveraging), there has been a sharp rebalancing (closing of the gap). In the case of Portugal, the current gap, as assessed by the stationarity approach, is significantly lower due to the absence of an asset price boom before the crisis.

This theoretical framework is in line with the empirical evidence presented in the April 2012 WEO (IMF, 2012), suggesting that part of the stronger contraction in economic activity following high-debt housing busts reflects a more intense household deleveraging process: "The larger declines in economic activity are not simply a reflection of the larger drops in house prices and the associated destruction of household wealth. It seems to be the combination of house price declines and pre-bust leverage that explains the severity of the contraction." (p. 91).

Our identification strategy provides a dynamic, country-specific benchmark against which to assess households' deleveraging pressures, departing from the static *ad-hoc* thresholds and yielding more refined conclusions. Moreover, it provides a natural starting point for model simulations looking at the aggregated impact of household deleveraging processes.

However, as mentioned by Rinaldi and Sanchis-Arellano (2006), differences related to institutional characteristics and structural supply-side factors should not be ignored as they play a key role in determining the stability of financial conditions and therefore the equilibrium level of household debt. Macroeconomic stability, financial developments and legal or institutional changes can lead to an increase in the level of debt towards a new equilibrium by easing credit rationing without having increased risk. For this purpose, the next section will qualify the results on the likelihood and extent of deleveraging pressures by looking at credit markets through the main credit supply and demand indicators.

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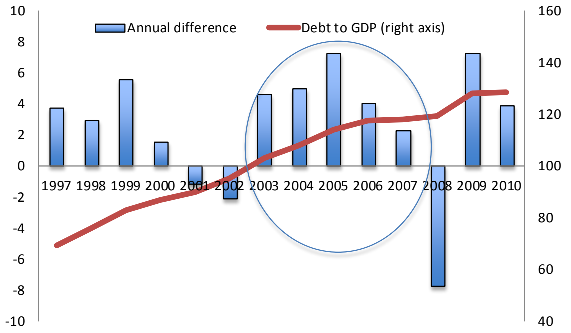
[18] If households incur in liabilities according to the evolution of the nominal pool of assets, which is in turn under a sharp adjustment process, the gap between actual and sustainable debt will indeed be negative, as the sustainable level takes deflated assets as a reference, easing the deleveraging pressures.

**Figure 19: Household sector deleveraging forces, NL**

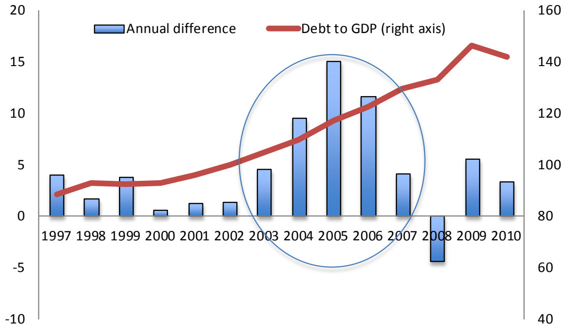
Difference between actual and sustainable debt, % of GDP



Source: own calculations. Cumulated gap of 23.2pp

**Figure 20: Household sector deleveraging forces, DK**

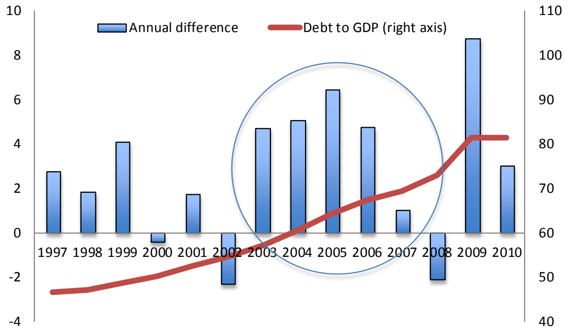
Difference between actual and sustainable debt, % of GDP



Source: own calculations. Cumulated gap of 44.8pp

**Figure 21: Household sector deleveraging forces, SE**

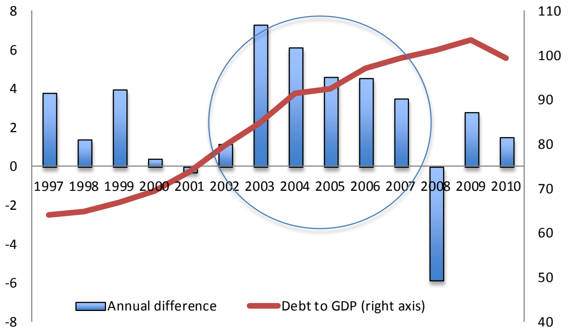
Difference between actual and sustainable debt, % of GDP



Source: own calculations. Cumulated gap of 21.9pp

**Figure 22: Household sector deleveraging forces, UK**

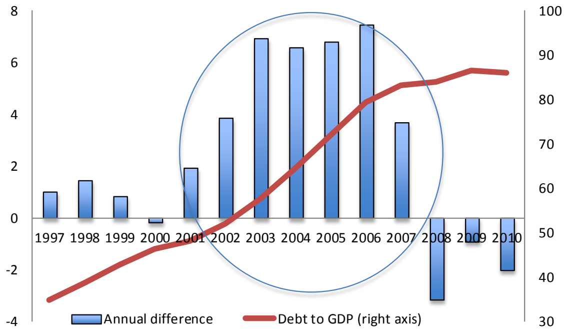
Difference between actual and sustainable debt, % of GDP



Source: own calculations. Cumulated gap of 26pp

**Figure 23: Household sector deleveraging forces, ES**

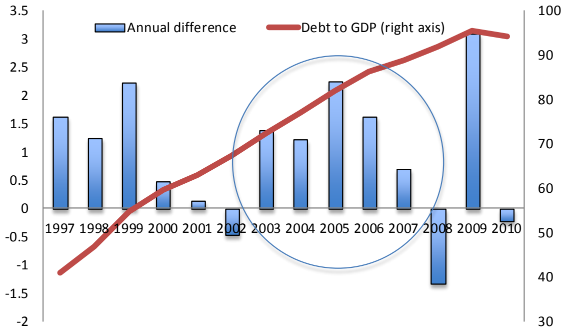
Difference between actual and sustainable debt, % of GDP



Source: own calculations. Cumulated gap of 35.3pp

**Figure 24: Household sector deleveraging forces, PT**

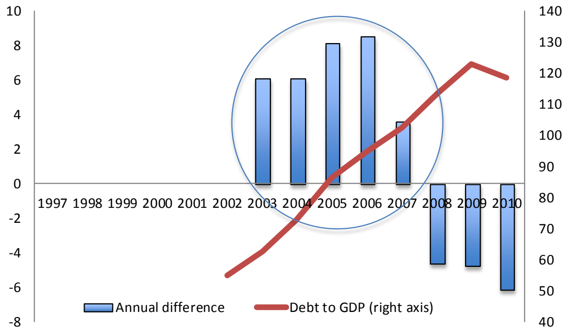
Difference between actual and sustainable debt, % of GDP



Source: own calculations. Cumulated gap of 7.2pp

**Figure 25: Household sector deleveraging forces, IE**

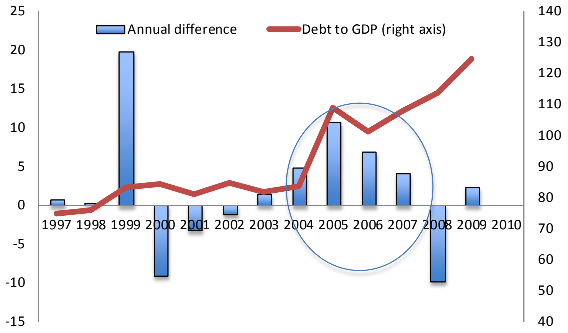
Difference between actual and sustainable debt, % of GDP



Source: own calculations. Cumulated gap of 32.5pp

**Figure 26: Household sector deleveraging forces, CY**

Difference between actual and sustainable debt, % of GDP



Source: own calculations. Cumulated gap of 26.3pp

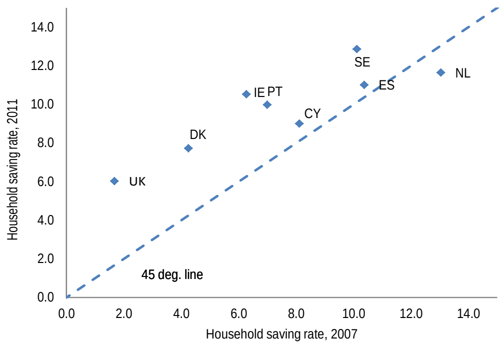
### 2.3. Qualifying factors for deleveraging pressures

Credit market conditions are an important qualifying factor for deleveraging processes and their assessment provides useful information to better understand the dynamics of the deleveraging pressures identified in the previous section.

The evolution of indebtedness is affected not only by the borrowers' willingness to take on debt but also by overall changes in lending attitudes of the financial sector (see Box 2). In the build-up phase, indebtedness is positively affected by favourable current credit supply and demand conditions. Conversely, in the deleveraging phase supply tightness and/or depressed demand can impact both the speed and the extent of the debt adjustment. For a given adjustment need identified in the sustainability analysis, different lending market conditions translate into different deleveraging processes, allowing also for deleveraging to overshoot (or undershoot, depending on the aforementioned conditions) the predicted adjustment. In short, credit supply constraints, which can be triggered by deleveraging pressures in the financial sector itself, have a direct impact on non-financial sector deleveraging (the credit crunch effect). Moreover, the latter can also be affected by households and non-financial corporations' reluctance to take on more debt due to, for instance, a more prudent attitude towards indebtedness. In fact, as shown in figure 27, households' saving rate increased, with the exception of the Netherlands, in all Member States identified in the previous section as having higher potential deleveraging pressures. This can be explained, at least in part, by a more prudent attitude of households due to greater macroeconomic instability.

**Figure 27: Changes in the saving rate**

Household saving rate



*Source: ESTAT*

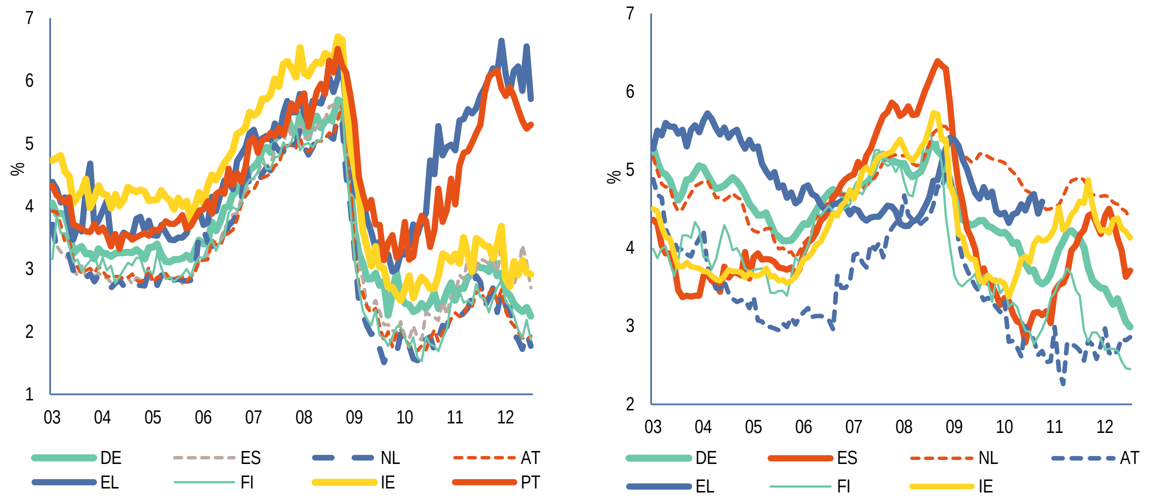
One should not, however, neglect the feedback loops between deleveraging, credit supply and demand conditions and the economic activity. By affecting economic activity, non-financial sector deleveraging has an impact on credit supply (*e.g.*, through potential non-performing loans) and on credit demand (due to recessionary effects). Although the purpose of this section is not to assess the relative importance of demand and supply conditions in explaining the recent development in credit markets, one should keep in mind these feedback effects when assessing the results.

