European Commission

ISSN 1830-6403 (online)
ISSN 1725-5759 (print)

# Quarterly Report on the Euro Area

**VOLUME 13 N° 1 (2014)**

## Highlights in this issue

- Focus: The drivers of total factor productivity in catching-up economies
- New estimates of Phillips curves and structural unemployment in the euro area
- The relationship between government and export sector wages and implications for competitiveness
- Latvia: maintaining sustainable growth after the boom-bust years
- Corporate balance sheet adjustment in the euro area and the US

*Economic and Financial Affairs*

This paper exists in English only and can be downloaded from
http://ec.europa.eu/economy_finance/publications/.

More information on the European Union is available on http://europa.eu.

KC-AK-14-001-EN-N (online)
ISSN 1830-6403 (online)

KC-AK-14-001-EN-C (print)
ISSN 1725-5759 (print)

European Commission
Directorate-General for Economic and Financial Affairs

# Quarterly Report on the Euro Area

VOLUME 13 N° 1 (2014)

# Table of contents

## Dealing with a legacy of high private and public debt

***Marco Buti***
Director General

DG ECFIN's latest Economic Forecast confirms that the recovery, though still fragile, is expected to continue to gain in strength while also becoming more balanced across growth drivers. Domestic consumption and investment are set to strengthen gradually, reducing the dependency of the recovery on the external sector. Besides, thanks to substantial improvements in public finances since 2011, the fiscal effort (measured as the change in structural balance) is now close to neutral for the euro area as a whole. Growth has also returned in many of the vulnerable Member States. Risks remain, however, tilted to the downside, both for growth and the inflation outlook.

Sustained policy efforts at all institutional levels have put the EMU on a much firmer footing. But it would be premature to declare victory. We have not yet reached a steady state in which the EMU architecture is complete and all the main economic challenges have been solved.

The in-depth reviews (IDRs) on macroeconomic imbalances published earlier this month illustrate that, while progress has been made on some fronts, serious challenges remain. For instance, on some counts, external rebalancing is progressing rapidly in those countries that had accumulated large external deficits before the crisis. Their current accounts have moved into surplus and they have achieved substantial gains in cost-competitiveness. Nevertheless, the rebalancing process has to continue given that the high debt accumulated over many years has in general been curbed only modestly so far.

The most indebted countries can make their rebalancing process more rapid and less painful by acting simultaneously in a range of areas. Firstly, they need to make sure that fiscal consolidation is as growth-friendly as possible and does not exacerbate social hardship. Secondly, policies can also help mitigate the negative impact of private sector deleveraging on growth. Improved bankruptcy frameworks have an important role to play here but, above all, it is essential to boost exports in order to offset the persistent shortfall in private sector demand that necessarily comes with deleveraging. Labour cost moderation and wage differentiation reflecting productivity developments is the standard adjustment channel in this respect. To ensure sustainable improvements, the labour cost adjustment channel has to be complemented with measures aimed at increasing productivity and non-price competitiveness. In this respect, the analysis presented in the focus section of this report is encouraging. It shows that some structural reforms can, on top of their usual positive effects on the functioning of labour and product markets, also contribute to enhance growth in productivity. Admittedly, some reforms may take time to play out but, given the length of deleveraging processes, their rapid implementation will help make these processes more sustainable and mitigate their social and economic costs.

Of course, high debt levels must in any case be addressed through responsible fiscal policies and growth-enhancing structural reforms. At the same time, successful past experiences of deleveraging and external rebalancing benefitted from a supportive external environment. As called for by the Commission in the IDRs, less indebted Member States should address distortions in savings and investment behaviours so as to raise domestic demand, particularly investment, and pursue reforms opening up markets and boosting potential growth. Moreover, it is necessary to avoid a prolonged period of excessively low overall euro area inflation. The continuation of the current levels of euro area inflation — well below the ECB definition of price stability — would make the task of vulnerable countries, which have to simultaneously regain competitiveness and reduce indebtedness, very challenging.

Overall, Member States should take action individually and collectively to address macroeconomic imbalances in the euro area. An important element of the euro area's responsibility relates to financial fragmentation. Addressing fragmentation, notably through the Banking Union and well-capitalised banks, will greatly facilitate the capital reallocation processes towards more productive uses and help channel savings from surplus countries to peripheral countries. The forthcoming agreement on the SRM and the AQR are essential milestones in this process.

Member States are making progress in addressing their challenges, but efforts must be stepped up. We hope to see a strong response and stand ready to support them.

# I. The drivers of total factor productivity in catching-up economies ([1])

*The pace of total factor productivity (TFP) convergence in the euro area slowed down in the mid-1990s. This mainly reflects poor TFP growth in the euro area's catching-up economies. Measured in terms of TFP, the technology gap between leaders and laggards in a broad range of industries actually increased between 1994 and 2007. The persistence of the technology gap suggests that the causes are deep-rooted and at least partly structural.*

*Panel regression results based on an endogenous growth model indicate that the TFP divergence between euro area catching-up economies in the decade preceding the global financial and economic crisis can be partly explained by the weakening of the convergence channel, lower spending on innovation activities such as R&D and ICT, deteriorating government effectiveness, and faster population ageing.*

*Throughout the crisis, a broad range of reforms aimed at improving framework conditions have been adopted in catching-up economies and are likely to raise TFP growth rates. However, since convergence is shown to be more difficult for economies getting closer to the technological frontier, the adoption of further structural measures would help ensure a faster TFP convergence process. In particular, policies that foster innovation activities, reduce further the restrictiveness of employment protection legislation, lower corporate tax rates and improve government effectiveness appear to support TFP growth.*

## I.1. Introduction

The pace of euro area income per capita convergence has slowed since the mid-1990s. This mainly reflects poor growth rates in some of the catching-up economies (i.e. Greece, Spain, and Portugal), but also in some Member States with a higher income per capita than the euro area average (e.g. Italy). Their weak performance mirrors an excessive allocation of resources towards less productive sectors, but also reflects low growth in total factor productivity (TFP) in a broad range of industries (see European Commission, 2013). ([2]) TFP measures the efficiency with which inputs are being used in the production process and it can be understood as a rough measure of the rate of technological progress in the economy.

The empirical evidence suggests that the TFP performance of the euro area catching-up economies before the beginning of the global economic and financial crisis in 2008 can be split into three phases: (i) The 1980s and early 1990s were characterised by average TFP growth rates above the euro area's average, supporting a strong convergence towards the rest of the euro area; (ii) around the mid-1990s, TFP performance slowed down significantly, bringing convergence to a halt; (iii) between the end of 1990s until the crisis, TFP actually declined, resulting in a divergence of catching-up economies from the rest of the euro area Member States. The last period can be illustrated by an atypical positive correlation between the initial level of GDP per capita and average TFP growth rates (see Graph I.1). This evidence on divergence is at odds with the results of seminal papers pointing to a small convergence effect for at least some European regions in previous decades (Barro and Sala-i-Martin, 1991; Sala-i-Martin, 1996). ([3])

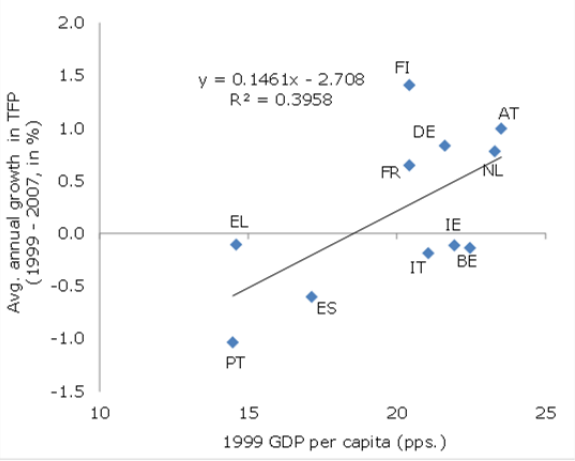
Against this background, the focus section takes a closer look at the key drivers of TFP growth over the period 1994 to 2007 with a special focus on the euro area catching-up economies. The group labelled as 'euro area catching-up economies' hereafter includes Portugal and Spain which were part of the euro since its inception and therefore for most of the sample considered. Due to data constraints at the sectoral level, Greece could not be considered in most of the analysis hereafter. Occasionally, Italy is also discussed as an example. Although not a catching-up country, Italy's TFP performance diverged significantly from the rest of the euro area in the decade preceding the crisis.

([1]) The section was prepared by Narcissa Balta and Philipp Mohl.
([2]) European Commission (2013), `Focus: Catching-up processes in the euro area', *Quarterly Report on the Euro Area*, Vol. 12(1), pp. 7-18.
([3]) Barro, R. and X. Sala-i-Martin (1991), `Convergence across states and regions', *Brookings Papers on Economic Activity*, Vol. 1, pp. 107-182; Sala-i-Martin, X. (1996), `Region cohesion: evidence and theories of regional growth and convergence', *European Economic Review*, Vol. 40, pp. 1325-1352.

The empirical identification of key drivers of TFP is challenging, since TFP cannot be observed directly and it is hard to measure. The TFP data used are taken from the EU KLEMS database, which offers the advantage of sector-level data.

The focus section is structured as follows: Section I.2. provides an overview of TFP performance in the euro area. Section I.3. reviews potential structural drivers of TFP, taking into account the insights of the literature. Section I.4. analyses key drivers of TFP based on a panel econometric approach. Finally, Section I.5. concludes.

Graph I.1: **Total factor productivity developments, euro area (1)**




(1) The sample consists of the euro area Member States in 2007. Due to data availability, LU is not covered and growth rates for PT and EL refer to the period 1995 to 2006.
***Source:*** DG ECFIN based on EU KLEMS and WIOD.

## I.2. TFP performance in the euro area at sectoral level

*In brief: this section shows that most industries in the euro area catching-up economies exhibited poor TFP performance during the pre-crisis decade, leading to a divergence with the rest of the euro area in several sectors. The persistence of this weakness, as well as its broad sectoral representation, suggests that the weak TFP performance is at least partly structural in nature.*

This section takes a closer look at TFP performance in the euro area at the sectoral level. The data for TFP growth rates are taken from the EU KLEMS database. (4) In the EU KLEMS methodology, TFP is corrected for changes in the quality of both labour and capital inputs so as to capture disembodied technological progress. (5) This implies, for instance, that changes in the composition of the labour force or the rapid shifts in investment towards information and communication technologies (ICT) over the recent years are not reflected in the EU KLEMS TFP measure, but in the inputs used in the production function. The TFP level is determined by anchoring the EU KLEMS TFP growth rates to the 1997 PPP-adjusted TFP levels of the Groningen Growth and Development Centre's productivity level database. (6)

Weak productivity growth in the euro area catching-up economies in the decade preceding the financial and economic crisis affected most industries (Graph I.2). On the one hand, a handful of industries have registered significant productivity losses, notably some service sectors and construction. On the other hand, in the manufacturing sector, annual average TFP growth between 1999 and 2007 has been close to zero or even slightly negative (Graph I.2) despite the sector's openness to trade and close integration with the EU market. Only the financial intermediation sector showed significantly positive growth rates.