Lending interest rates are a natural starting point for an analysis of lending conditions. As can be seen in figure 28, interest rates for non-financial corporations have evolved in a relatively stable spread structure before the crisis period. Afterwards, a disconnection can be seen, pointing to the existence of credit market segmentation: Portuguese and Greek rates spiked up sharply; spreads in Spain also increased although to a lesser extent. When looking at house-purchase lending, the spread structure has been less stable over the period. During the crisis period, lending spreads relative to Germany increased in the Netherlands, Spain and Ireland. However, the absolute level of household lending rates remains below their respective 2008 levels.

The evolution of lending rates needs to be interpreted jointly with aggregate credit flows presented in the bottom panel of figure 28. Credit flows to NFCs and households were significantly negative in several Member States during 2009/10 and 2011/12. In cases like Ireland and Spain, the observed reaction of credit flows seems stronger than that of lending rates. Such path would be consistent with a situation where both demand and supply contracted simultaneously, leading to a strong fall in loans and increase in lending rates. Lenders could also optimally try to prevent rates from rising to market clearing levels to avoid problems related to adverse selection and moral hazard (see Stiglitz and Weiss, 1981). In such a setting credit rationing occurs and unsatisfied loan demand exists at prevailing rates.

Against this background, the analysis in this section focuses on a selection of variables that influence or reflect credit supply or demand conditions. They are interpreted as qualifying factors for the deleveraging pressures identified in the previous section.

**Figure 28: Interest rates and credit flows in selected Member States**

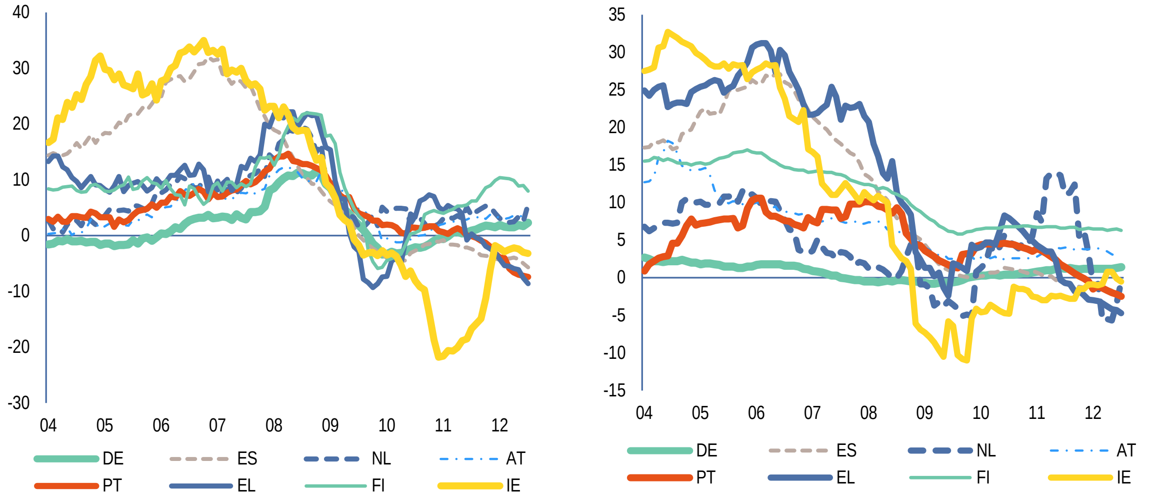


Interest rates to NFCs, loans above 1M EUR up to 1 year maturity

Source: ECB

Interest rates to households, loans for house purchases over 1 year maturity without collateral

Source: ECB. Note: EL data until 2010.



NFC credit flows, YoY growth

Source: ECB

Household house-purchase credit flows, YoY growth

Source: ECB

### 2.3.1. *Credit demand and supply conditions*

The set of credit supply-related indicators includes financial soundness indicators: the change in overall non-performing loans (NPL) relative to 2007, the Tier 1 capital ratio and banks' return on equity. Bank soundness has been shown to be an important factor in credit supply and is a significant factor affecting financing conditions (Bernanke and Lown, 1991, Woo, 1999, Bê Duc *et al*., 2005). However, conclusions should be drawn carefully, in particular on the path of the capital ratio whose changes may reflect not necessarily an increase in the level of capital but a decrease in banks' assets (the denominator), thus affecting negatively the households' and/or firms' access to financing.

To address the link between sovereigns and the banking sector, mentioned in the introduction, the sovereign CDS spreads were also included in the set of variables affecting the credit supply side, as well as the banks' exposure to high risk foreign claims capturing potential negative external spill-overs effects (again, the results should be interpreted carefully as sovereign CDS spreads are themselves influenced by the situation in the banking sector).

These indicators of financial sector soundness are complemented with information gathered from lending surveys as the Eurosystem Bank Lending Survey (BLS),[19] which collects information on supply and demand conditions in the euro area credit markets and the lending policies of euro area banks.  On the credit supply side, we use information about changes in bank's credit standards as applied to the approval of (*i*) loans or credit lines to enterprises and (*ii*) loans for house purchase granted to households. We use a trailing 4-quarter average of the net percentage of banks that tightened their credit standards. According to de Bondt *et al*. (2010), the BLS is a reliable leading indicator for bank lending: the BLS outcomes significantly lead bank loan growth by four quarters for enterprises and by one quarter for households. Credit standards lead also corporate bond spreads by one quarter. Conversely, the correlations between credit standards and bank lending rate spreads are comparatively low and there are different lead-lag relations depending on the class of borrowers.

We also use the survey on the access to finance of SMEs (SAFE) in the euro area: question Q7B - Application success in the past 6 months is used to construct the loan request failure rate, equal to the percentage of requests that did not receive all or most of the amount requested.

On the loan demand side, we include the Consumer Confidence Indicator and the Economic Sentiment Indicator, released monthly by the European Commission[20], as they may provide some information about the willingness of households and NFCs to take more debt. The unemployment rate and the house price evolution (relative to 2007Q4) are also included. The house price change, by influencing the collateral underlying mortgage loans, provides some information about the potential impact coming from the financial accelerator effect. At the same time, the short-term dynamics of the house market may influence sentiment and therefore the overall willingness of households to take on debt.

Finally, we also include, in the loan demand set of variables, direct lending survey data. From the BLS we use information about changes in demand for (*i*) loans or credit lines to enterprises and (*ii*) loans for house purchase granted to households. From the SAFE survey we use the question Q5 - External financing needs over the past 6 months. The net balance is computed by taking the difference between the percentage of firms where financing needs increased and those where they decreased.

Having introduced the various indicators, we now proceed by (*i*) constructing stress maps of credit supply and demand conditions in Member States that were identified as likely subject to major deleveraging pressures in previous sections; and (*ii*) developing overall indicators of demand and supply pressures.

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[19] http://www.ecb.int/stats/money/surveys/lend/html/index.en.html.

[20] http://ec.europa.eu/economy_finance/db_indicators/surveys/index_en.htm.

*Stress Maps*

Along each dimension (variable) of the stress map, the scale is given by the minimum and maximum observation among Member States with available data. The "Average" is, by order of preference, (*i*) the aggregate EU27 value in the dataset, or (*ii*) the aggregate value for all Member States with available data, or (*iii*) the weighted average of the variable using data from Member States for which the variable is available (authors' calculations).

We then run an analysis based on a relative comparison of individual Member States at a given point in time. There are several arguments in favour of such an approach. First, it might be unfeasible to devise country-specific absolute thresholds for each variable, as such thresholds would be endogenously related to the values of all other variables. Additionally, a relative analysis complemented with a view on the overall trend for individual indicators may be a useful first approximation of actual tensions faced by individual Member States. In effect, borrower credibility is a relative concept and investors tend to judge debtors (country-sectors) from a relative rather than an absolute point of view.

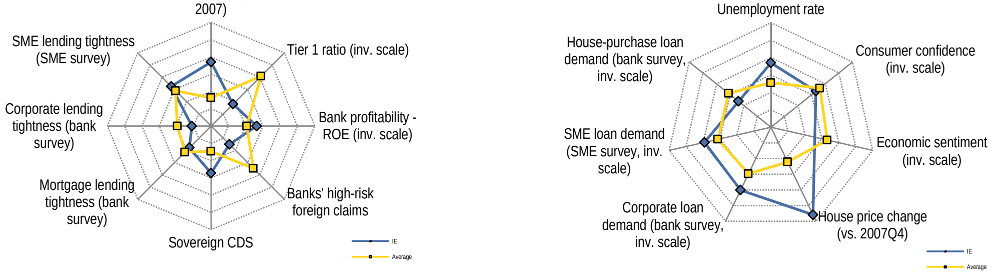
The left column in figure 29 shows that supply-side pressures could be of concern in Cyprus and Portugal. Financial soundness variables (increases of NPL rate, bank profitability and capital coverage) are particularly pressing in Cyprus (jointly with sovereign tensions). They are also signalled in Portugal, Ireland and Spain. Direct surveys signal lending tightening in Cyprus, Portugal, and, to some extent, in Spain and the Netherlands.

The right column in figure 29 points to deteriorating credit demand conditions in Cyprus, Portugal, Ireland, Spain, and the Netherlands. The general economic context and sentiment are likely to weigh on demand in Cyprus and Portugal. A house price correction is part of demand pressures in Ireland, Spain and Cyprus. Furthermore, survey data point to demand contraction in Ireland, Portugal, Cyprus, Spain and the Netherlands.

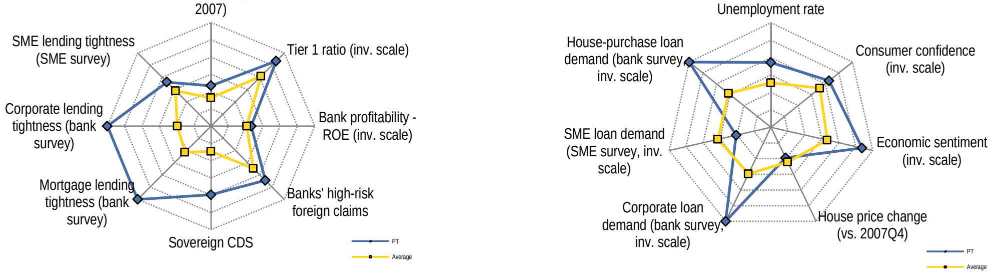
**Figure 29: Stress maps of credit supply and demand conditions for Member States with likely deleveraging pressures, 2012.**

**SUPPLY** **DEMAND**

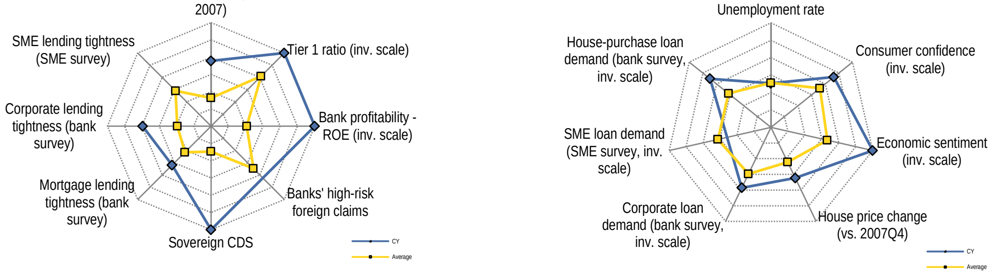
Ireland



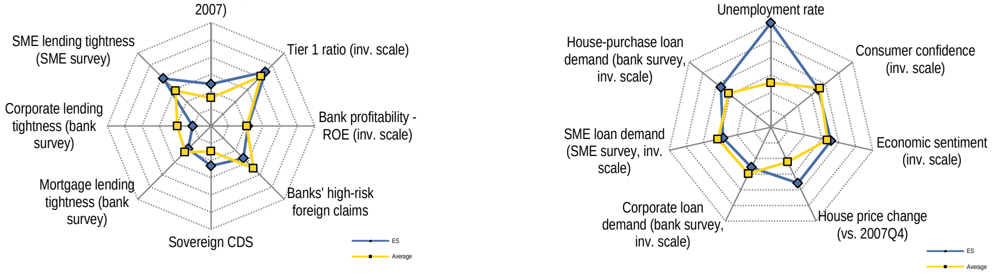
Portugal



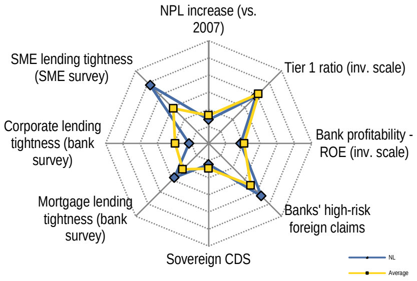
Cyprus

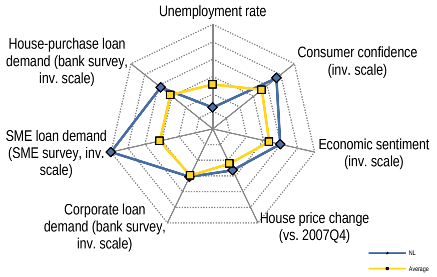


Spain

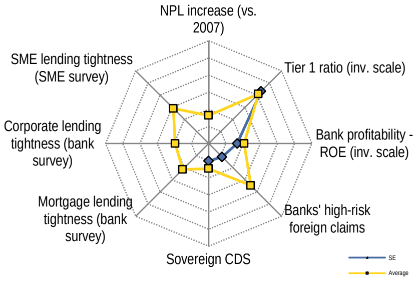


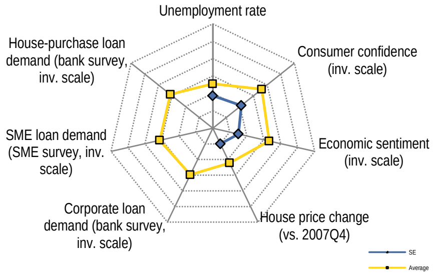
## Netherlands



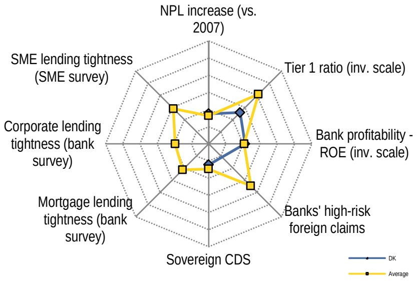


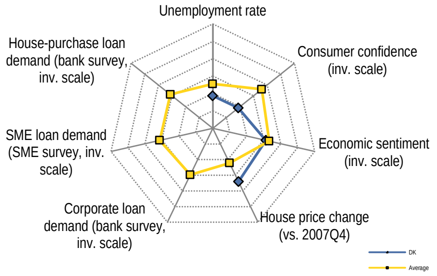
## Sweden



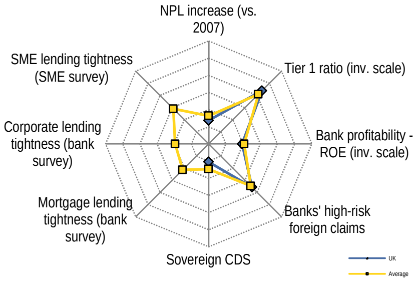


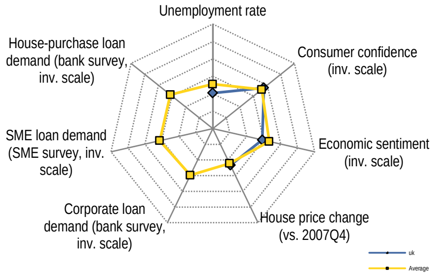
## Denmark





## United Kingdom





*Source: ECB, BIS, IMF, Thomson Reuters, ESTAT, European Commission, staff calculations. Note: For annual data we present 2011 values, for quarterly data we present 2012Q1 or Q2, as available. House price change calculated for 2011Q4.*

### *Country synthesis of supply and demand pressures*

The above qualitative analysis allowed us to discuss which specific issues affect credit supply and demand in individual Member States. We now proceed by constructing overall indicators of demand and supply pressures in order to gauge the likely effect on the short-term deleveraging dynamics.

Our overall indicator is based on the average rank of a Member State on each variable. Specifically, for each Member State we calculate its rank (percentile) along all variables. We then calculate, separately for supply and demand variables, the average rank and we scale it between 0 and 10. Tables 4 and 5 present the individual variables and the overall pressure indicator for all Member States. Both tables start by reporting information on the eight Member States under analysis.

**Table 4: Credit supply conditions**

| | NPL increase (vs. 2007) | | Tier 1 ratio | | Bank profitability (ROE) | | Banks' high-risk foreign claims (% GDP) | | Sovereign CDS | | Mortgage lending tightness (bank survey) | | Corporate lending tightness (bank survey) | | SME lending tightness (SME survey) | | Overall supply pressures |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Last | Prev. year | Last | Prev. year | Last | Prev. year | Last | Prev. year | Last | Prev. year | Last | Prev. year | Last | Prev. year | Last | Prev. year | |
| CY | 8,6 | 1,6 | 7,0 | 11,0 | -86,0 | 9,1 | | | 1595 | 354 | 35,0 | 30,0 | 45,0 | 10,0 | | | 9,1 |
| PT | 4,1 | 2,5 | 8,6 | 8,3 | -4,1 | 6,7 | 16,7 | 17,6 | 967 | 734 | 80,0 | 70,0 | 75,0 | 95,0 | 35,3 | | 8,5 |
| ES | 4,4 | 3,3 | 10,6 | 9,7 | 0,1 | 8,0 | 8,5 | 8,4 | 450 | 223 | 13,9 | 5,6 | 2,5 | 7,5 | 38,7 | 33,5 | 6,2 |
| NL | 1,1 | 1,0 | 11,8 | 11,8 | 6,2 | 7,5 | 16,2 | 16,5 | 113 | 33 | 29,2 | 31,0 | 3,6 | 0,0 | 49,0 | | 5,3 |
| IE | 8,4 | 7,8 | 16,7 | 11,6 | -11,1 | -65,2 | 3,2 | 3,4 | 579 | 745 | 12,5 | 0,0 | 3,1 | 0,0 | 31,3 | | 5,0 |
| UK | 1,0 | 1,0 | 10,7 | 10,9 | 4,2 | 4,4 | 12,7 | 13,3 | 59 | 56 | | | | | | | 4,5 |
| DK | 2,2 | 2,3 | 14,9 | 14,1 | 0,6 | 2,4 | | | 110 | 26 | | | | | | | 4,2 |
| SE | | | 10,9 | 10,7 | 10,7 | 10,2 | 1,4 | 1,3 | 51 | 17 | | | | | | | 2,9 |
| IT | 4,8 | 3,7 | 9,5 | 8,7 | -13,0 | 3,7 | 5,2 | 5,3 | 431 | 131 | 37,5 | 15,6 | 46,9 | 15,6 | 38,0 | 19,2 | 7,7 |
| BG | 15,6 | 13,9 | 15,7 | 15,2 | 4,6 | 6,0 | | | 292 | 209 | | | | | | | 5,7 |
| BE | 1,4 | 1,2 | 15,1 | 15,5 | 1,4 | 10,5 | 12,0 | 13,4 | 168 | 118 | | | | | 27,0 | | 4,2 |
| EE | 3,9 | 8,7 | 18,5 | 12,7 | 25,5 | 4,9 | | | 109 | 76 | 25,0 | | 6,3 | | | | 3,3 |
| LV | 9,5 | 14,7 | 13,5 | 10,9 | 5,1 | -21,1 | | | 261 | 192 | | | | | | | 5,6 |
| HU | 12,1 | 8,0 | 11,7 | 11,6 | -7,9 | 0,1 | | | 475 | 251 | | | | | | | 8,1 |
| EL | 9,3 | 4,3 | 9,6 | 10,9 | -43,5 | -4,7 | 6,9 | 7,0 | | 2168 | | | | | 62,6 | | 8,0 |
| SI | | 1,8 | 9,3 | 8,6 | -11,1 | -3,1 | | | 356 | 90 | 10,0 | 10,0 | 30,0 | 10,0 | | | 7,2 |
| RO | 10,0 | 7,3 | 14,2 | 14,1 | 1,3 | 3,0 | | | 370 | 241 | | | | | | | 6,3 |
| FR | 1,6 | 1,5 | 10,9 | 10,8 | 5,6 | 8,4 | 20,5 | 21,5 | 103 | 59 | 15,1 | -2,8 | 16,3 | -10,1 | 21,0 | 18,5 | 5,1 |
| LT | 15,3 | 15,4 | 12,0 | 10,8 | 17,0 | -3,9 | | | 246 | 192 | | | | | | | 5,1 |
| AT | 1,7 | 1,6 | 10,3 | 10,0 | 1,5 | 6,4 | 23,9 | 25,8 | 112 | 46 | 2,5 | 0,0 | 17,5 | 0,0 | 5,6 | | 5,0 |
| SK | 2,1 | 2,0 | 12,5 | 11,4 | 11,1 | 9,8 | | | 247 | 85 | 14,4 | | 26,7 | | | | 4,8 |
| PL | 2,1 | 2,5 | 11,9 | 12,6 | 12,3 | 9,9 | | | 187 | 139 | | | | | | | 4,0 |
| MT | -0,1 | 0,6 | 13,2 | 13,3 | 5,8 | 12,1 | | | 448 | 211 | 0,0 | 0,0 | 6,3 | 6,3 | | | 3,6 |
| CZ | 2,9 | 3,5 | 13,7 | 13,6 | 13,7 | 15,2 | | | 117 | 74 | | | | | | | 3,4 |
| DE | -0,2 | 0,6 | 11,7 | 11,4 | 2,2 | 1,9 | 12,2 | 13,3 | 43 | 27 | 4,3 | -2,3 | 1,6 | -5,8 | 12,1 | 10,5 | 2,9 |
| LU | -0,1 | -0,2 | 16,1 | 15,1 | 6,2 | 8,5 | | | | | 8,3 | -4,2 | 14,3 | 0,0 | | | 2,5 |
| FI | 0,2 | 0,3 | 13,7 | 13,7 | 8,1 | 7,0 | 0,9 | 1,0 | 79 | 33 | | | | | 14,7 | | 2,0 |
| Average | 1,9 | 1,7 | 11,4 | 11,1 | 1,7 | 3,5 | 12,2 | 12,9 | 188 | 100 | 18,3 | 7,5 | 15,5 | 4,8 | 27,3 | 20,8 | |

*Source: ECB, BIS, IMF, Datastream, ESTAT, European Commission, staff calculations. Note: For annual data we present 2011 values, for quarterly data we present 2012Q1 or Q2, as available.*

The minimum and maximum of the overall supply pressure indicator (high values signal a tight credit supply) in table 4 are respectively Finland and Cyprus. Vulnerable and programme countries tend to score high on this indicator, while 'core' countries tend to have moderate values. The only exception is Ireland which has a moderate supply indicator, both due to a high capitalization as well as moderate results on the lending surveys.

As for the credit demand pressures indicator in table 5 (high values signal a depressed credit demand) the minimum and maximum are respectively Sweden and Greece. Again, high pressures are mostly signalled in program and vulnerable Member States. One exception is the Netherlands, whose high demand pressure indicator is driven by negative sentiment and lending surveys.