The observed poor performance in productivity led the catching-up economies and Italy to diverge from the rest of the euro area (Graph I.3). The TFP gap between euro area catching-up economies and the technological leaders (i.e. the countries where the TFP level was the highest in the industry considered among a sample of OECD countries) was not concentrated just in a handful of industries. Instead, there was little progress in TFP convergence in most industries.

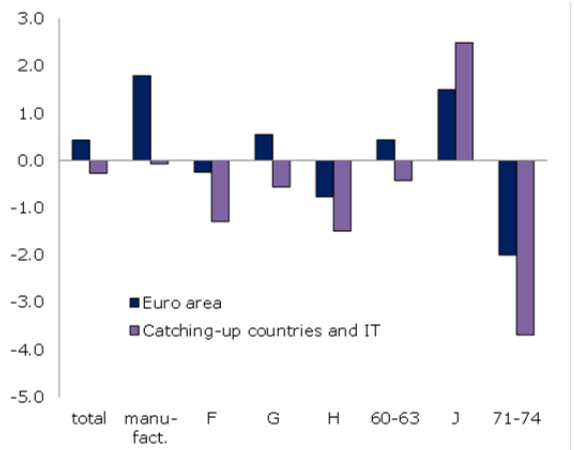
(4) EU KLEMS methodology for deriving TFP measures differs from the European Commission TFP trend estimation methodology, which is based on the commonly agreed production function methodology for calculating potential output. For details, D'Auria, F., C. Denis, K., Havik, K. Mc Morrow, C. Planas, R. Raciborski, W. Röger and A. Rossi (2010), 'The production function methodology for calculating potential growth rates and output gaps', *ECFIN Economic Papers*, No 420.

(5) For more details on EU KLEMS see: O'Mahony, M. and M.P. Timmer (2009), 'Output, input and productivity measures at the industry level: the EU KLEMS database', *The Economic Journal*, Vol. 119 (June), pp. F374-F403.

(6) See Inklaar, R. and M.P. Timmer (2009), `Productivity convergence across industries and countries: the importance of theory-based measurement', *Macroeconomic Dynamics*, Vol. 12 (Sup 2), pp. 218-240.

Graph I.2: **TFP performance at sectoral level (1)**

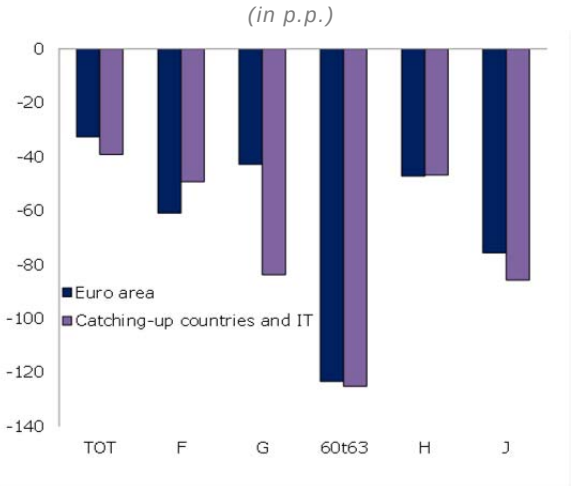
*(1994-2007, avg. annual % change)*




(1) The chart shows average annual TFP growth rates over the period 1994 to 2007. Euro area consists of the euro area Member States in 2007 (except EL). Catching-up countries includes PT, ES and IT. The sector classification used for Graphs I.2, I.3 and I.4 includes (sector codes in parenthesis): manufacturing (consisting of food, beverages and tobacco (15-16), pulp, paper, printing and publishing (21-22), machinery (29), electrical and optical equipment (30-33) and other manufacturing (36-37)), construction (F), wholesale and retail trade (G), hotels and restaurants (H), transport and storage (60-63), financial intermediation (J), renting of machinery and equipment and other business activities (71-74), real estate activities (K), public administration, education and health (L-N) .
***Source:*** EU KLEMS.

Graph I.3: **Average technology gap divergence at sectoral level (1)**

*(in p.p.)*




(1) The graph shows the average technology gap in selected sectors between 1994 and 2007 (see Graph I.2 for a description of sectors and country groups).
***Source:*** DG ECFIN based on EU KLEMS.

The persistence of the gap (and in many cases its widening) over the 1994-2007 period, suggests that the weakness of TFP performance is at least partly structural. This implies that some structural features present in manufacturing and services sectors, and more so in non-tradable services sectors, impeded TFP growth in the catching up economies in the pre-crisis period, even though there was a surge in investment during that time. Without substantial policy action and structural reforms, the catching-up economies could be facing a long period of relatively low TFP growth in the medium-term.

## I.3. Potential TFP drivers

*In brief: the literature has identified a broad set of factors supporting TFP growth. In particular, policy measures which affect the quality of human capital, the capital stock and the structural/institutional framework conditions of the economy seem to be beneficial for TFP growth.*

This section takes a closer look at the key TFP drivers identified in the literature. The review builds upon the insights of endogenous growth models, which put a great emphasis on the role of innovation in promoting productivity. (7) In this framework, TFP is mainly driven by the quality of labour and capital inputs (i.e. the skill structure of the labour force and the quality of the capital stock) as well as the structural and institutional framework conditions, in which the economy operates.

### Quality of labour inputs

There is plenty of evidence in the literature showing that a higher skilled labour force tends to promote innovation, leading to a rise in productivity. (8)

Some euro area catching-up economies (e.g. Portugal), but also some of the more advanced economies (e.g. Italy), started with a very low proportion of high-skilled workers, and despite significant progress, are still struggling with a high share of low-skilled workers in the economy. This driver may still be negatively affecting their TFP performance.

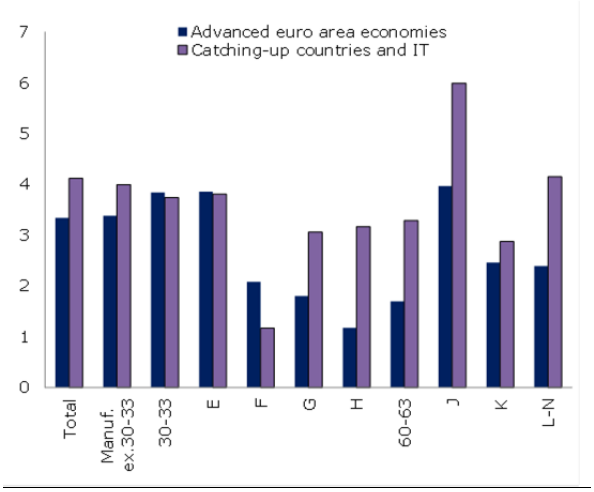
(7) For example, in Aghion, P. and P. Howitt (2006), 'Appropriate growth policies: a unifying framework', *Journal of the European Economic Association*, Vol. 4(2/3), pp. 269-314.

(8) See European Commission (2009), 'Trade costs, openness and productivity: market access at home and abroad', *Industrial Policy and Economic Reform Papers*, No 10, January; Sondermann (2012), 'Productivity in the euro area. Any evidence of convergence?', *ECB Working Paper*, No 1431, April.

However, given the progress observed, the quality of human capital endowments is not likely to have been a potential driver of the divergence in TFP growth rates between the catching-up economies and the rest of the euro area. The evidence suggests that the skill structure improved during the pre-crisis period. The increase in the share of high-skilled hours worked has been broad based in manufacturing, but even more so in services sectors. It has also been more pronounced in the euro area catching-up economies than in those of the core, suggesting that there has been some convergence of skill structures in the euro area (Graph I.4).

Graph I.4: **Change in the share of high-skilled hours worked, between periods 1995-01 and 2001-07 (1)**

*(in p.p.)*




(1) Advanced euro area economies: DE, FR, NL, AT, and FI. Catching-up economies (ES and PT) as well as IT. See also Graph I.2 for a description of sectors.
***Source:*** DG ECFIN based on EU KLEMS and WIOD.

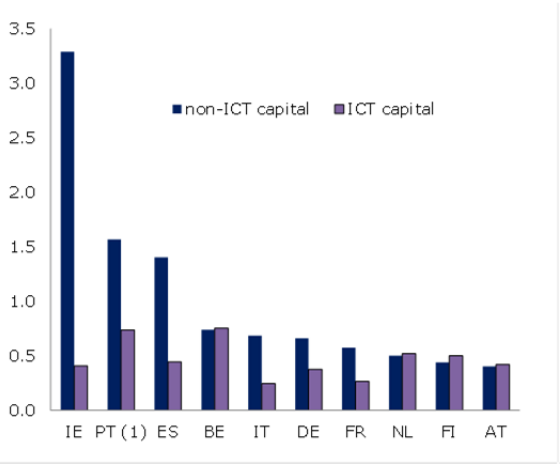
## Quality of capital inputs

In terms of the quality of capital inputs, the literature suggests that investment in ICT plays a prominent role in explaining TFP performance. ([9]) Investment in ICT increases an economy's productive potential by raising its capital stock, but also increases its potential for rapid technical progress with positive effects on TFP growth.

In terms of the quality of capital inputs, the relative contribution to the added value of the non-ICT component of capital seems to be much greater in the euro area catching-up economies than in the rest of the euro area (Graph I.5). This pattern is observable across all sectors, with the exception of the ICT-producing industries (i.e. electrical and optical equipment, postal services and communications). Moreover, in most euro area countries, the contribution to growth of the ICT-component of capital, relative to its non-ICT component, further deteriorated in the latter years of the pre-crisis period (2004-2007) especially in the weak TFP performing euro area countries (e.g. Spain, Portugal and Italy). This implies that in terms of the quality of capital inputs, insufficient investment in ICT could be an important explanation for the disappointing TFP performance in the catching-up countries.

Graph I.5: **Contribution to value added growth of non-ICT and ICT capital**

*(1995-2007, avg. in %)*



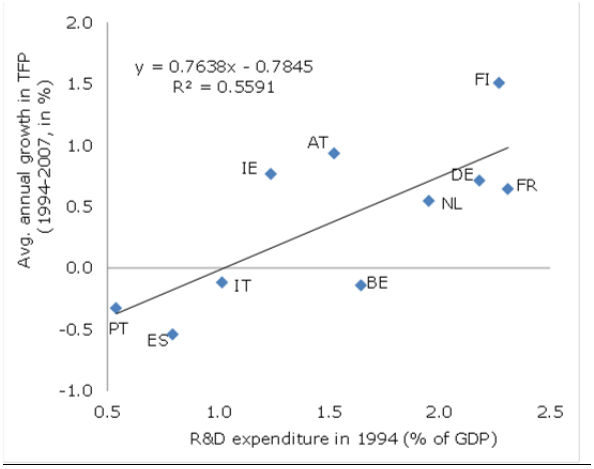

(1) PT: 1995-2005.
***Source:*** DG ECFIN based on EU KLEMS and WIOD.

Finally, the literature provides evidence that countries that spend more on R&D tend to exhibit higher growth rates of TFP. (10) This seems to be confirmed over the sample period analysed. Graph I.6 illustrates that countries that spent a smaller share of GDP on R&D (e.g. Spain, Portugal and Italy) also had lower annual average growth rates of TFP during the pre-crisis period.