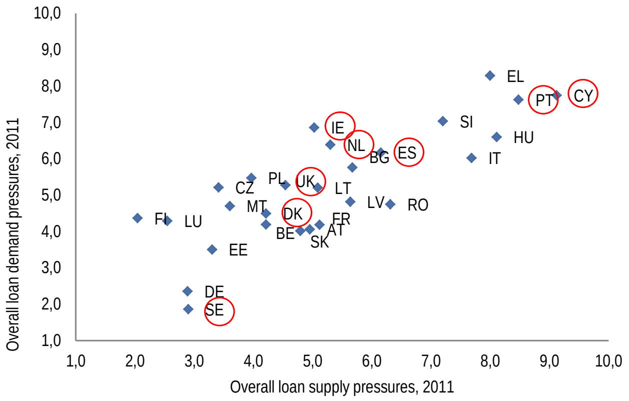
## Table 5: Credit demand conditions

| | Unemployment rate | | Consumer confidence | | Economic sentiment | | House price change (vs. 2007Q4) | | Corporate loan demand (bank survey) | | SME loan demand (SME survey) | | House-purchase loan demand (bank survey) | | Overall demand pressures |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Last | Prev. year | Last | Prev. year | Last | Prev. year | Last | Prev. year | Last | Prev. year | Last | Prev. year | Last | Prev. year | |
| CY | 10,1 | 6,7 | -2,1 | -0,2 | 74,1 | 85,3 | -16,7 | -11,8 | -20,0 | 20,0 | | | -60,0 | -30,0 | 7,7 |
| PT | 14,8 | 12,3 | -1,8 | -1,8 | 77,9 | 86,5 | -0,5 | 4,0 | -45,0 | -25,0 | 12,1 | | -100,0 | -65,0 | 7,6 |
| ES | 23,8 | 20,7 | -1,2 | 0,1 | 89,1 | 96,4 | -21,1 | -11,2 | -5,0 | 0,0 | 8,2 | 9,4 | -38,9 | -8,3 | 6,2 |
| NL | 5,0 | 4,2 | -2,2 | -0,2 | 86,4 | 98,9 | -9,2 | -5,9 | -10,7 | -3,6 | -8,0 | | -42,9 | -34,5 | 6,4 |
| IE | 14,7 | 14,1 | -1,0 | -0,7 | | | -46,8 | -36,1 | -21,9 | -6,3 | 2,6 | | -5,0 | -1,3 | 6,9 |
| UK | 8,2 | 7,7 | -1,4 | -0,9 | 92,9 | 100,2 | -5,3 | -4,9 | | | | | | | 5,3 |
| DK | 7,5 | 7,5 | 0,2 | 1,2 | 91,6 | 104,8 | -19,1 | -13,3 | | | | | | | 4,5 |
| SE | 7,5 | 7,7 | 0,0 | 1,5 | 101,5 | 113,2 | 11,7 | 13,7 | | | | | | | 1,9 |
| IT | 10,1 | 8,0 | -3,3 | -1,1 | 79,7 | 99,4 | 1,3 | 1,0 | -15,6 | 15,6 | 17,4 | 11,2 | -50,0 | 21,9 | 6,0 |
| BG | 12,0 | 11,2 | -1,0 | -0,9 | 97,4 | 96,3 | -25,7 | -21,1 | | | | | | | 5,8 |
| BE | 7,1 | 7,2 | -0,3 | 0,6 | 90,5 | 107,6 | 9,1 | 6,9 | | | 1,5 | | | | 4,2 |
| EE | 10,9 | 13,6 | 0,6 | 1,1 | 102,9 | 108,2 | -32,7 | -39,8 | -6,3 | | | | 31,3 | | 3,5 |
| LV | 15,4 | 17,1 | 0,9 | 0,2 | 104,6 | 103,0 | -41,3 | -43,3 | | | | | | | 4,8 |
| HU | 11,1 | 11,0 | -1,0 | -0,4 | 86,9 | 101,0 | -10,4 | -9,4 | | | | | | | 6,6 |
| EL | 21,7 | 15,2 | -2,5 | -2,8 | 74,1 | 75,0 | -4,1 | 2,6 | | | | | | | 8,3 |
| SI | 8,2 | 8,1 | -2,7 | -0,6 | 81,6 | 97,4 | -7,2 | -8,4 | -35,0 | 20,0 | | | -35,0 | 5,0 | 7,0 |
| RO | 7,2 | 7,1 | -0,1 | -0,9 | 97,2 | 94,5 | -52,2 | -42,3 | | | | | | | 4,7 |
| FR | 10,0 | 9,6 | 0,1 | 0,1 | 91,7 | 107,5 | 2,9 | -0,7 | -10,6 | 3,1 | 12,1 | 6,7 | -64,6 | 26,0 | 4,2 |
| LT | 13,6 | 16,7 | 0,0 | 0,1 | 100,3 | 109,6 | -28,1 | -31,9 | | | | | | | 5,2 |
| AT | 4,1 | 4,4 | -0,7 | 1,0 | 96,7 | 103,5 | 2,3 | 1,9 | -17,5 | -7,5 | -2,3 | | -5,0 | 5,0 | 4,1 |
| SK | 13,7 | 13,6 | 0,0 | -0,1 | 96,2 | 95,5 | -14,9 | -12,8 | 13,3 | | | | 20,4 | | 4,0 |
| PL | 10,0 | 9,4 | -0,9 | -0,1 | 90,7 | 97,7 | -10,9 | -6,4 | | | | | | | 5,5 |
| MT | 6,0 | 6,5 | -1,3 | -1,1 | 94,5 | 97,5 | 1,8 | 1,5 | -31,3 | -12,5 | | | -12,5 | -12,5 | 4,7 |
| CZ | 6,8 | 6,9 | -1,4 | -0,8 | 86,9 | 95,5 | 1,0 | 1,2 | | | | | | | 5,2 |
| DE | 5,6 | 6,3 | 0,7 | 1,9 | 100,5 | 113,8 | 7,0 | 2,7 | 6,8 | 26,9 | -1,6 | -1,4 | 29,6 | 30,7 | 2,4 |
| LU | 5,2 | 4,7 | -0,9 | 1,0 | 88,3 | 103,6 | 11,0 | 4,3 | -35,7 | -3,6 | | | 0,0 | 33,3 | 4,3 |
| FI | 7,5 | 8,0 | -1,4 | -0,3 | 94,4 | 106,2 | 10,9 | 8,9 | | | 4,5 | | | | 4,4 |
| | | | | | | | | | | | | | | | |
| Average | 10,2 | 9,5 | -1,2 | 0,0 | 90,4 | 104,1 | -3,9 | -2,9 | -9,8 | 8,5 | 6,6 | 4,4 | -24,3 | 11,5 | |

*Source: ECB, BIS, IMF, Datastream, ESTAT, European Commission, staff calculations. Note: For annual data we present 2011 values, for quarterly data we present 2012Q1 or Q2, as available. House price change calculated for 2011Q4.*

Using the information gathered in the tables above, figure 30 plots credit supply and demand conditions against each other in order to visually identify Member States with accumulated demand and supply deleveraging pressures. The analysis reveals that among the shortlist countries from section 2.2 immediate pressures could be highest in Cyprus, Portugal and, to a lesser extent, Spain, where both supply and demand risks are high. As mentioned before, one should however keep in mind that this result, especially in what concerns the demand side, might be also driven by the deleveraging process itself, given the impact of the latter on economic activity.[21]

### Figure 30: Overall lending supply and demand pressures



*Source: staff calculations*

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[21] The existing feedback effects might actually underlie the positive relationship between the two indicators shown in figure 30. This topic would deserve further analysis.

Pressures in Ireland and the Netherlands could also be significant, especially from the demand-side. On the other hand, short-term pressures in Denmark and the UK seem somewhat lower, while in Sweden they are much less significant.

### Box 2: Deleveraging in the financial sector

As mentioned in the introduction, this study attempts to identify EU Member States where debt overhang and/or deleveraging processes in the non-financial private sector stand out as an immediate concern. Although the deleveraging in the financial sector is not directly addressed in the study, one should bear in mind its impact on the deleveraging pressures faced by non-financial sectors. In fact, the on-going balance sheet adjustment process in households and non-financial corporations in some EU Members is strongly linked to private financial outflows from "vulnerable countries" and credit constraints underlying financial sector deleveraging.

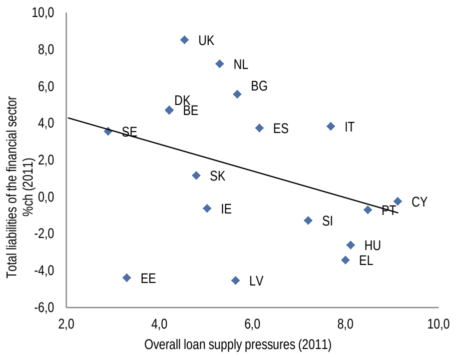
The conditions in the EU banking sector worsened considerably towards the end of 2011, with the intensification of the sovereign debt crisis and the deterioration of economic growth perspectives. In parallel with the non-financial sector, banks faced deleveraging pressures coming from both demand and supply factors (Praet, 2012): the lack of profitable opportunities for investment, the presence of deleveraging forces arising in other sectors of the economy, and banks' insufficient balance sheet capacity to hold assets.

A recent research study by Barclays (2012) identifies four primary triggers for deleveraging in the banking sector: state-aid rules underlying bank restructuring (still on-going), EBA requirements (completed at this stage), Basel III (spreading as banks face pressure to achieve the new capital ratios sooner) and long-term funding issues. In addition, the entanglement between oversized banks and their respective sovereigns leads to rising sovereign solvency risks. This adds to the aforementioned deleveraging pressure, by leading to the reduction of cross-border activities and to an outflow of funds from "vulnerable" countries. Given the intermediation function of the banking sector, these pressures coming both from the market and supervisory capital requirements, from the increase in funding costs and from reversed cross-country capital flows (the latter attenuated by the ECB non-standard measures), have an impact on economic activity by contributing to the deleveraging in the non-financial sector.

In this context, and as mentioned by Gambacorta and Marques-Ibanez (2012), the role of the financial sector stability in promoting a smooth transmission of credit to borrowers became even more evident during the crisis. The bank lending channel theory suggests that exogenous shocks (or situations of severe financial distress) may have an amplified effect on the economic activity due to the specificities of the financial sector (e.g., information asymmetry, uncertainty, imperfect substitutability between bank lending and other sources of financing and costs underlying a capital increase). This mechanism explains to a large extent the current credit constraints and, consequently, the deleveraging pressures currently faced by the non-financial private sector. Even if the corporate bond market and the intra-company loans have helped large firms in reducing the potential aforementioned constraints, small and medium sized enterprises, especially in vulnerable countries, and households do not have access to a similar alternative financing source.

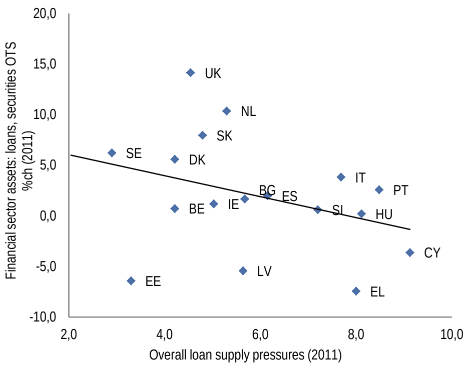
Against this background, we assess whether the loan supply pressure indicator developed in this paper captures the on-going changes in the balance sheet of the financial sector. Figure I plots the indicator against the 2011 annual growth rate of the total financial sector liabilities for the countries identified as potentially highly indebted (listed in tables 2 and 3). Figure II focuses on the asset side, by plotting the pressure indicator against the 2001 annual growth rate of lending assets (loans and securities other than shares).

**Figure I: Credit supply pressures and financial sector size**



*Source: ESTAT, staff calculations*

**Figure II: Credit supply pressures and financial sector lending**



*Source: ESTAT, staff calculations*

There seems to be a negative relationship between our loan supply pressure indicator and the growth of financial sector liabilities. Similarly, the indicator seems to capture the changes in financial sector assets. Estonia and, to a lesser extent, Latvia are notable outliers: their financial sectors seem to undergo stronger deleveraging processes than what our indicator would suggest. In effect, the financial soundness indicators for these Member States have recently improved, while the balance sheet adjustment was still on-going.

All in all, the overall supply pressure indicator provides information on the undergoing changes in the balance sheets of the financial sector, both in terms of the overall size as well as in terms of the evolution in assets.

### *From the assessment of debt overhang and deleveraging pressures to the analysis of the impact of non-financial private sector deleveraging on economic activity*

All in all, the degree and the extent of unsustainability of pre-crisis debt levels together with the analysis of the conditions on credit markets provide a first-order assessment of the potential for deleveraging in Member States.

The screening of the different indicators on indebtedness and leverage with a view of pooling their informational content into aggregate measures of over-indebtedness risks, provides a first-hand signal of countries that are likely to be faced with deleveraging pressures. The materialization of the estimated potential for deleveraging into actual reduction of debt is not straightforward, however, and needs to consider credit market conditions, which qualify sustainable debt levels according to differences in domestic financial sectors.

Another aspect that should be taken into account, and that is also country specific, relates to the pace of adjustment: bringing the debt down to a sustainable level before debt distress occurs is highly desirable, but it can also be costly in terms of growth and employment. There is a trade-off between a fast debt rollback and the associated costs, which must be assessed taking due account of each country specificities.

Following these considerations, the next section attempts at deriving the transmission channels through which these processes work and, at the same time, providing an order of magnitude of their impact on the main macroeconomic aggregates.

## 3. DELEVERAGING AND MACROECONOMIC ADJUSTMENT

In the previous section, a build-up of deleveraging pressures in the household sector between 2002 and 2007 has been identified for a number of Member States. Following the interpretation of the metrics used, the current households' debt-to-GDP ratios in these Member States are unsustainable, which suggests that they are increasingly likely to enter a period of debt deleveraging. In fact, this process appears to have already started in countries like Ireland and Spain, and is in line with empirical literature (as described in section 2.2, several authors have found that financial crises are typically followed by periods of consolidation in the non-financial private sector).

Based on historical experience, the necessary reduction of the excessively high levels of private sector debt, accumulated in many EU Member States before the current crisis, will take many years. Importantly, periods of private debt reduction may be painful, and household deleveraging, in particular, is associated with large contractions in the economic activity (see Roxburgh *et al*., 2012 and IMF, 2012). Understanding the extent and impact of deleveraging and underlying balance-sheet adjustment on the dynamics of the main macroeconomic aggregates and financial stability is, hence, crucial for defining appropriate policy objectives for the scope, structure and speed of the deleveraging process. Unfortunately, the scope for empirical analysis to provide information to policy makers on the likely impact of deleveraging on the economy is limited: while the list of financial crises followed by private debt deleveraging is long, a large majority of these episodes refer to medium-income countries.[22] More importantly, several EU Member States today face a combination of risks (*e.g.*, deleveraging pressures and decrease of households' wealth due to a fall in house prices), which were not necessarily observed in past crises. The modelling approach, which is followed in the remainder of this section, provides a more ample scope to capture these country-specific factors.

### 3.1. Analysis framework

In this section we use a 3-region version of QUEST to assess the impact of household sector deleveraging on the main macroeconomic aggregates. QUEST is an open economy new-Keynesian dynamic stochastic general equilibrium (DSGE) model developed by the European Commission (see Ratto *et al.*, 2009, Roeger and in't Veld, 2010, for a detailed description of the model)[23], and incorporating various real, nominal as well as financial frictions, used for policy analysis.

On the firms' side, the model includes three production sectors: a construction sector and two manufacturing sectors producing traded and non-traded final consumption goods. In the model firms do not incur in debt. On the households' side, the model includes two main types of households:

- 'Ricardians' households who own capital and have unlimited access to financial markets; their consumption decisions are based on the life-time income hypothesis and they are net debt-holders.
- 'Credit-constrained' households, who have limited access to credit markets and can only get indebted against the value of collateral, in the form of housing stock,

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[22] See Tang and Upper (2010) for a list. Two clearly relevant cases from the EU perspective are Finland and Sweden; see Roxburgh *et al*. (2012).

[23] For references to QUEST model publications see:
http://ec.europa.eu/economy_finance/research/macroeconomic_models_en.htm.

up to an exogenously given loan-to-value (LTV) ratio. These households are net borrowers in the model.[24]

A three region version of QUEST model, consisting of a medium-sized euro area economy characterized by a relatively large initial household debt-to-GDP ratio, the rest of the euro area and the rest of the world, is used, thus also allowing the study of spillovers effects between regions.

As mentioned, the model incorporates various frictions (real, nominal and financial), thus allowing to assess economies with different structural characteristics. In particular, the degree of real and nominal rigidities can be differentiated to reflect different characteristics of the labour and product markets. On the financial side, the model comprises two types of frictions. First, credit-constrained households are not able to smooth consumption over time. For this reason, exogenous shocks to the LTV ratio as well as (exogenous or endogenous) fluctuations in the value of their wealth (housing stock) translate into shocks to their consumption and then to investment, employment and output.[25] Additionally, the model includes risk-premia on different assets, reflecting generalised risk perceptions, including at country and sectoral levels (*e.g.*, risk premium on housing or corporate investment).

Fiscal policy is described by a set of fiscal instruments, on the revenue[26] and expenditure[27] sides. The government budget does not need to be balanced every period and fiscal deficits are financed through public debt. This detailed and rich fiscal block allows for studying policy changes like public sector deleveraging, which may add to the effects of private sector deleveraging.

Finally, the model realistically depicts monetary policy arrangements between the euro area Member States. There is only one policy interest rate and Member States do not conduct independent monetary policy. Specific circumstances underlying the on-going crisis, like the policy rate being stuck at the zero-lower bound, can also be captured.

### 3.2. The effects of deleveraging on aggregate activity

In this section we use the model just described to assess the impact of households sector deleveraging on aggregate activity, highlighting the main mechanisms through which deleveraging affects the economy and discussing alternative scenarios.

We focus our analysis on one medium size and of a relatively low degree of openness euro area Member State. The initial gross debt of credit-constrained households is set at 80% of GDP. The average debt maturity is ten years.

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[24] There is also a third type of households, the so-called hand-to-mouth consumers, who do not have access to financial markets and consume their after-tax labour income and transfer earnings in every given period. These households do not play an important role in the described simulations and their share is kept at a low level (10%).

[25] This feature distinguishes QUEST from most other general equilibrium models, which do not make a link between the level of debt and the available collateral, as Eggertsson and Krugman (2012) paper, which focuses on the role of deleveraging during the recent financial crisis.

[26] Different types of taxes.

[27] Public consumption, productive investment, transfers and unemployment insurance benefits.

### *3.2.1. Scenario description*

The following scenarios are considered:

Baseline household deleveraging scenario

Deleveraging is captured by a combination of the two following shocks: (*i*) a drop in credit availability captured by a negative loan-to-value (LTV) ratio shock, and (*ii*) a fall in house prices captured as a shock to housing demand through an increase in the risk premium on housing investment.

The risk premium shock captures the foreclosure-house price deflation spiral: a fall in the LTV ratio leads to the insolvency of some households, forcing foreclosure of their houses; the excess of supply of houses, due to the aforementioned foreclosures, drives house prices down and, consequently, leads to a decrease in the value of the collateral, which further limits the access to credit (amplifying financial accelerator effect). The LTV ratio shock is calibrated to lead to a long-run 20 p.p. reduction in households' debt-to-GDP ratio. After 6 years this yields a fall of around 5 to 6 p.p. The risk premium shock on housing investment is calibrated to imply a permanent fall in house prices of around 15% in the long run. This shock adds to the amplification effects described before by leading to a decrease in the value of collateral.

In all scenarios considered in this analysis, we assume that the reduction in household debt translates in full into a reduction in the economy's net foreign debt (an improvement in the net asset position). Technically, this is captured in the model as an exogenous increase in Ricardian households' desired foreign asset holdings, which mimics the reduction in credit-constrained households' debt reduction. This assumption captures two alternative situations, in which either domestic households are directly indebted to foreign lenders or, faced by a lack of domestic investment possibilities in the deleveraging economy, domestic lenders to whom domestic households were indebted are forced to reinvest in foreign assets. In fact, this reflects, in a way, the financial outflows that took place in countries with a highly negative net foreign asset starting position and that are now facing strong deleveraging pressures.

Under this baseline scenario, the nominal interest rate is fixed (no monetary policy autonomy) and fiscal consolidation measures are absent.

In addition to the baseline scenario, the following alternative scenarios are considered:

Structural reforms scenario

The deleveraging shocks described in the baseline scenario are simulated in an economy with more flexible labour and product markets, thus representing the impact of the adoption of key structural reforms. In particular, the flexibility of the economy is captured by lower real wage rigidities and nominal (price and wage) rigidities. This is especially relevant for economies characterized by sectoral imbalances (for example due to a construction boom before the crisis), in which a smooth reallocation of capital and labour across sectors crucially depends on well-functioning product and labour markets. The results of this scenario should also highlight the potential of structural reforms for alleviating the impact of the deleveraging process on the economy.

Generalised risk perception scenario

In this scenario we add an increase in the domestic risk premium, thus illustrating the impact of a generalised increase in the risk perception in the economy under analysis. Such an increase may be expected if the deleveraging process is accompanied by an increased uncertainty and/or by contagion from the household sector to other sectors of the economy, and may in fact reflect a situation where, in addition to the household sector, the non-financial corporations' sector is also facing deleveraging pressures (situation not directly captured by the model, as the non-financial corporations are not indebted). The risk premium shock is calibrated to be of 100 basis points for four years and fading out progressively thereafter.

(More) open economy scenario

Here we compare the impact of deleveraging in the baseline scenario, i.e. in an economy with a relatively low degree of trade openness (Exports/GDP ≈ 30%), with its impact in an economy with a relatively large degree of openness (Exports/GDP ≈ 60%), to assess to what extent the degree of openness affects the deleveraging impact (taking into account the positive impact that deleveraging has on the current account, through the increase in exports and decrease in imports).

Private and public sectors deleveraging

This scenario addresses the effects of simultaneous private and public sectors deleveraging, by assuming that public authorities start a deleveraging process aiming at improving the budget balance by 2% of GDP.[28] The fiscal measures are equally distributed over the revenue and expenditure side.

### *3.2.2. Results*

*Deleveraging has a marked negative impact on the economy*

Baseline scenario: deleveraging in the households' sector

The simulation results displayed in Figure A.1 show that a combined reduction in access to credit (LTV ratio shock) and drop in house prices (housing risk premium shock) lead to a relatively speedy deleveraging process: after 6 years households' debt-to-GDP ratio falls by about 9 p.p. The speed of deleveraging is roughly in line with empirical studies mentioned in section 2.2. The debt overhang observed in some Member States may require an even larger degree of deleveraging. In the baseline scenario, the debt-to-GDP ratio is reduced by around 17 p.p. after 10 years, almost reaching the assumed long-run reduction of 20 p.p.

This speedy and sizeable household debt reduction leads to a marked contraction in output. GDP falls by a maximum of around 3% with the trough reached after 3 years. Output starts climbing back after this period towards its initial level, but at a slow pace.

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[28] This scale of fiscal consolidation has been chosen for illustrative purposes. It should be recognized that the required fiscal consolidation for some countries may well be in excess of this.

There are several channels via which deleveraging affects output. First, falling households' demand leads to a significant contraction in housing investment and consumption, which has a direct negative effect on output. Second, there is an additional effect due to the so called debt-deflation spiral: falling prices slow down the speed of deleveraging in terms of the real debt, which forces households to deleverage more aggressively. In consequence, households have to shed relatively more nominal debt, which pushes prices further down.