([9]) Marrocu, E., Paci, R. and S. Usai (2013), 'Productivity growth in the old and new Europe: The role of agglomeration externalities', *Journal of Regional Science*, Vol. 53(3), pp. 418-442; Griffith, R., Redding, S. and J. van Reenen (2004), 'Mapping the two faces of R&D: productivity growth in a panel of OECD industries', *The Review of Economics and Statistics*, Vol. 86(4), pp. 883-895.

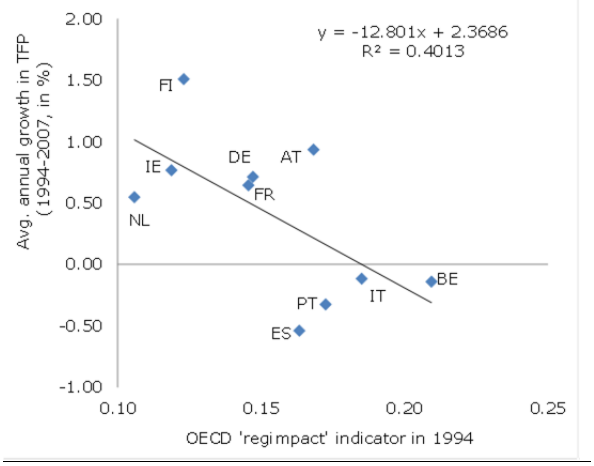
([10]) Griffith, R., Redding, S. and J. van Reenen (2004), 'Mapping the two faces of R&D: productivity growth in a panel of OECD

Graph I.6: **TFP growth and R&D spending**




***Source:*** DG ECFIN based on EU KLEMS and WIOD.

Graph I.7: **Product market regulation (1)**




(1) The graph shows the OECD 'regimpact' indicator, which assigns higher indicators to stricter product market regulation.
***Source:*** DG ECFIN based on OECD.

## Structural/institutional drivers related to framework conditions

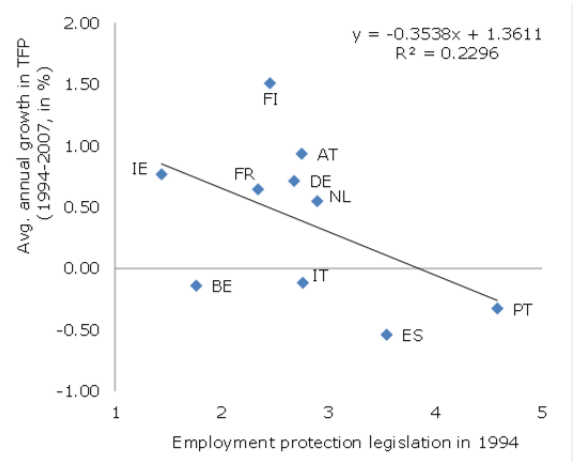
Apart from the quality of labour and capital inputs, the literature suggests that structural/institutional drivers affecting the framework conditions, in which the economy operates, have a significant impact on TFP.

A large body of economic literature suggests that more rigid product and labour markets tend to weaken productivity by slowing down the catching-up process of best-practice technologies, delaying firm-level adjustments and/or reducing direct productivity gains. (11)

The OECD product market regulation (PMR) indicators, which measure the degree of anti-competitive regulation in selected sectors of the economy, have improved for most sectors of the euro area countries during the pre-crisis period (1994-2007). At the same time, countries with a higher PMR indicator in 1994, showed lower productivity growth over the period, resulting in a negative correlation between TFP growth and the degree of anti-competitive regulation. All catching-up economies as well as Italy showed stricter product market regulation in 1994 (Graph I.7).

Looking at labour market rigidities, the OECD employment protection indicators (EPL) show that the catching-up economies started with a relatively high degree of rigidity in their employment protection legislation (Graph I.8). The negative correlation between the average TFP growth over 1994 to 2007 and the score in the EPL indicator in 1994 indicates that the poor TFP performance observed over the pre-crisis period could, to some extent, be negatively related to the initial level of the employment protection legislation. However, the correlation seems to be much weaker than in the case of R&D spending.

Graph I.8: **Employment protection legislation (1)**



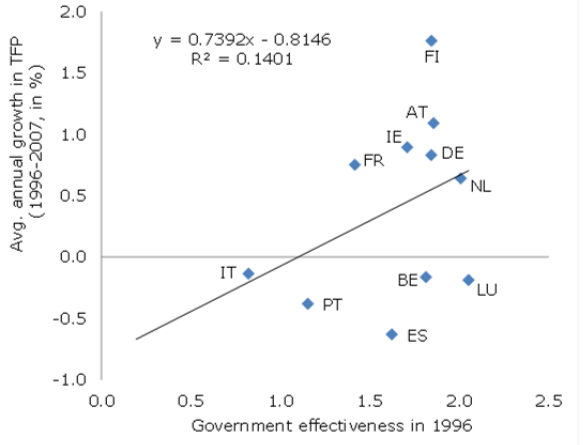

(1) The graph shows the employment protection indicator for regular contracts in terms of individual and collective dismissals. Higher values stand for stricter protection rules.
***Source:*** DG ECFIN based on OECD.

industries', *The Review of Economics and Statistics*, Vol. 86(4), pp. 883-895; Inklaar, R., Timmer, M., and van Ark, B. (2008), 'Market services productivity across Europe and the US', *Economic Policy 23*, pp. 139-194,.

(11) Nicoletti, G. and S. Scarpetta (2003), 'Regulation, productivity and growth: OECD evidence', *Economic Policy*, April, pp. 9-72; Burda, M. and B. Svergnini (2009), 'TFP growth in old and new Europe', *Comparative Economic Studies*, Vol. 51, pp. 447-466.

Poor productivity performance has also been linked by several studies to the deteriorating quality of institutions. [12] The institutional quality, as measured by the government effectiveness of the World Bank Governance Indicators database, was indeed low in the euro area economies with poor productivity performance (Graph I.9). This seems to be particularly the case of Italy.

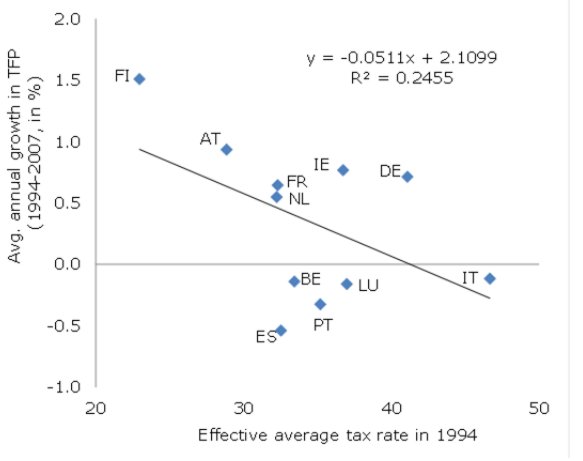
Graph I.9: **Effectiveness of governments (1)**




(1) Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Higher values point to higher government effectiveness.
***Source:*** DG ECFIN based on World Bank (2013): Worldwide governance indicators.

Finally, there is also evidence that higher corporate tax rates can distort factor prices and reduce entrepreneurship and R&D activities, resulting in a negative impact on TFP. [13] The negative correlation between average TFP growth rates over the period 1994-2007 and the corporate tax rate in 1994 seem to support this hypothesis (Graph I.10).

Graph I.10: **Effective average tax rates (1)**




(1) Effective average tax rates are calculated in line with Devereux, M.P. and R. Griffith (2003), 'Evaluating tax policy for location decisions', International Tax and Public Finance, Vol. 10, pp. 107-126.
***Source:*** DG ECFIN based on Elschner, C. and M. Overesch (2007), 'Trends in corporate tax levels in Europe', Intereconomics, Vol. 42(3), pp. 127-132.

## I.4. Empirical evidence of the drivers of TFP

*In brief: this section presents panel regression results based on an endogenous growth model. The findings show that TFP growth over 1994-2007 was mainly driven by the convergence and spillover channel as well as spending for innovation activities. For euro area catching-up countries, policy measures that reduce employment protection legislation, lower corporate tax rates and improve government effectiveness seem to have the most beneficial impact on TFP growth.*

The aim of this section is to analyse the main drivers of TFP using a panel data approach. The identification of key determinants of TFP is challenging, since TFP is hard to measure and it can be affected by a broad set of factors shaping the institutional and economic features of the economy.

The empirical approach investigates TFP performance in OECD economies, thereby excluding emerging countries. Relying solely on country-specific information may, however, lead to biased results due to the small sample size. Therefore, the analysis benefits from the sector-specific information of the EU KLEMS database. One major drawback of this approach, however, is that EU KLEMS only offers data until 2007. Against this background, the drivers of TFP are analysed using a sample of up to 20 OECD countries and 14 sectors over the time period 1994 to 2007.

(12) Bertola, G. (2013), 'Policy coordination, convergence and the rise and crisis of EMU imbalances', 'The future of EMU' Fellowship, *ECFIN Economic Paper* 490; Acemoglu, D., Johnson, S. and J. Robinson (2001), 'The colonial origins of comparative development: an empirical investigation', *American Economic Review*, Vol. 91(1), pp. 1369-1401.

(13) Vartia, L. (2008), 'How do taxes affect investment and productivity? An industry-level analysis of OECD countries', *OECD Economics Department Working Papers*, No 656.

The dependent variable is defined as total factor productivity growth in line with the growth accounting methodology of EU KLEMS (see Section I.2.). The selection of potential explanatory factors with a causal impact on TFP was made based on the key explanatory variables presented in Section I.3.

Two independent variables are of particular importance. First, the technology gap, which measures the distance between the TFP level of the country concerned and the country with the highest TFP level. This variable provides an indication of the impact from the convergence channel. It is expected that with a larger technology gap the potential benefit of adopting new technologies increases, resulting in a higher TFP growth rate. Second, the possibility of positive innovation and knowledge spillovers is captured by including the TFP growth rate of the country with the highest TFP level (the technology leader). This variable measures the importance of the spillover channel. Apart from these explanatory variables, the specification includes a large set of control factors in line with Section I.3., such as the impact of ICT compensation, R&D expenditure, the share of high-skilled population, as well as country-, sector- and time-fixed effects (see Box I.1 for more detailed results).

The findings of a first set of (restricted) empirical regressions [14] show that convergence and spillover effects are important factors in explaining TFP growth. Both variables appear to be strongly significant. The larger the distance to the frontier, the more sizeable the positive impact from the convergence channel on TFP gets. At the same time, an increase of the spillover effect as realised by the TFP growth of the technology leader, results in a higher TFP growth rate. The empirical findings suggest that the impact from the spillover channel is stronger than the impact from the convergence channel.. The results also reveal that the strength of the spillover channel seems to have increased over time, while that of the convergence channel has weakened.

Apart from the convergence and spillover channels, TFP growth appears to be strongly supported by innovation activities as captured by the share of ICT compensation in total compensation and R&D expenditure. By contrast, labour skills, as measured by the share of population aged 25 and over who have completed tertiary education, turns out not to be significant. This finding indicates that the correction of TFP done in EU KLEMS for changes in the quality of input factors (see Section I.2.) appears to be successful for labour but not completely so for capital input factors.

There is no clear evidence that other structural variables have a direct significant impact on TFP growth. However, it is possible that the impact of other potential factors could depend on the state of the convergence or spillover channel. For instance, certain structural variables may only be significant for more (or less) advanced countries, i.e. those with a small (or high) gap to the technology frontier.