The deleveraging shock leads also to lower investment in capital as the real interest rate rises: without an independent monetary policy the nominal interest rate does not fall sufficiently to offset the decrease in prices. Further, real wages fall persistently. Since labour supply tends to increase (due to the negative income shock for households) and the labour demand falls, the net impact on equilibrium employment is largely driven by the degree of wage flexibility: in the baseline calibration with relatively high degree of real and nominal wage rigidities, the fall in wages is relatively contained and unemployment increases more significantly.

The negative impact on the economy leads, via the automatic stabilisers, to a negative impact on the government's budget balance and to an increase in the public-debt-to-GDP ratio. At the same time, deleveraging also leads to a rebalancing of the economy as housing investment falls, thereby reducing the demand for non-traded goods. Demand shifts from housing investment towards consumption goods and production resources are redirected towards the traded sectors. The economy's net foreign asset position improves, not only due to the assumption described above, but also due to the decrease of the terms-of-trade (due to falling domestic prices) and net exports increase.

### Structural reforms scenario

The structural reform scenario illustrates how a higher degree of real and nominal flexibility may dampen the impact of deleveraging on the economy. Figure A.2 compares the impact of the baseline deleveraging scenario in an economy with relatively high degree of real and nominal rigidities to the impact of the same deleveraging shocks in a more flexible economy. The results suggest that employment, investment and production would fall less in the more flexible economy, especially in the first years of the adjustment process. The effect is sizeable: for example, the average output loss over 10 years due to deleveraging in the flexible economy is 0.75 p.p. per year smaller than the output loss in the rigid economy. At the same time, households whose income depends on wages and salaries only may be hit more seriously, which leads to a somewhat more marked fall in aggregate consumption and housing investment than in case of more sticky prices and wages. More flexibility is found to contain the deterioration of the public-debt-to-GDP ratio especially over the medium run. The speed of deleveraging is somewhat slower in the short run, but not markedly affected in the medium and long run compared to the benchmark scenario.

There are two main channels via which rigidities make the impact of households' deleveraging relatively more painful. First, the optimal reaction of the economy to deleveraging is a downward adjustment in real wages. If working properly, this mechanism allows to sustain a stable level of employment (unemployment stays virtually constant, see figure A.2) leading to a smaller fall in output. Real and nominal wage rigidities shut this channel by making the downward wage adjustment slower (labour becomes relatively more costly and firms shed workers, which results in an additional decrease in output). The second channel works via a price effect on the interest rate. While in an economy characterized by flexible prices, prices fall relatively more on impact, they quickly start climbing back towards their original level. In effect, after an initial short period of deflation, moderate inflation sets in. In an economy without independent monetary policy these changes have a direct effect on the real interest rate: while the initial upward adjustment of the rate in the flexible economy is stronger, it is much quicker to revert back to its pre-deleveraging level. In fact, 3 years after the start of the deleveraging process the real rate actually falls below its initial level and only then starts converging to the steady state. In contrast, in the rigid economy, the real interest rate remains above its steady state for an extended period of time. Since lower interest rates make corporate investment cheaper, investment falls less in the flexible economy, helping to sustain a relatively high level of output.

Both, the baseline 'rigid economy' scenario and its 'flexible economy' counterpart, assume a sizeable fall in house prices. For economies characterized by the emergence of a housing bubble before the crisis this assumption may be thought of as reflecting the bursting of the bubble. Economies affected by the housing boom and the subsequent bust will require (and may be already in the process of) a major sectoral reallocation of capital and labour. Having this in mind, the baseline scenario and the 'structural reform' scenario may also be seen as partly capturing the economic costs of such reallocation in a rigid and relatively flexible economy, respectively. In the rigid economy higher adjustment costs hinder an increase in labour and capital in the goods-producing firms, following a collapse in the housing sector.

### Generalised risk perception scenario

A contagion from the housing sector to other economic sectors, as captured by a generalised increase in the risk premia in the deleveraging economy, is shown to aggravate the negative impact of the shock (figure A.3). This effect is primarily visible in a significantly larger fall in corporate investment. Consumption, employment and GDP also fall markedly more than in the benchmark case. This may thus give an idea of the magnitude of the effects when both households and non-financial corporations sectors face deleveraging pressures.

### (More) open economy scenario

A higher degree of openness can attenuate the negative impact of the shock by the stabilising effect of increasing net exports in the wake of falling domestic prices (figure A.4). Foreign trade dampens the impact of the negative demand shock for domestic production – especially for the production of traded goods. Unemployment would then increase less and consumption fall less during the process of deleveraging. Note that a larger increase in current account as a share of GDP takes place: while exports and imports move (up and down, respectively) relatively less in the (more) open economy, due to their larger share in the total output, their aggregate adjustment is larger in terms of output.

### Private and public sectors deleveraging

Public sector deleveraging in a period of private sector deleveraging is found to be challenging (figure A.5). Public sector deleveraging aggravates the fall in GDP and all domestic demand components, when compared to the baseline scenario. It should however be noted that the baseline scenario does not explicitly include a deleveraging need in the public sector, and is thus not comparable to a situation where the government itself is under funding pressure. Thus comparing to the baseline does not allow concluding that fiscal consolidation should not be undertaken.[29] Since private deleveraging deteriorates the government's budget balance by itself, the government needs to undertake substantial and credibly permanent restrictive fiscal policy measures to achieve a reduction in the public-debt-to-GDP ratio over the medium term. Moreover, as in the case of the debt-deflation spiral, also real public debt is affected by emerging deflation: falling prices increase the level of real debt which further increases, although temporarily, debt-to-GDP ratio.

The simulations display an across-the-board fiscal consolidation package which leads to a permanent improvement in the budget balance by 2% of GDP ex ante. As can be seen, this prevents an increase in the public debt to GDP ratio which would otherwise emerge from private sector deleveraging. However, a marked reduction of the debt to GDP ratio can only be seen after about six years. It must also be pointed out that these simulations focus on the demand shortfalls associated with private and public sector deleveraging. Not considered in these calculations are negative demand effects from rising sovereign risk premia in the absence of fiscal consolidation. On the other hand, the trade balance and the net financial assets position are found to improve somewhat more with the contribution of deleveraging in the public sector.

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[29] A recent article (DG ECFIN, 2013) contains a more complete analysis of the impact of fiscal consolidation in an economic situation characterised by private sector deleveraging and a stressed banking sector, highlighting the importance of fiscal space. For a similar deleveraging scenario, as presented here, it is shown that for countries with high and rising sovereign debt levels, fiscal consolidation has an important role to play for mitigating macroeconomic instability, since rising sovereign risk can amplify the private deleveraging shock via balance sheet effects on the domestic banking system. In such a situation the macroeconomic effects of no consolidation would be significantly worse.

## 4. CONCLUDING REMARKS AND POLICY IMPLICATIONS

**Depicting imbalances in private sector balance sheets requires an encompassing approach, covering the main relevant dimensions**. First, debt must be gauged against agents' income, evaluating their capacity to repay existent commitments, but also against assets as a more general concept of wealth. Second, when considering leverage it is important to take into account non-financial assets, especially in the case of households as they represent the bulk of their wealth. Third, changes in private sector debt should go in line with the absorption capacity of the economy. Therefore, valuation effects should be taken into account when considering the evolution of assets. Following these principles, the following countries were identified as more prone to face deleveraging pressures:

- Cyprus, Denmark, Spain, Ireland, the Netherlands, Portugal, Estonia, Latvia, Slovakia, Sweden and the United Kingdom on the household side;
- Belgium, Bulgaria, Cyprus, Greece, Spain, Hungary, Ireland, Italy, Portugal, Estonia, Latvia, Slovenia, Sweden and the United Kingdom on the corporate side.

The analysis also captures, within this set of countries, some "catching up" economies for which debt ratio levels are significantly lower, despite large increases before the crisis: Slovakia, Latvia, Estonia, Slovenia, Bulgaria and Hungary.

**Private sector debt sustainability analysis requires a benchmark against which to gauge actual developments in indebtedness: a balanced or sustainable level**. The most common approach in the literature assesses current debt levels against *ad hoc* static benchmarks, ignoring important country-specific factors as well as the possibility of time-varying thresholds. To complement this approach, this paper develops a stationarity approach that forces households' debt to grow in line with their notional or transaction-based assets (filtered from valuation effects). A positive diverging trend of debt from the balanced path implies increasing deleveraging pressures. The rebalancing of balance sheets depends, on the one hand, on debt reduction (effective deleveraging) and, on the other hand, on asset price valuation effects (*e.g.,* house price adjustment). The pace of the adjustment will crucially depend on the interaction of these two forces. As can be seen in the case of Spain and Ireland, where both factors have been at play (house prices bust and actual deleveraging), there has been a sharp rebalancing towards the closing of the gap. In the case of Portugal, the current gap, as assessed by the stationarity approach, is significantly lower due to the absence of a house price boom before the crisis.

**The analysis of credit market conditions allows a further refining of the message on whether and how the identified deleveraging needs may translate into actual adjustments of indebtedness in the Member States concerned.** The evolution of indebtedness is affected by both lending attitudes of the financial sector and borrowers' willingness to take on debt. Deleveraging in the financial sector may be seen as a cause, but also as a consequence of non-financial sector deleveraging, given the feedback effects existing between the two. On the credit demand side, the weak level of economic activity, the high level of uncertainty, low consumer and business confidence levels and the underlying deleveraging in the non-financial private sector continue to influence borrowing in a number of euro area countries. On the supply side, banks' capital constraints, the underlying adjustment in balance sheets and segmentation of financial markets affect negatively credit growth. **Our analysis suggests that immediate deleveraging pressures could be highest in Cyprus, Portugal and, although to a lesser extent, Spain, where both credit supply and demand risks are high.** Deleveraging pressures in Ireland and the Netherlands could also be significant, but coming more from the credit demand side. Short term pressures in Denmark and the UK seem lower, while in Sweden they seem to be currently at low levels.

**The materialization of a households' sector deleveraging process has a significant negative impact on the economic activity through a decrease in housing investment and consumption, amplified by a debt-deflation spiral.** The simulation of a deleveraging shock in a dynamic general equilibrium model also shows the negative consequences of a deleveraging shock on unemployment, notably when the economy is characterized by significant real and nominal wage rigidities. Nevertheless, this adjustment is accompanied by a positive external rebalancing with the reallocation of resources from non-tradable to tradable sectors. Structural reforms leading to a more flexible economy are key in this context, not only by contributing to a durable rebalancing process, but also by attenuating the negative impact of households' deleveraging: stronger real wages adjustment leads to a smoother reaction of employment and, consequently, of real output, while a faster adjustment in prices allows for an also faster adjustment in the real interest rate towards the equilibrium level. The need for simultaneous public sector deleveraging, as currently faced by some European economies, raises, however, some additional challenges: (*i*) public sector deleveraging aggravates the fall in GDP, and (*ii*) since households' deleveraging impacts negatively (via the automatic stabilisers) the government balance, restrictive fiscal policy measures lead to a decrease in the public debt to GDP ratio only in the medium term.

**Despite clear signals of rebalancing and deleveraging, especially in some vulnerable economies as Spain, Portugal and Ireland, deleveraging in the non-financial private sector has still a long way to go in many European countries.** Limiting the negative impact on growth remains one of the key policy challenges ahead.

- The room for manoeuvre to attenuate the underlying negative consequences for economic activity is extremely limited in countries whose *public sector* is also highly indebted - in some cases due to excessive private indebtedness that was transformed into public sector debt - and for which sovereign yields increased significantly during the crisis. In addition, the ongoing public sector deleveraging needs, especially when taking place in several Member States simultaneously, adds to the recessionary pressures coming from the private sector. This context thus raises significant challenges in terms of fiscal policy options and the overall policy-mix. The Stability and Growth Pact offers a flexible framework to guide the differentiated pace of consolidation: in particular, it allows for the pace of consolidation to vary according to the particular characteristics of the Member States.
- This note highlights the importance of *structural reforms*, not only by guaranteeing a durable rebalancing process, but also by attenuating the negative impact of households' deleveraging. Measures aiming to decrease nominal and real rigidities, as envisaged by the labour and product market reforms now being implemented in programme and vulnerable countries, are crucial to attenuate the impact of private sector deleveraging on economic activity and unemployment.
- Measures targeted at guaranteeing an *orderly and coordinated deleveraging proces*s in the private sector should also be envisaged. In the current context of still high levels of indebtedness, low growth and low inflation, an adequate private sector insolvency framework might be needed to achieve timely deleveraging: improving insolvency and bankruptcy procedures in the household and non-financial corporations' sectors can become crucial to guarantee an orderly deleveraging process.

- In addition to the key role currently played by central banks in providing liquidity to the banking sector, and to the need for a well-capitalized and well-regulated banking system, *breaking the banks-sovereign link* and thus promoting a more supportive role of financial markets is also key in the current juncture.
- Finally, and looking forward, it is also important to guarantee that once the proper financing conditions are re-established, the rebalancing process continues to take place and macroeconomic imbalances, including private sector indebtedness, will not start building up again. Structural reforms are a necessary but not sufficient condition for this to happen. In addition, and given the procyclical nature of capital flows, the right financial supervision tools must be in place to guarantee that the new lending will support the rebalancing process (possibly including tax-reforms, such as amending favourable fiscal treatment on debt-related instruments). The *banking union and the reinforcement of micro and macro-prudential supervision* are of utmost importance in this context. The relevance of cross-border capital flows at EU level and the evidence from the past pointing to the role of the core countries' banking sector in fuelling the building up of macroeconomic imbalances in the periphery, are two clear examples pointing to the need for effective regulation and supervision of cross-border banking and for a more centralized macro-prudential supervision, especially at the euro area level.

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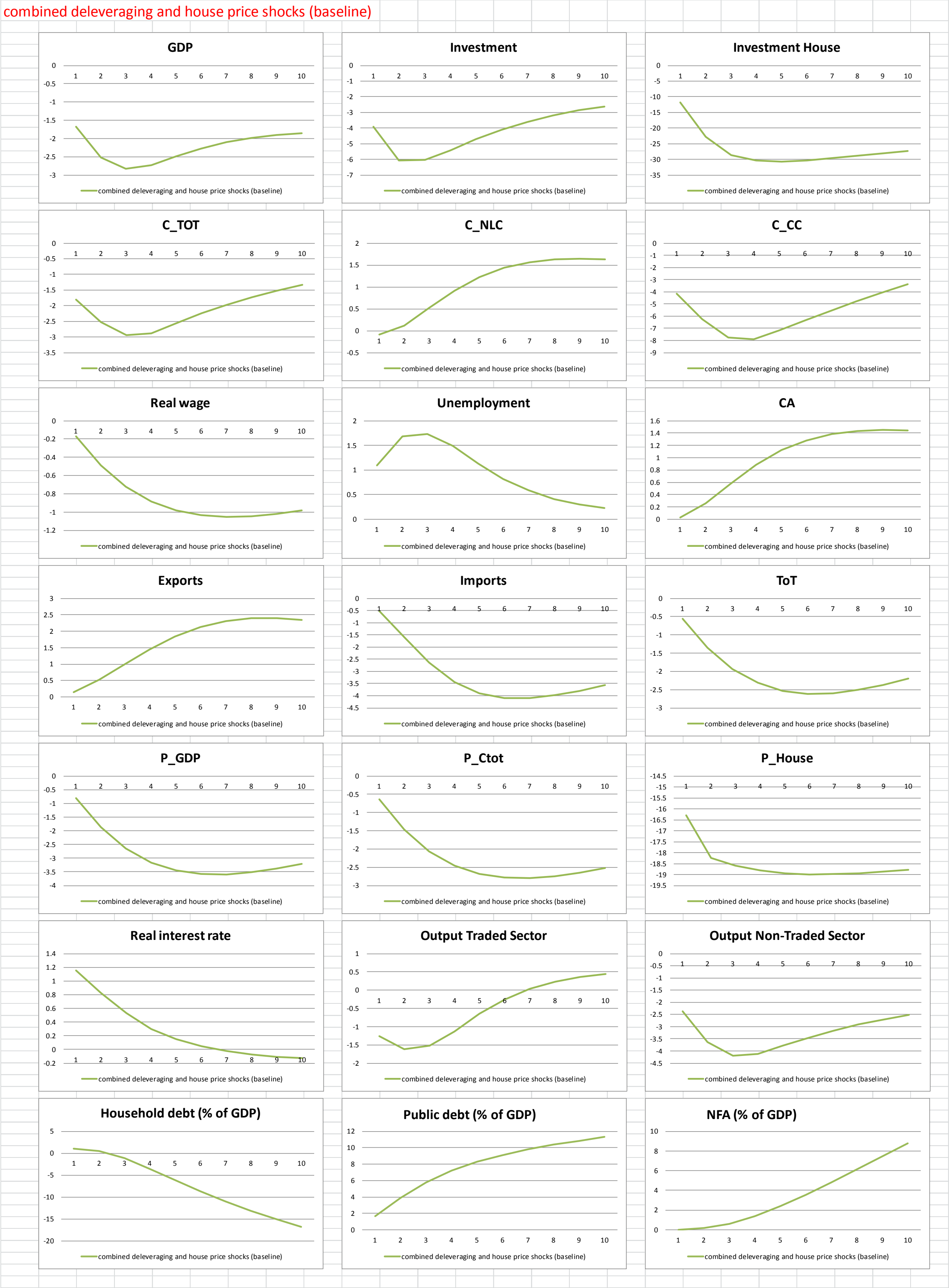
# ANNEX: FIGURES FROM QUEST SIMULATION