To investigate these conditional effects, another set of regressions was run to estimate a set of interaction models. In these regressions, the technology gap and the spillover term are interacted with the structural drivers related to the framework conditions presented in Section I.3. These indicators capture different policy areas that are proxied by five variables, namely *labour market flexibility* (employment protection legislation), *tax regimes* (effective average tax rates), *institutional quality* (government effectiveness), *population ageing* (old age dependency ratio) and *product market regulations* (OECD regimpact indicator)

The results of these interaction models show that the effect of the structural variables on TFP growth is dependent on the technology gap. More rigid employment protection legislation tends to have a negative impact on TFP growth. The negative impact becomes stronger the less advanced the economy is. The impact on TFP growth is, however, not statistically significant for the least advanced economies, i.e. those which have a very high technology gap. An increase in corporate tax rates and ageing population seem to have a particularly detrimental impact on TFP in less advanced economies. Improving government effectiveness tends to have a positive and significant impact on TFP growth for medium- and more advanced economies. Finally, the results do not suggest a statistically significant impact of product market regulation.

[14] As a starting point, TFP growth was regressed on the technology gap and the spillover channel apart from country-, sector- and time-fixed effects, thereby omitting further control variables.

## *Box I.1:* The drivers of TFP – an empirical assessment

This box provides empirical evidence on the main drivers of total factor productivity (TFP). The empirical identification of the most important explanatory factors of TFP is challenging, since TFP cannot be observed directly and a wide range of indicators influencing the institutional and economic features of the economy can impact TFP.

### Empirical specification

The drivers of the TFP growth rates ($\hat{TFP}_{i,j,t}$) are analysed with the help of a panel data approach. To mitigate the risk of a small sample bias, the analysis is not limited to euro area Member States, but based on a sample covering up to 20 OECD countries ($i$), 14 sectors ($j$) over the time period ($t$) 1994 to 2007. ([1]) The basic specification follows Mc Morrow et al. (2010) ([2]) and looks as follows:

$$\text{(i)}\quad \hat{TFP}_{i,j,t} = \beta_0 + \beta_1 GAP_{i,j,t-1} + \beta_2 \hat{TFP}_{L,j,t} + \beta_4 D_i + \beta_5 D_j + \beta_6 D_t + \varepsilon_{i,j,t}$$

$$\text{(ii)}\quad \hat{TFP}_{i,j,t} = \beta_0 + \beta_1 GAP_{i,j,t-1} + \beta_2 \hat{TFP}_{L,j,t} + \beta_3 X_{i,j,t-1} + \beta_4 D_i + \beta_5 D_j + \beta_6 D_t + \varepsilon_{i,j,t}$$

$$\text{(iii)}\quad \hat{TFP}_{i,j,t} = \beta_0 + \beta_1 GAP_{i,j,t-1} + \beta_2 \hat{TFP}_{L,j,t} + \beta_3 Z_{i,t-1} + \beta_4 GAP_{i,j,t-1} Z_{i,t-1} + \beta_5 \hat{TFP}_{L,j,t} Z_{i,t-1} + \ldots + \ldots + \beta_6 X_{i,j,t-1} + \beta_7 D_i + \beta_8 D_j + \beta_9 D_t + \varepsilon_{i,j,t}$$

As a starting point the TFP growth rates are regressed on two main independent variables (see equation (i)). The technology gap (GAP) indicates the impact from the catching-up process on TFP growth. GAP measures the log-difference between the TFP level of the country concerned and the country with the highest TFP level in year $t$ and sector $j$ ($(ln(TFP_{i,j,t-1}) - ln(TFP_{L,j,t-1}))$. The technology gap equals zero for the leading economy and it takes negative values for the economies with a gap. It is expected that a larger technology gap with the leading economy implies a higher potential benefit from adopting advanced technologies, thus increasing TFP growth. In addition, the possibility of positive innovation and knowledge spillovers is captured by including the TFP growth rate of the economy with the highest TFP level ($\hat{TFP}_{L,j,t}$) in the sector and for the year considered. The specification also incorporates country, sector and time-fixed effects ($D_i$, $D_j$, $D_t$) apart from an error term ($\varepsilon_{i,j,t}$).

As a second step, further control variables with a potential impact on TFP growth are added to the specification with the matrix $X$ (see equation (ii)). The selection of these variables was guided by a review of the literature (see section I.3. in the main text). Since the impact of these variables tends to occur only gradually, they are included with a lag of one year.

In the final step, the empirical model is augmented with interaction terms in order to investigate whether the impact of the independent variables occurs conditional on the level of convergence or the growth rate of the frontier economy. For this purpose, the proxies influencing the institutional and economic features of the economy ($Z_{i,t-1}$) are interacted with the technology gap and the TFP growth rate of the leading economy (see equation (iii)). This approach has the advantage of alleviating potential multicollinearity between the TFP variables and the interaction term.

---

([1]) The sample size is clearly constraint by data availability. It consists of the following sectors (*sector codes in parenthesis*): food, beverages and tobacco (*15-16*), pulp, paper, printing and publishing (*21-22*), machinery (*29*), electrical and optical equipment (*30-33*), manufacturing (*36-37*), electricity, gas and water supply (*E*), construction (*F*), wholesale and retail trade (*G*), hotels and restaurants (H), transport and storage (*60-63*), financial intermediation (*J*), real estate activities (*70*) and renting of machinery and equipment and other business activities (*71-74*) and other community, social and personal services (*O*) for a panel consisting of Australia, Austria, Belgium, Czech Republic, Denmark, Spain, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Slovenia, Sweden, the United Kingdom and USA. The period covered reflects the fact that the second stage of EMU integration started on 1 January 1994 with the establishment of the European Monetary Institute (EMI). Note that the panel is unbalanced, since not all variables are available over the entire sample period.

([2]) For a similar specification see Mc Morrow, K., Röger, W. and A. Turrini (2010), 'Determinants of TFP growth: A close look at industries driving the EU-US TFP gap', *Structural Change and Economic Dynamics*, Vol. 21(3), August, pp. 165-180.

*(Continued on the next page)*

*Box (continued)*

### Data

The main source for the TFP-related indicators is the March 2011 update of the EU KLEMS database, which offers the great benefit of sectoral level data (see section I.2. of the main text for a more detailed description). ([3]) Apart from the technology gap and spillover indicator taken from the EU KLEMS database, the following explanatory variables are analysed in the regression framework: high-skilled as measured by the share of population aged 25 and over with a completed tertiary education (Barro and Lee, 2013), share of labour compensation for ICT-related services as a percentage of total labour compensation (EU KLEMS), corporate income tax rates (Elschner and Overesch, 2007), strictness of employment protection legislation (OECD), strictness of product market regulation (OECD), old age dependency ratio (OECD), R&D expenditure as a percentage of GDP (OECD) and government effectiveness as measured by the World Bank Governance Indicators dataset. ([4])

The interaction terms are constructed for five different policy areas shaping the institutional and structural framework conditions, in which the economy operates. The following proxies are used: the employment protection indicator (as a measure of *labour market flexibility*), the corporate income tax rate (*tax regime*), the government effectiveness (*institutional quality*), the old age dependency ratio (*ageing societies*) and the regimpact indicator by the OECD (*product market flexibility*). To allow for a better interpretation of the results, all variables are centred around a zero mean.

### Results

*Restricted specification*

In the first step, the TFP growth rates are regressed for different sample periods in a restricted specification consisting, apart from the fixed effects, of the technology gap and spillover term (see equation (i) and Table 1). The technology gap turns out to have a negative and significant impact on TFP growth throughout the specifications used. Since the technology gap is defined on a scale from zero for the leading economy to negative values for the catching-up countries, the negative signs of the coefficients imply that a larger technology gap enables higher potential gains for adopting enhanced technologies, thereby increasing TFP growth. The spillover channel as realised by the TFP growth of the leading economy, appears to have a positive and significant influence on TFP growth, irrespective of which sample period is analysed. The country, sector and time-fixed effects seem to be highly significant.

**Table 1**: Restricted specifications

| | 1980-07 | 1985-07 | 1990-07 | 1980-93 | 1985-93 | 1994-07 |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| TFP growth (L,j,t) | 0.0500*** | 0.0513*** | 0.0485*** | 0.0225** | 0.0125 | 0.0605*** |
| | (4.633) | (4.442) | (4.054) | (2.000) | (0.976) | (3.505) |
| GAP (i,j,t-1) | -0.0101*** | -0.00961*** | -0.00908*** | -0.0191*** | -0.0193*** | -0.00690*** |
| | (-5.434) | (-4.745) | (-3.990) | (-5.975) | (-4.808) | (-2.802) |
| Constant | -0.0125 | 0.00175 | 0.00570 | -0.00514 | 0.0313* | -0.00769 |
| | (-1.271) | (0.327) | (0.581) | (-0.532) | (1.646) | (-1.101) |
| Observations | 6599 | 5819 | 4904 | 2520 | 1740 | 4079 |
| R-squared | 0.108 | 0.111 | 0.107 | 0.120 | 0.129 | 0.118 |

*Notes*: The specifications include country, sector and time fixed effects, which are not shown due to space constraints. Wald test provide strong evidence that the fixed effects are statistically significant. t-statistics in parenthesis are derived using the heteroskedasticity robust Huber-White estimator (LSDV). ***, ** and * denote respectively statistical significance at 1, 5 and 10%.

([3]) The methodology and construction of the EU KLEMS database is described in: O'Mahony, M. and M.P. Timmer (2009), `Output, input and productivity measures at the industry level: the EU KLEMS database', *Economic Journal*, Vol. 119(538), pp. F374-F403. For more details on the database see: Timmer, M.P., Inklaar, R., O'Mahony, M. and B. van Ark (2013), `Economic growth in Europe. A comparative industry perspective', *Cambridge University Press*, January.

([4]) Barro, R. and J.-W. Lee (2013), `A new data set of educational attainment in the world, 1950-2010', forthcoming: *Journal of Development Economics*; Devereux, M.P. and R. Griffith (2003), `Evaluating tax policy for location decisions', *International Tax and Public Finance*, Vol. 10, pp. 107-126; Elschner, C. and M. Overesch (2007), `Trends in corporate tax levels in Europe', *Intereconomics*, Vol. 42(3), pp. 127-132.

*(Continued on the next page)*

*Box (continued)*

A closer look at the size of the coefficients reveals that the size of the spillover channel seems to have increased over time, while that of the convergence channel appears to have weakened significantly and loses significance after the mid/end-1990s. ([4]) Moreover, the findings suggest that the further the distance to the frontier, the more sizeable the coefficient of a marginal increase of the gap on TFP growth.

*Benchmark specifications*

In a second step, the reduced form specification is augmented by adding further explanatory variables in line with the literature review (see equation (ii) and Table 2). These benchmark specifications broadly confirm the results of the literature. TFP growth seems to be strongly supported by innovation activities in the form of ICT compensation and R&D expenditure, while the proxy for human capital is not statistically significant. This indicates that the EU KLEMS correction of TFP for labour and capital inputs reported above appears to be only successful for changes of labour inputs, while it may not be the case for ICT and R&D expenditure. In addition, the results show that the significance level of the technology gap is reduced compared to the results reported above (see columns (2)-(4)).

**Table 2**: Benchmark specifications

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| TFP growth (L,j,t) | 0.0605*** | 0.0616*** | 0.0639*** | 0.0832*** |
| | (3.505) | (3.354) | (3.272) | (3.288) |
| GAP (i,j,t-1) | -0.00690*** | -0.00497* | -0.00576** | -0.00432 |
| | (-2.802) | (-1.883) | (-2.142) | (-0.885) |
| ICT compensation (i,j,t-1) | | 0.0189** | | 0.0331* |
| | | (2.169) | | (1.829) |
| High-skilled (j,t-1) | | | -0.00104 | |
| | | | (-0.698) | |
| R&D (i,j,t-1) | | | | 0.165*** |
| | | | | (2.912) |
| Constant | -0.00769 | 0.0411*** | 0.000915 | 0.0241* |
| | (-1.101) | (5.204) | (0.0749) | (1.847) |
| Observations | 4079 | 3690 | 3480 | 1298 |
| R-squared | 0.118 | 0.117 | 0.112 | 0.145 |

Note: Sample period 1994 to 2007. The specifications include country, sector and time fixed effects, which are not shown due to space constraints. Wald test provide strong evidence that the fixed effects are statistically significant. t-statistics in parenthesis are derived using the heteroskedasticity robust Huber-White estimator (LSDV). ***, ** and * denote respectively statistical significance at 1, 5 and 10%.

*Specifications with interactions*

In the final step, the regressions are run including interaction terms. The interpretation of the empirical model is then less straightforward. The impact of a change of the structural variable of interest ($Z$) on TFP growth needs to be assessed based on the partial derivative derived from equation (iii), i.e.:

$$\text{(iv)} \quad \frac{\delta TFP}{\delta Z} = \beta_3 + \beta_4 GAP_{i,j,t-1} + \beta_5 \hat{TFP}_{L,j,t}$$

Equation (iv) clarifies that the impact from a marginal increase of the structural variable can only be evaluated conditional on the technology gap and the TFP growth of the leading economy.

For instance, in a specification which incorporates the employment protection indicator interacted with both the technology gap and the spillover variable, the size and significance of an increase of the employment protection indicator on TFP growth needs to be evaluated conditional on the technology gap and the spillover variable. ([1]) Since the latter are centred around a mean of zero, the coefficient of the employment protection indicator reported in an ordinary regression output table indicates how a marginal change of the EPL would affect TFP growth given the technology gap and the TFP growth of the frontier economy are at its sample mean, i.e. zero.

([3]) For the interpretation of interaction models see, among others, Brambor, T., Clark, W.R. and M. Golder (2006), 'Understanding interaction models. Improving empirical analyses', *Political Analysis*, Vol. 14, pp. 63-82 or Braumoeller, B.F. (2004), 'Hypothesis testing and multiplicative interaction terms', *International Organization*, Vol. 58(fall), pp. 807-820.

*(Continued on the next page)*

*Box (continued)*

However, it may be meaningful to analyse the size and significance of the employment protection legislation for different values of the technology gap, assuming an average growth rate of the leading economy. For this purpose, the marginal effects of the employment protection legislation are plotted for the whole range of observed values of the technology gap. In addition, confidence bands indicate the level of uncertainty regarding the marginal effects by plotting the lower and upper bound of the 95% confidence intervals. The effects are statistically significant whenever the upper and lower bounds of the confidence interval are both above the zero line and when both bounds are below the zero line.

Graph 1 illustrates the effects of an increase of different structural variables on TFP growth conditional on the observed values of the technology gap for an average growth rate of the leading economy. (5)

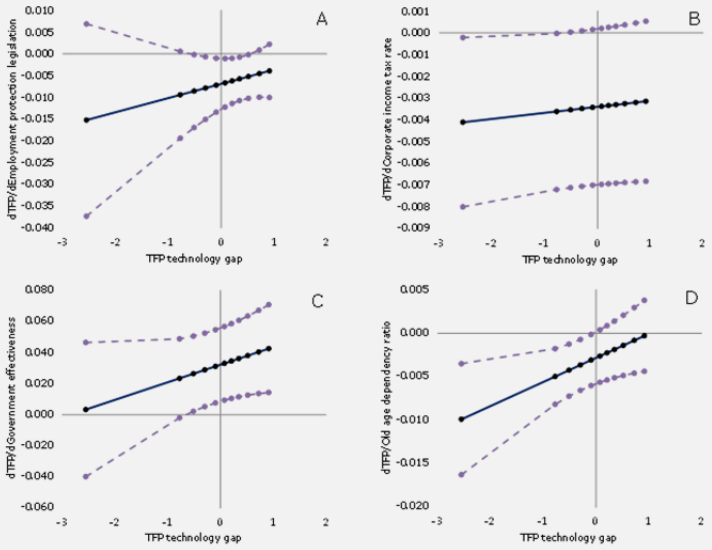
Graph 1A shows that a marginal increase of the employment protection legislation on TFP growth is associated with a negative impact on TFP growth. The positive slope of the regression line can be interpreted to mean that the negative impact from stricter employment protection legislation weakens with smaller values of the technology gap. The confidence bands show that the impact is statistically significant for the overwhelming part of the values for the technology gap.

An increase of the corporate income tax rate appears to have a negative effect on TFP growth (Graph 1B). However, its impact is only statistically significant for economies that are located further away from the economic frontier, i.e. those that are more technologically backwards. As a consequence, the tax regime seems to play an important role in explaining TFP growth for less advanced economies.

The empirical findings provide evidence that the institutional quality seems to matter for TFP growth (Graph 1C). Improving the effectiveness of governments has a positive effect on TFP growth. This effect is significant for a large part of the sample and becomes stronger the closer the economy gets to the frontier as shown by the positive slope of the regression line.

Population ageing also seems to be detrimental to TFP growth. The impact tends to be strongest and statistically significant for less advanced economies (Graph 1D). Finally, the panel results do not provide evidence for a statistically significant causal relationship between product market regulation and TFP growth.

**Graph 1**: Marginal effects of structural variables on TFP growth conditional on the technology gap (assuming the TFP growth rate of the frontier is at its mean)




Graph 2 illustrates the findings of a marginal change of the same structural variables on TFP growth conditional on the observed values of the TFP growth rates of the countries with the highest TFP level, assuming the technology gap to be at its mean. (6)

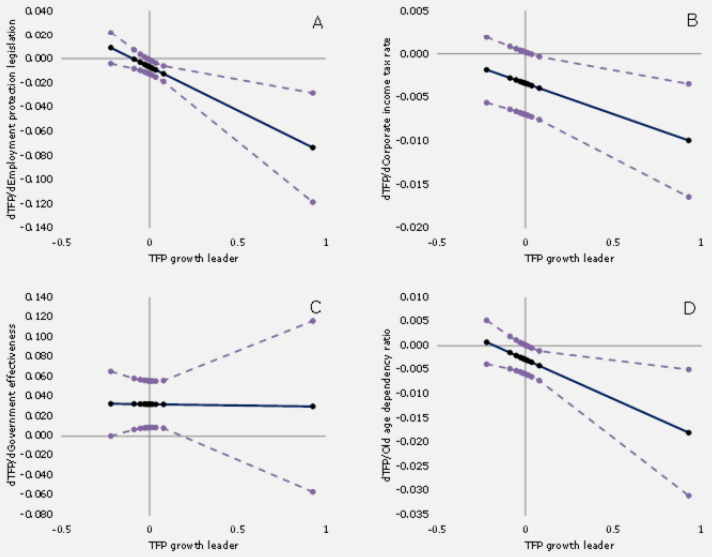
*(Continued on the next page)*

*Box (continued)*

The findings suggest that employment protection legislation, corporate income tax and the effect of an ageing society are particularly important for economies at the frontier with high TFP growth rates. Graphs 2A, 2B and 2D show that an increase in these variables has a negative impact on TFP growth rates. This effect is only statistically significant for high TFP growth rates and it becomes stronger the higher the TFP growth rate of the leader. Since sectors closely related to ICT appear to show the highest growth rates over the sample period, the findings implicitly suggest that these sectors tend to react strongest to changes in labour market flexibility, tax regimes and population ageing.

The effect from improving the effectiveness of governments, by contrast, seems to be of particular importance for sectors with a lower TFP growth rate, as illustrated by the slightly negative slope of the regression line (Graph 2C). A more effective government, however, tends to be beneficial and statistically significant for TFP growth for a large part of the sectors examined. Finally, the empirical model indicates that product market regulation does not seem to effect TFP growth no matter the TFP growth rate of the leading economy.

**Graph 2**: Marginal effects of structural variables on TFP growth conditional on the TFP growth of the frontier (assuming the technology gap is at its mean)




The interaction models reveal that the impact of the structural variables also seems to be conditional on the spillover channel, i.e. the growth rates of the economies with the highest TFP level. Stricter employment protection legislation, an increase of the corporate income tax rate, or a higher old age dependency ratio, all have a detrimental impact on TFP growth when the TFP growth rate of the technology leader is high. Since sectors closely related to ICT appear to show the highest growth rates over the sample period, the findings implicitly suggest that these sectors tend to react strongest to changes in labour market flexibility, tax regimes and population ageing. The effect from improving the effectiveness of governments, by contrast, seems to be of great importance for all sectors. Finally, product market regulation does not seem to matter for TFP growth, irrespective of the growth rate of the leading economy.

Applying the findings of the panel regressions conducted for up to 20 economies to the euro area economies allows for the following tentative conclusions:

- The TFP divergence between euro area catching-up economies relative to the rest of the euro area in the decade preceding the global financial and economic crisis can be partly explained by the following indicators: a weakening of the convergence channel, lower spending on innovation activities such as R&D and ICT, deteriorating government effectiveness and faster population ageing.

- Looking forward, policy measures that foster innovation activities, reduce the restrictiveness of employment protection legislation, lower corporate tax rates and improve government effectiveness could help promote TFP growth in the euro area catching-up economies.

- It is worth stressing that, according to the regression results, employment protection legislation has not contributed to the TFP divergence process, since euro area catching-up economies did not fall behind the rest of the euro area in this respect between 1994 and 2007. Similarly, corporate tax policy does not seem to have been a source of divergence over that period. Nevertheless, the regression results also indicate that policy action in those two areas could improve TFP growth in the catching-up countries as well as in the rest of the euro area.

## I.5. Conclusions

The TFP income convergence process in the euro area weakened in the decade preceding the economic and financial crisis, mainly due to weak TFP growth in catching-up economies. In fact, the gap between euro area catching-up economies and technological leaders actually widened in a broad range of sectors.

The persistence of the technology gap since the mid-1990s suggests that the causes are deep-rooted and at least partly structural. The econometric analysis presented in this focus section shows that the TFP divergence between euro area catching-up economies and the rest of the euro area can be partly explained by the following indicators: a weakening of the convergence channel, lower spending on innovation activities such as R&D and ICT, deteriorating government effectiveness and faster population ageing.

In response to the crisis, catching-up countries have put in place a broad range of reforms aimed at improving framework conditions, labour market flexibility and the efficiency of the business environment. These are likely to raise TFP growth rates in the years to come.