Figure. A.1



# Figure A.2

economy with low real and nominal rigidities

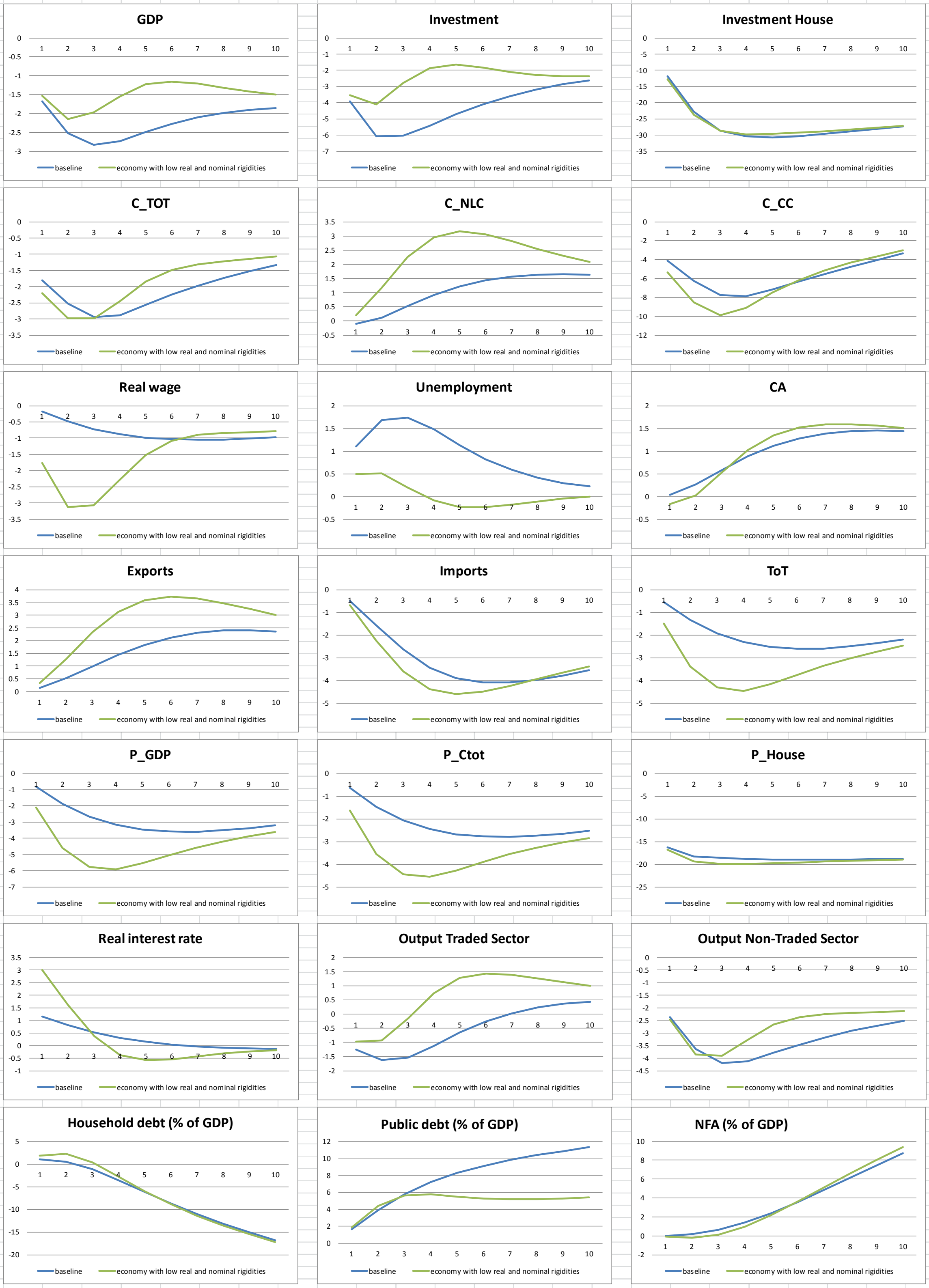


Figure A.3

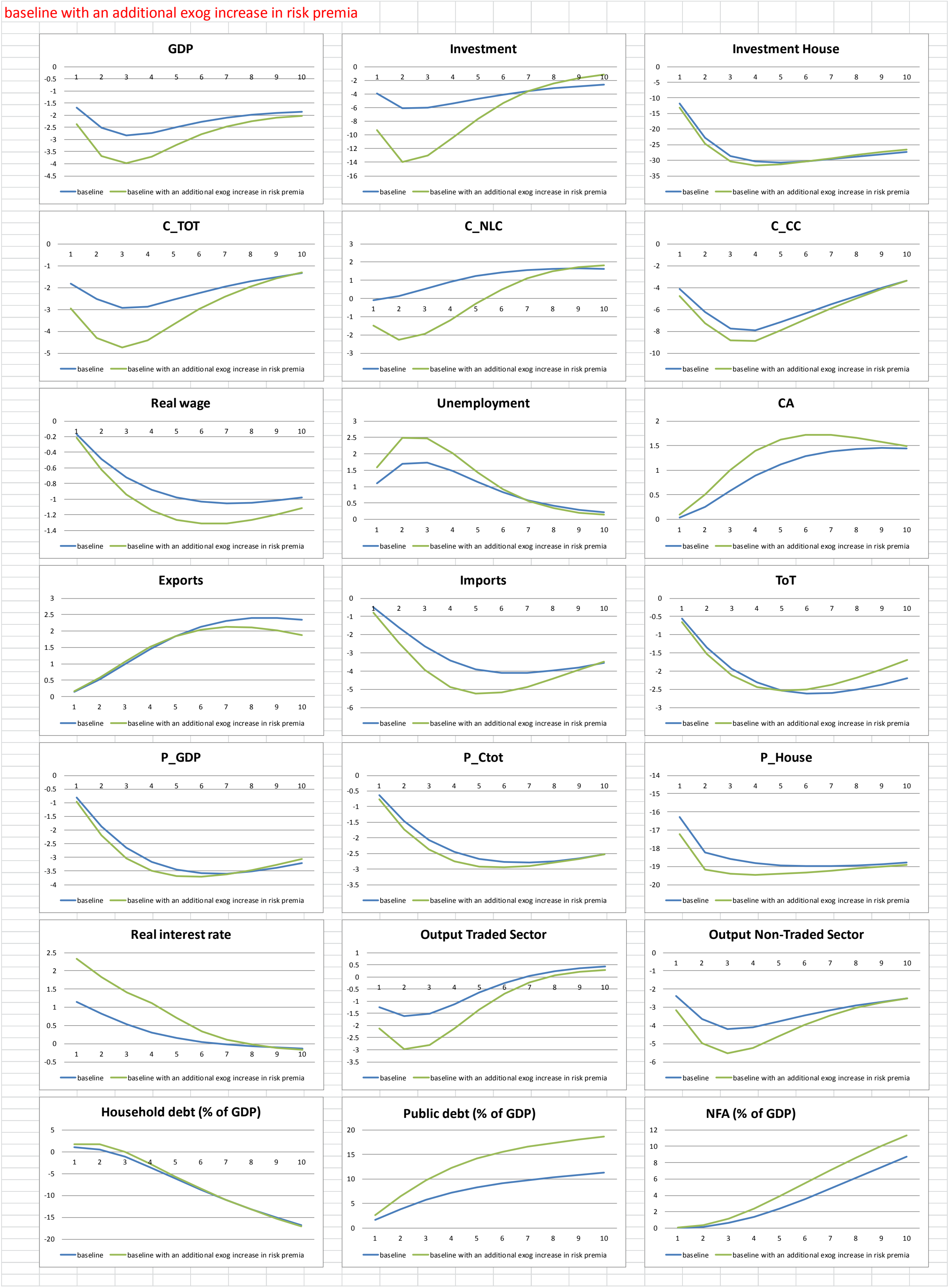

baseline with an additional exog increase in risk premia
GDP
0 -0.5 -1 -1.5 -2 -2.5 -3 -3.5 -4 -4.5
Investment
0 -2 -4 -6 -8 -10 -12 -14 -16
Investment House
0 -5 -10 -15 -20 -25 -30 -35
C_TOT
0 -1 -2 -3 -4 -5
C_NLC
3 2 1 0 -1 -2 -3
C_CC
0 -2 -4 -6 -8 -10
Real wage
0 -0.2 -0.4 -0.6 -0.8 -1 -1.2 -1.4
Unemployment
3 2.5 2 1.5 1 0.5 0
CA
2 1.5 1 0.5 0
Exports
3 2.5 2 1.5 1 0.5 0
Imports
0 -1 -2 -3 -4 -5 -6
ToT
0 -0.5 -1 -1.5 -2 -2.5 -3
P_GDP
0 -0.5 -1 -1.5 -2 -2.5 -3 -3.5 -4
P_Ctot
0 -0.5 -1 -1.5 -2 -2.5 -3 -3.5
P_House
-14 -15 -16 -17 -18 -19 -20
Real interest rate
2.5 2 1.5 1 0.5 0 -0.5
Output Traded Sector
1 0.5 0 -0.5 -1 -1.5 -2 -2.5 -3 -3.5
Output Non-Traded Sector
0 -1 -2 -3 -4 -5 -6
Household debt (% of GDP)
5 0 -5 -10 -15 -20
Public debt (% of GDP)
20 15 10 5 0
NFA (% of GDP)
12 10 8 6 4 2 0
1 2 3 4 5 6 7 8 9 10
baseline
baseline with an additional exog increase in risk premia

Figure A.4

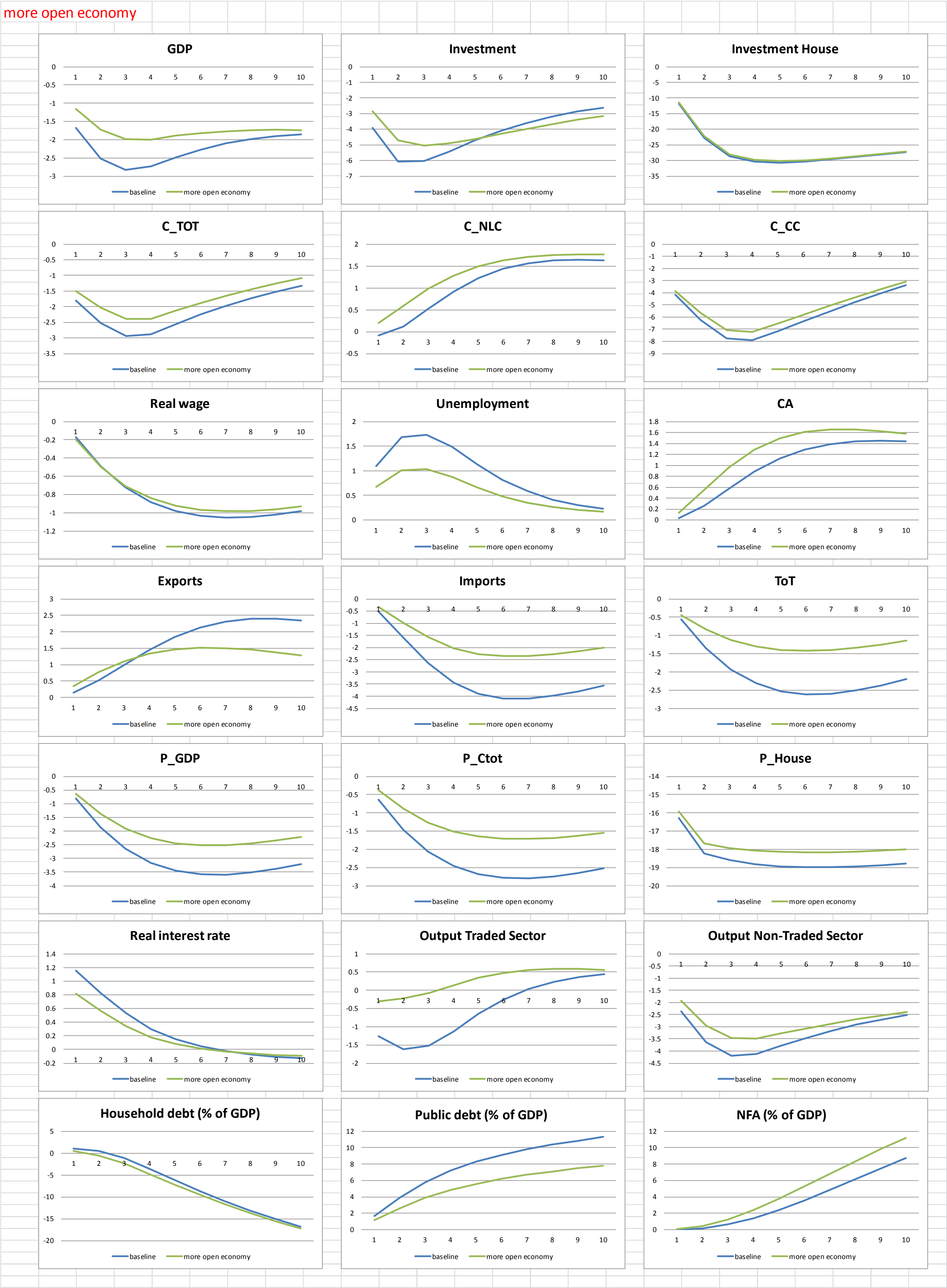
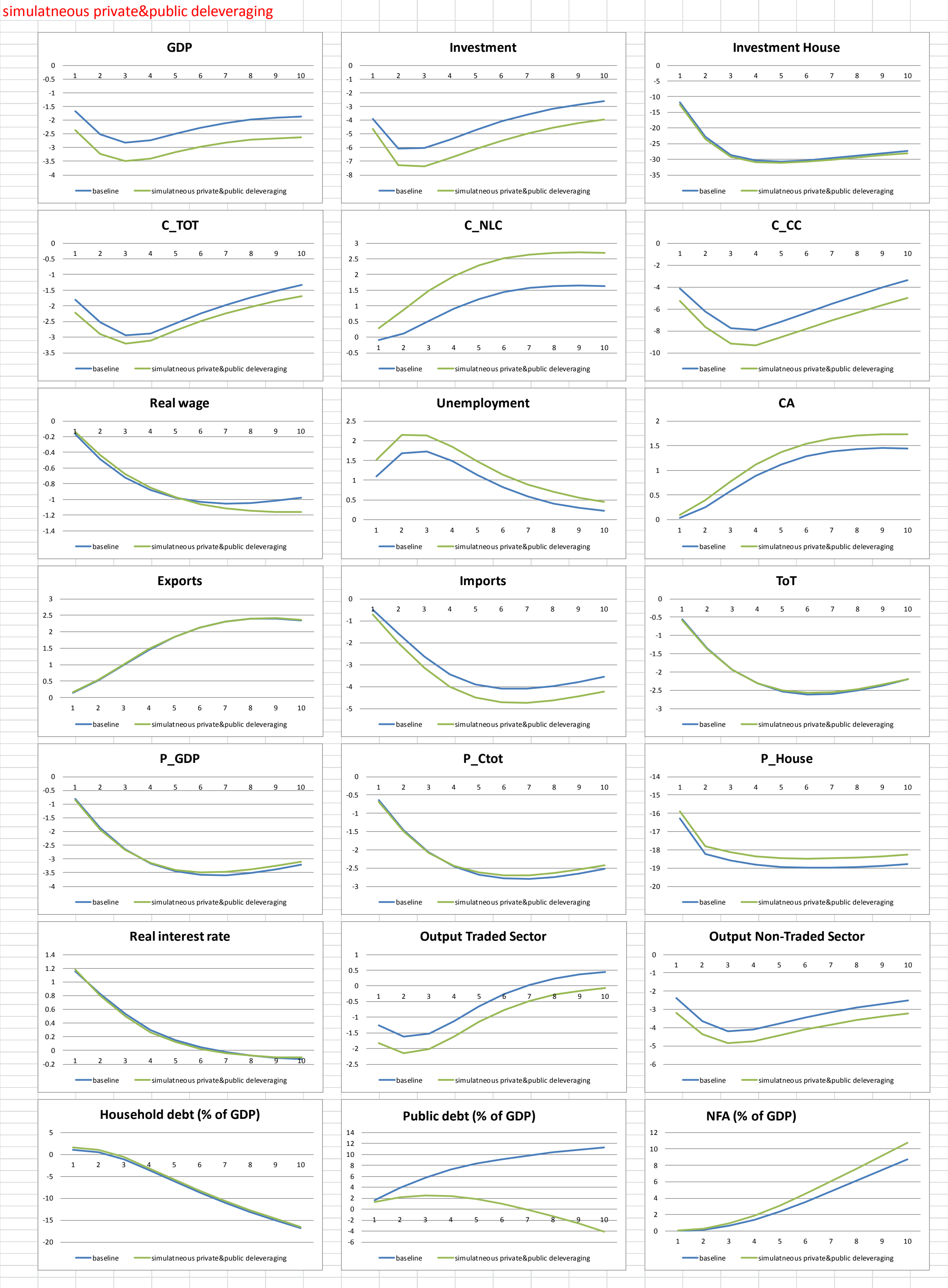

more open economy
GDP
Investment
Investment House
C_TOT
C_NLC
C_CC
Real wage
Unemployment
CA
Exports
Imports
ToT
P_GDP
P_Ctot
P_House
Real interest rate
Output Traded Sector
Output Non-Traded Sector
Household debt (% of GDP)
Public debt (% of GDP)
NFA (% of GDP)
1 2 3 4 5 6 7 8 9 10
baseline
more open economy

Figure A.5


simulatneous private&public deleveraging
GDP
Investment
Investment House
C_TOT
C_NLC
C_CC
Real wage
Unemployment
CA
Exports
Imports
ToT
P_GDP
P_Ctot
P_House
Real interest rate
Output Traded Sector
Output Non-Traded Sector
Household debt (% of GDP)
Public debt (% of GDP)
NFA (% of GDP)
baseline
simulatneous private&public deleveraging

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