However, since catching-up is shown to be more difficult for economies approaching the technological frontier, the adoption of further structural measures would also help more advanced countries accelerate their TFP convergence. In particular, measures that foster innovation activities, reduce further the restrictiveness of employment protection legislation, lower corporate tax rates and improve government effectiveness appear to be the most effective at promoting TFP growth.

# II. Special topics on the euro area economy

## II.1. New estimates of Phillips curves and structural unemployment in the euro area ([15])

*The Phillips curve can be used to estimate the non-cyclical part of unemployment. In such models, this estimate is commonly referred to as the 'non-accelerating wage rate of unemployment' (NAWRU).([16]) The Phillips curve can be specified in various ways, reflecting different assumptions regarding the formation of expectations. DG ECFIN has recently extended its framework to cover rational expectations. This section looks at the sensitivity of the results to alternative expectation assumptions, reporting NAWRU estimates based on Phillips curves produced using rational expectations and those (as used to date) allowing only for static or adaptive expectations.*

*Our findings show that, for the euro area as a whole, the alternative expectation assumptions yield similar NAWRU estimates. In particular, the NAWRU appears to have increased recently, suggesting a deterioration of labour market performance beyond what could be considered merely cyclical. For Spain, however, the results vary more depending on the assumptions used. The Phillips curve based on rational expectations points to a more moderate NAWRU increase than that used by DG ECFIN to date. However, all estimates point to a substantial post-crisis increase in the NAWRU for Spain.*

*In interpreting the rise in the NAWRU, it is important to bear in mind that both structural and non-structural factors are driving developments. Analysis shows that, in the presence of rigidities, crisis-related events can have temporary but long-lasting effects on labour market performance. Structural factors can play a role too, as illustrated by the steady decline in the NAWRU in Germany, which appears to be related to structural effects brought about by the Hartz reforms.*

---

### Introduction

Unemployment rates increased sharply in the euro area in the wake of the crisis and the surge has proved particularly persistent. Assessing this development is of paramount importance to policy-makers' efforts to find adequate responses to the effects of the crisis.

The non-cyclical part of unemployment play a key role in this assessment, as it identifies the proportion of the deterioration that is likely to last beyond the business cycle. In the EU context, this indicator is particularly important as it is a factor to be fed into the potential output calculations used to compute cyclically-adjusted fiscal figures, important benchmarks for country surveillance under the EU's fiscal framework.([17])

The non-cyclical part of unemployment is not an observable variable, however, and has to be estimated, which means that it is subject to uncertainty. In part, the uncertainty stems from the fact that different estimation models are available. The Phillips curve is commonly used as a key element in estimation models,([18]) but can itself be specified in various ways, most notably reflecting alternative assumptions as to the formation of expectations.([19])

This section sets out DG ECFIN's approach to estimating the non-cyclical part of unemployment, in particular in its use of the Phillips curve. We also investigate the sensitivity of the results to alternative expectation assumptions, highlighting the results obtained for the case of rational expectations, the case recently incorporated in DG ECFIN's estimation framework.

The results presented here focus on the euro area, but results are also reported for Spain and Germany, two countries that have witnessed starkly different non-cyclical unemployment developments

([15]) Section prepared by Fabrice Orlandi.

([16]) The Phillips curve features a relationship between the unemployment gap and an inflation or labour-cost variable. In the case of the former, the non-cyclical unemployment estimate obtained is usually referred to as the 'non-accelerating inflation rate of unemployment' (NAIRU), while with the latter it is referred to as the 'non-accelerating wage rate of unemployment' (NAWRU).

([17]) For details on the EU's SGP framework, see *Vademecum on the Stability and Growth Pact*, European Economy — Occasional Paper, No 151, DG ECFIN, European Commission, May 2013.

([18]) For an illustration of structural unemployment analysis based on an alternative concept, see e.g. *Unemployment dynamics during recessions and recoveries: Okun's law and beyond*, IMF WEO, April 2010.

([19]) For details on the Phillips curve, see Fuhrer J., Y.K. Kodrzycki, G.P. Olivei and J. Sneddon Little, *Understanding inflation and the implication for monetary policy — a Phillips curve retrospective*, MIT Press, 2009.

in the recent past. We use long time series, usually starting in 1965, to capture medium-term cycles. The latest DG ECFIN forecasts are also included in the dataset.

### Alternative NAWRU models

Non-cyclical unemployment is estimated on the basis of models that pin-down its statistical and economic properties. DG ECFIN's approach relies on an 'unobserved component' model, which features a Phillips curve. The curve links cyclical unemployment (i.e. the unemployment gap) to labour cost developments, while non-cyclical unemployment is assumed not to be affected by labour cost developments. In this setting, non-cyclical unemployment estimates are commonly referred to as the 'non-accelerating wage rate of unemployment' (NAWRU).([20])

The specification of the Phillips curve reflects particular assumptions made regarding inflation expectations. In the past, DG ECFIN's considered only static and adaptive expectations. More recently, the case of rational expectations has been added, providing a more comprehensive framework (see Box II.1.1).

More specifically, the so-called traditional Keynesian Phillips (TKP) curve based on static or adaptive expectation assumptions a positive unemployment gap $(u_t - u_t^*)$ with a fall in the *change of the growth rate of nominal* unit labour cost $(\Delta^2 nulc_t)$ *(and* vice versa):

$$\Delta^2 nulc_t = -\beta(u_t - u_t^*)$$

The new Keynesian Phillips (NKP) curve based on rational expectations implies that a positive unemployment gap $(u_t - u_t^*)$ is associated with a fall in the *growth rate of real* unit labour cost $(\Delta rulc_t)$. Lagged effects are also relevant because some wage-setters may use *ad hoc* rules and not fully optimise:

$$\Delta rulc_t = \delta \Delta rulc_{t-1} - \beta_1(u_t - u_t^*) + \beta_2(u_{t-1} - u_{t-1}^*)$$

These alternative Phillips curves thus rely on different labour cost indicators to determine the unemployment gap (and thus also the NAWRU), namely $\Delta^2 nulc_t$ *and* $\Delta rulc_t$. As explained in Box II.1.1, this does not mean that the models are fundamentally different. Instead, it illustrates the impact of assumptions as to expectation formation on the specification of the Phillips curve.

### NAWRU developments

For the euro area as a whole, NAWRU estimates based on the TKP and the NKP show a similar pattern (see Graph II.1.1).([21]) The similarity suggests that, for most countries in the euro area, results are not overly sensitive to the specification of the Phillips curve (i.e. to assumptions as regards expectation formation). In practice, it also suggests that alternative labour cost indicators (i.e. change in unit labour cost (ULC) growth and real unit labour cost (RULC) growth) underwent broadly similar developments in the euro area; this is confirmed by the top chart in Graph II.1.2.

Graph II.1.1 shows that non-cyclical unemployment in the euro area posted a steady increase up to the mid-90s, followed by an improvement that was then halted by the recent crisis. The recent rise in the NAWRU suggests that the increases in unemployment seen in the aftermath of the crisis are, to some extent, likely to last beyond the cyclical upturn.

Graph II.1.1 also shows NAWRU developments for Spain and Germany, illustrating the diversity within the euro area. Spain has witnessed developments that have been similar to, though more dramatic than, those in the euro area as a whole. Germany posted a starkly different profile, with its NAWRU falling steadily (from 2002 according to the NKP or 2004 according to the TKP).

As regards sensitivity, the NAWRU estimates for Spain vary considerably depending on the specification. With the NKP, the recent increase is more moderate, with the NAWRU reaching 22.0 % by 2015, while the estimated level with the TKP is 26.4 %. Recent results for Germany are less sensitive to assumptions regarding expectations,

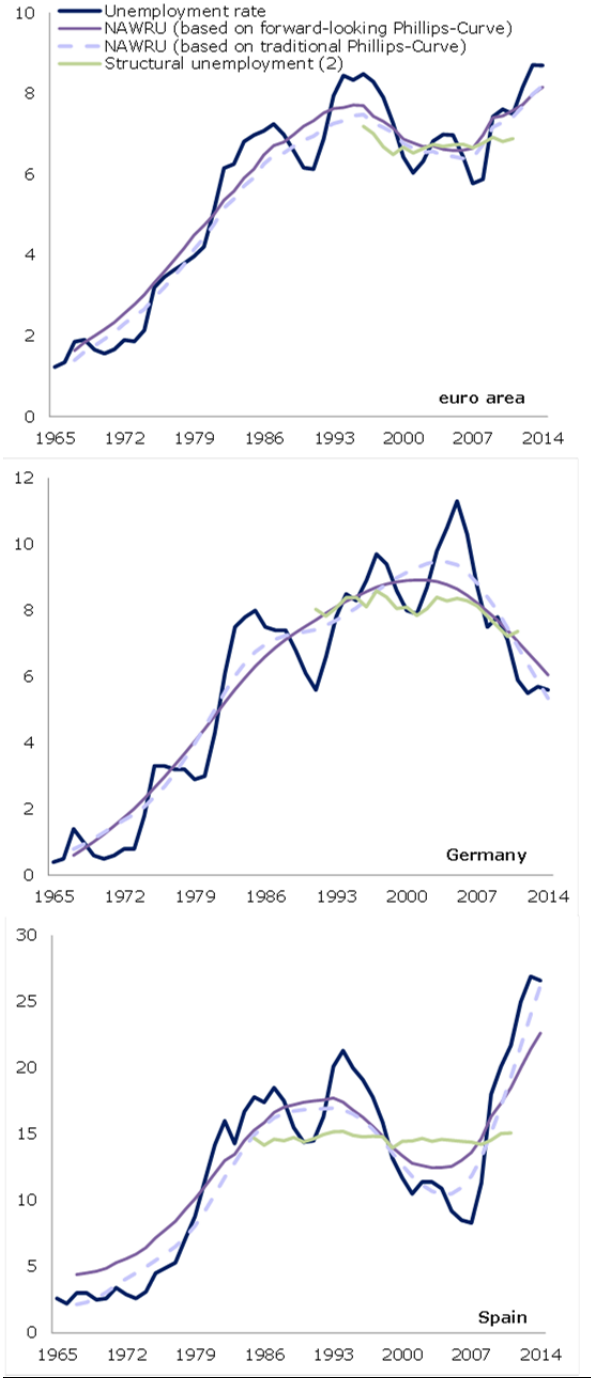
([20]) For further details on the DG ECFIN approach see D'Auria, F., C. Denis, K. Havik, K. Mc Morrow, C. Planas, R. Raciborski, W. Röger and A. Rossi (2010), *The production function methodology for calculating potential growth rates and output gaps*, European Economy — Economic Paper, No 420, DG ECFIN, European Commission, July 2010.

([21]) NAWRUs referred to in this section are those computed for the Commission's 2014 winter forecast. Latest available NAWRUs can be downloaded from the AMECO database: http://ec.europa.eu/economy_finance/ameco.

with the two Phillips curve specifications producing similar NAWRUs. However, around 2005, some difference across the two specifications is observed for Germany, with the NKP producing a relatively less volatile NAWRU. Given that the current NAWRU estimates for Germany, based on the TKP and NKP specifications, do not diverge greatly and taking into account the stability considerations in moving to a new specification, Germany continues to use the TKP specification.

Graph II.1.1: **Alternative NAWRU estimates, euro area, Germany and Spain (1)**

*(1965-2015, in %)*




(1)GDP weighted average of euro-area countries for which alternative NAWRUs have been computed (i.e. AT, BE, DE, EL, ES, FI, FR, IE, IT, NL and PT). For AT, both NAWRUs are based on the backward-looking model, as the forward-looking model yields econometrically unsatisfactory results.
(2)Component of the NAWRU explained only by structural determinants (see Orlandi (2012), op. cit.).
***Source:*** DG ECFIN calculations based on Eurostat data.

NAWRU differences for Spain depending on the curve specification stem from corresponding differences between the labour cost indicators used. Graph II.1.2 shows that recently RULC growth posted greater and more persistent moderation in Spain than change in nominal ULC growth. For Germany, the indicators have followed more similar paths, over recent years (as they have in the euro area as a whole). More fundamentally, in times of heightened economic volatility and/or big labour market adjustments (e.g. recent crisis, Hartz reforms), the TKP model is likely to yield NAWRUs that are more pro-cyclical, as it does not take full account of the price rigidities that play an important role in the adjustment process of the labour market. These rigidities are better reflected in the NKP model.

To sum up, except in the case of Spain, recent NAWRU estimates for the euro area do not appear to be sensitive to assumptions as regards expectations, with alternative Phillips curve specifications yielding similar results. Overall, results point to a recent increase in the NAWRU across the euro area, with the notable exception of Germany. A rise in the NAWRU points to persistent deterioration in labour market performance. Identifying the causes of the deterioration calls for cautious interpretation, however.

## NAWRU versus Structural Unemployment

Understanding the sharp and protracted rise in unemployment in the wake of the crisis is of paramount importance from a policy perspective. What caused the rise? Is it a sign of structural deterioration? Or is it purely cyclical, reflecting the prolonged slowdown? These questions are the subject of lively debate, with views ranging from 'it's all demand'([22]) to 'it's all/mostly structural'.([23])

([22]) See e.g. Krugman, P. (2010), *Debunking the structural unemployment myth*, New York Times, 28 September 2010.

## *Box II.1.1:* **Alternative specifications for the Phillips curve**

A decomposition of unemployment changes into cyclical and trend components must rely on the statistical properties of the time series and information provided by economic theory. The Phillips curve provides the latter, since it postulates a negative relationship between cyclical unemployment and the expected growth rate of real unit labour costs:

$$\Delta rulc_t^e = -\lambda(u_t - u_t^*) \qquad (1)$$

The way expectations are formed needs to be specified to obtain a relationship that can be used for practical purposes. Alternative Phillips curve specifications differ in the way they model such expectations. In early work, the so-called traditional Keynesian Phillips (TKP) curve generally assumed no uncertainty about productivity growth and static or adaptive inflation expectations. Also, it was commonly assumed that workers use lagged nominal unit labour cost growth to forecast inflation. This set up yields the standard 'accelerationist' form of the Phillips curve, linking the unemployment gap inversely to the change in the growth rate of nominal unit labour costs:

$$\Delta^2 nulc_t = -\lambda(u_t - u_t^*) \qquad (2)$$

Allowing for adaptive expectations, the Phillips curve can be formulated with more lags and other exogenous variables (in particular, labour productivity growth $\Delta yl$). Also, uncertainty as to whether wage-setters are targeting consumer price inflation or the GDP deflator can be addressed by adding a 'terms of trade' ($tot$) indicator, resulting in the following more general specification (hitherto used by DG ECFIN):

$$\Delta^2 nulc_t = \sum_i \rho_i \Delta yl_{t-i} + \sum_i \omega_i \Delta tot_{t-i} - \sum_i \lambda_i (u_{t-i} - u_{t-i}^*) \qquad (3)$$

In recent years, the New Keynesian Phillips (NKP) curve has been introduced in the macroeconomic literature. It differs from the TKP, essentially, in the way expectations are formed. Rational expectations and somewhat different assumptions regarding the information set available to wage-setters are introduced (i.e. different timing for wage-setting, relying on a beginning-of-period rather than a middle-of-period concept). While these assumptions imply a different specification, it is important to bear in mind that the NKP still represents an implementation of the same fundamental theoretical relationship shown in equation (1). Considering both the TKP and the NKP can thus be viewed as merely investigating alternative ways of implementing the Phillips curve approach. In particular, reporting results for both specifications provides a more encompassing approach as to how expectations are assumed to be formed in the economy.

The literature on NKP concedes that a purely forward-looking specification, as implied by rational expectations, is not realistic. Therefore, empirical applications often use a 'hybrid NKP', allowing for a combination of backward- and forward-looking behaviour. This produces the following specification, which DG ECFIN has recently incorporated into its framework for estimating NAWRU developments:

$$\Delta rulc_t = \beta(s\Delta rulc_{t+1}^e + (1-s) * rulc_{t-1}) - \lambda(u_t - u_t^*) \quad \text{with } \beta \leq 1 \text{ and } 0 \leq s \leq 1 \qquad (4)$$

The NKP assumes that wage-setters can use information from the current year and that wages are negotiated during the year. Therefore, unlike the TKP, it does not require expectations to be formed as to current real unit labour cost developments. Expectations as to future real unit labour cost growth, which appear in the NKP specification because wage contracts are assumed to span more than one period, are still needed, however, and these are computed on the basis of rational expectations.[2] Intuitively, the forward-looking (RULC) component reflects wage-setters' efforts (in a framework where wages are set in advance) to minimise the extent to which wages deviate from productivity and inflation developments in a framework where wages are set in advance.

Note that equation (4) can be used to stress the link between the TKP and the NKP. In particular, the TKP arises as a special case when s=0 (i.e. no forward-looking behaviour), β=1 (i.e. no positive rate of time preference) and the timing that holds under the TKP is reintroduced, i.e. wage-setters do not use all available

[2] See in particular Galí, J. (2011), *The return of the wage Phillips curve*, Journal of the European Economic Association, 9(3), pp. 436–461.

*(Continued on the next page)*

*Box (continued)*

information in the current period to form inflation expectations, relying instead on static (i.e. $\Delta p_t^e = \Delta p_{t-1}$) or adaptive expectations.

Overall, the TKP and NKP are thus based on identical concepts of the labour market, differing only in terms of underlying timing and expectation assumptions. As it can be difficult to map complex labour market dynamics to a particular set of assumptions, considering TKP and NKP specifications in parallel provide a useful framework for applying the Phillips curve approach.

In particular, changes in the NAWRU are sometimes interpreted as a sign of a structural change. Careful analysis of developments in the NAWRUs produced by DG ECFIN shows that they can be driven by both structural and non-structural factors.([24])

In particular, crisis-related shocks (e.g. unwinding of unsustainable developments), especially boom-bust episodes in the housing market that can trigger a lengthy process of deleveraging in the construction sector, have a statistically significant impact on the NAWRU. The real interest rate and Total Factor Productivity (TFP) growth, which controls more generally for the presence of such shocks, also play a part in driving NAWRU develpoments.

At a theoretical level, adding various rigidities (e.g. real wage rigidity, cyclical price mark-ups or sluggish adjustment of the reservation wage) to the traditional labour market model can be shown to yield a NAWRU that is not solely determined by structural factors.

Despite uncertainties, the NAWRU remains a useful policy indicator. It is a well-defined concept that provides useful information on the nature of unemployment rate developments. In particular, it identifies risks of persistent labour market deteriorations that may not always be caused by structural phenomena.([25])

In this context, it appears useful to distinguish between the NAWRU and a narrowly defined notion of structural unemployment affected only by structural factors, as shown in Graph II.1.1 by the 'structural unemployment' series. The latter represents the portion of the NAWRU that, according to econometric results, appears to be explained by structural features of the labour market. As can be seen, the series has remained broadly stable during the crisis. Except for a notable decline due to structural labour market reforms in Germany, change in the NAWRU in the euro area is not related to structural change. This is also the case in Spain, where structural unemployment has remained broadly stable.

Recent increases in the euro-area NAWRU should therefore not be interpreted as a sign of big structural change at the current juncture. Rather, in most countries, the increases reflect the effects of shocks that, in the presence of various rigidities, have a long-lasting impact on unemployment rates.

To sum up, the decline in the NAWRU at euro-area level and in countries like Spain in the run-up to the crisis appears mostly attributable to non-structural factors such as unsustainable developments in the housing sector. The build-up and subsequent unwinding of imbalances has caused large economic shocks (e.g. need for sectoral reallocation) which have a persistent effect on the performance of the labour market. However, in some countries, structural factors have also played a role in driving NAWRU developments. In Germany, for example, the decline in the NAWRU seems related to some aspects of the Hartz reforms (e.g. the change in the period of eligibility for unemployment benefit appears to have contributed to a decline of the NAWRU over recent years). This suggests that large-scale reforms, as currently being enacted in some countries, will tend to translate into a gradual lowering of the NAWRU over coming years. For example, recent efforts in Ireland to bring down the labour tax wedge appear to be contributing to more favourable NAWRU developments. A number of countries (e.g. France) have failed to

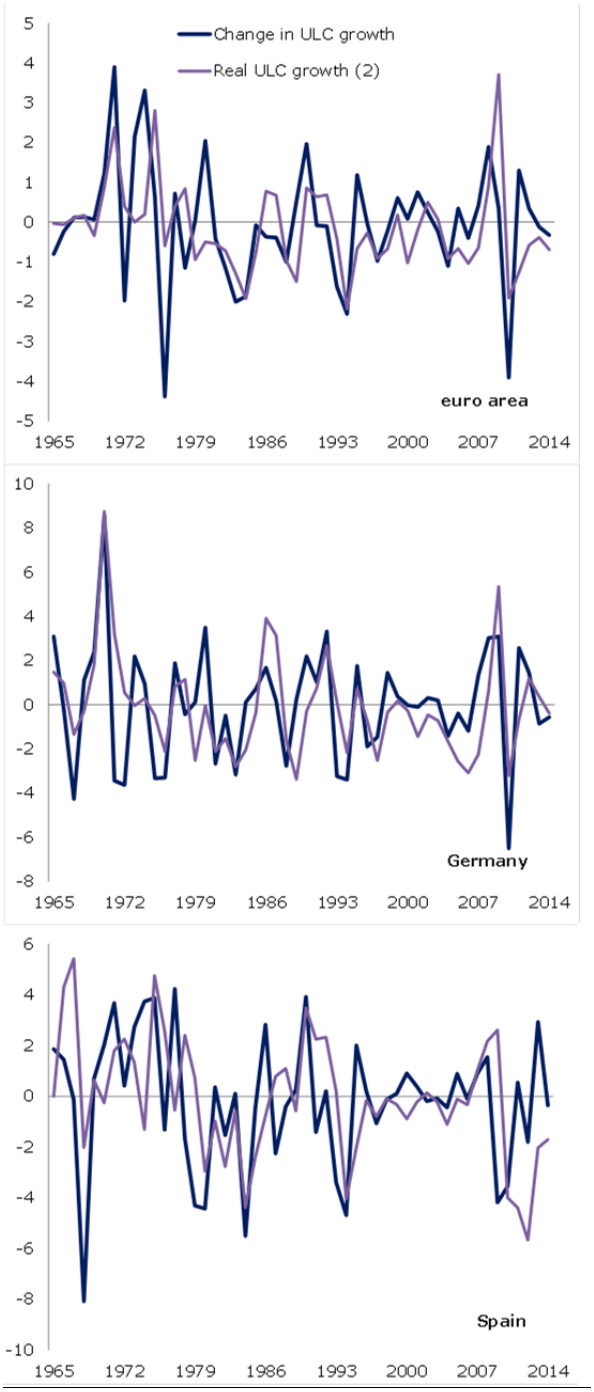
([24]) For further details see Orlandi, F. (2012), *Structural unemployment and its determinants in the EU countries*, European Economy — Economic Paper, No 455, DG ECFIN, European Commission, May 2012.

([25]) For further details see *Cyclical and structural unemployment in the euro area*, in Labour Market Developments in Europe, 2013, European Commission.

post similar improvements in their underlying labour market structures.

Graph II.1.2: **Alternative labour cost signals for the euro area, Germany and Spain (1)**

*(1965-2014)*




(1)GDP-weighted average of euro-area countries for which alternative NAWRUs have been computed (i.e. AT, BE, DE, EL, ES, FI, FR, IE, IT, NL and PT).
(2)Private consumption deflated ULC.
***Source:*** DG ECFIN calculations based on Eurostat data.

## Conclusions

Alternative Phillips curve specifications based on different assumptions regarding expectation formation point to broadly similar NAWRU results for the euro area. Estimates point to a recent rise in the NAWRU, suggesting that post-crisis unemployment increases are to some extent persistent.

In the case of Spain, alternative Phillips curve specifications yield somewhat different NAWRU results, pointing to the current importance for that country of theoretical considerations regarding expectations. The NKP, which uses rational expectations and relies on RULC growth to identify the unemployment gap, yields a more moderate NAWRU increase over recent years than the TKP (hitherto used by DG ECFIN), which allows only for static or adaptive expectations and relies on the signal provided by the change in nominal ULC growth. While this sensitivity in the results underlines the need for caution in interpreting NAWRU estimates, it should also be borne in mind that all specifications point to an important increase in the NAWRU for Spain at this juncture.

The deterioration in the NAWRU signals difficulties that are likely to last beyond the cyclical upturn. In interpreting those developments, it is important to recognise that changes in the NAWRU can be caused by both structural and non-structural factors. While the improvement in the NAWRU in Germany seems to be caused by structural factors, the deterioration in Spain seems to be caused more by crisis-related events that have persistent effects due to the presence of various rigidities that tend to slow down the adjustment process.

## II.2. The relationship between government and export sector wages and implications for competitiveness ([26])

*In 2012, the general government sector employed on average about 15% of the labour force in the euro area. Since most countries in the euro area are now trying to consolidate public finances, whilst also trying to boost competitiveness for external rebalancing and to reduce unemployment, it is crucial to assess whether there is any wage spillover from the public to the export sector, in particular under conditions of fiscal stress. This section shows that there has been a link between government and manufacturing wages over the long-run, which is much closer when the government employs a large share of the labour force. Government size dimension is especially important during fiscal consolidation. If the government wage bill is inflated due to unjustified wage premia for example, limiting government wage growth is a fiscal strategy that may, among other effects, deliver competitiveness gains that contribute to external rebalancing and help boost employment in the tradable sector.*

---

### Introduction

General government employment accounts for a considerable share of the labour force in the euro area. It stood at about 15 % in 2012, with but some cross-country variation. The evolution of government wages is likely to have an impact not only on fiscal variables and on the sustainability of public finances, but also on the labour market, on cost competitiveness and on external rebalancing within the euro area. This section looks at the relationship between public and private sector wages, at a time when most euro area countries are trying to consolidate their public finances, improve competitiveness to support external rebalancing, whilst also having to tackle high unemployment levels. ([27])

Changes in general government compensations may spill over into the private sector through both market-based and institutional channels. For example, excessive government wages may crowd out private sector employment, inflating cost conditions and leading to competitiveness losses. ([28]) There are channels of transmission also in the opposite direction, from the private to the government sector. Wage growth linked to productivity improvements in the private sector can spill over into the public if there is labour mobility across sectors. This can affect governments' capacity to keep wage expenditure growth under control.

Against this background, this section analyses the relationship between general government and manufacturing wages, in order to assess the potential for and conditions of a wage spillover from the insulated government sector to the export sector. The relationship is analysed by looking at a sample of EU countries over the period 1980-2013 in a co-integration framework that makes it possible to distinguish between long-run and short-run effects. The relationship between the two wages is also assessed for different fiscal scenarios, differentiating between normal periods and periods of fiscal adjustment.

### The various forms the relationship takes

The relationship between public and private wages takes many forms. It may be influenced by market forces and/or by institutional features of the wage setting system in each country. Changes in private wages can affect government wage growth in the following ways:

- Wage bargaining in the private sector has a demonstration effect on public wage-setters. Perez and Sanchez (2011) find evidence of signalling by the private sector in the negotiation phase in France and Germany before the EMU period. ([29]) Signalling may be motivated by envy effects that reflect the strength of the wage-bargaining position ([30]) or

([26]) Section prepared by Benedicta Marzinotto and Alessandro Turrini.

([27]) Throughout the section, the public sector is referred to alongside general government, which refers to public offices at all levels of government, non-market public owned hospitals, schools, and social security organizations. Thus, the term "public" is used as a synonym for general government.

([28]) See for example Alesina, A. and R. Perotti, (1997), "The welfare state and competitiveness", *American Economic Review*, Vol. 87, pp. 921-939. Alesina A., Ardagna S., Perotti R. and Schiantarelli F., (2002), "Fiscal policy, profits, and investment", *American Economic Review*, Vol. 92(3), pp. 571-589. Ardagna, S., (2004), "Fiscal stabilizations: when do they work and why", *European Economic Review*, Vol. 48, pp. 1047-1074.

([29]) Perez, J.J. and A.J. Sanchez, (2011), "Is there a signalling role for public wages? Evidence of the euro area based on macro data", *Empirical Economics*, Vol. 41(2), pp. 421-445.

([30]) Maffezzoli, M., (2001), "Non-Walrasian labor markets and real business cycles", *Review of Economic Dynamics*, Vol. 4(4), pp. 860-

by the fact that the same trade union negotiates wages for both sectors.

- Wage-bargaining practices may explicitly or implicitly grant wage leadership to the private sector. Under the Scandinavian wage-setting model, the private export sector typically takes the lead, dictating bargaining outcomes to other sectors, including the public sector. ([31])

- There may also be established practices and institutional mechanisms that make public wages responsive to private wage settlements, usually those of the export sector. This is the case if for example there is a formal rule under which the growth rate of private wages is automatically applied to public sector wages. ([32])

It is of course a two-way street. Changes in government wages affect private wage growth in a number of ways:

- Wage adjustment in the public sector causes cross-sector labour shifts and a change in the private sector's labour supply. As the supply of labour changes, so does the *competitive* private sector's equilibrium wage.

- Adjustments to government wages affect the outside option of unionised private sector bargainers, putting pressures on the bargaining process ([33]) with, for example, private sector workers tempted to move to the general government sector due to large public wage increases.

- Changes in public wages may be fully compensated in government budgets by changes in labour taxation that alter labour costs in the private sector ([34]) and might also affect union behaviour. ([35])

Co-movements between government and private wages may also take place in the absence of direct links, when driven by factors common to both sectors. For example, public wages may be pro-cyclical and change in a manner similar to private wages over the cycle. ([36]) Co-movements in aggregate wage series could be linked to developments common to both factors, relating to the composition of the labour force.

### Testing the relationship between government and manufacturing wages

To analyse more systematically the long- and short-term effects of government wages on the export sector, a cointegration approach is used linking manufacturing compensations to a number of determinants, including compensation in the government sector. The long-term relationship is analysed in terms of levels, while the Error Correction Mechanism (ECM) equation makes it possible to estimate the short-term relation between export sector wage growth, shocks in explanatory variables, and their deviation from the long-term relationship. The long-term relationship in also analysed in terms of levels using a dynamic ordinary least squares (DOLS) model, and the results incorporated in an ECM model.

Estimates were made on a sample of 17 EU countries for which data are available over the period 1980-2013. This has not only has the advantage of gaining degrees of freedom and reinforcing the results. It also makes it possible to

892. Ardagna S., (2007), "Fiscal policy in unionized labor markets", *Journal of Economic Dynamics and Control*, Vol. 31(5), pp. 1498-1534.

([31]) For a review, see Lindquist, J. and R. Vilhemsson, (2006), "Is the Swedish central government a wage leader?", *Applied Economics*, Vol. 38, pp. 1617-1625. Friberg, K., (2007), "Intersectoral wage linkages: the case of Sweden", *Empirical Economics*, Vol. 32, pp. 161-184. Traxler, F. and B. Brandl, (2012), "Collective bargaining, inter-sectoral heterogeneity and competitiveness: a cross-national comparison of macroeconomic performance", *British Journal of Industrial Relations*, Vol. 50(1), pp. 73-98. Ramskloger, P., (2012), "Is there a European wage leader? Wage spillovers in the European Monetary Union", *Cambridge Journal of Economics*, Vol. 36(4), pp. 941-962; and (2013), "The national–transnational wage-setting nexus in Europe: What have we learned from the early years of monetary integration?", *Journal of Common Market Studies*, Vol. 51(5), pp. 916-930.

([32]) For evidence on the Netherlands, see Hartog, J. and H. Oosterbeek, (1993), "Public and private sector wages in the Netherlands", *European Economic Review*, Vol. 37(1), pp. 97-114.

([33]) Afonso, A. and P. Gomes, (2008), "Interactions between private and public sector wages", ECB Working Paper No. 971.

([34]) Holmlund, B., (1993), "Wage setting in private and public sectors in a model with endogenous government behaviour", *European Journal of Political Economy*, Vol. 9(2), pp. 149-162.

([35]) The spillover from the public to the private sector is likely to be mediated by the structure of wage-setting systems. Alesina and Perotti (1997) find that increases in labour taxation do not necessarily lead to higher wage demands by unions in highly centralised bargaining systems, as large wage setters would internalise the consequences from higher labour costs on employment.

([36]) For instance, Lane (2003) and Lamo et al (2007) find that public wages are pro-cyclical because of discretionary fiscal expansion in good times. Lane, P., (2003), "The cyclical behaviour of fiscal policy: evidence from the OECD, in: *Journal of Public Economics*, Vol. 87, pp. 2661-2675. Lamo, A., Perez J.J., Schuknecht L., (2007), "The cyclicality of consumption, wages and employment of the public sector in the euro area", *ECB Working Paper* No. 757.

investigate the role of framework conditions in bringing the impact of general government to bear on manufacturing wages by means of appropriate sample splits. Box II.2.1 shows the estimation methodology and the results.

Much of the variance in manufacturing wages is explained by variables usually used when estimating wage equations (i.e., the price level, labour productivity, and the unemployment rate) and by general government wage levels. Both the long- and short-term elasticity of manufacturing wages with respect to government wages is estimated to be around 0.3-0.4. This tallies with the results of similar studies (e.g., Afonso and Gomes, 2008). It works both ways: general government wages also react to manufacturing wages. They have a long-term elasticity of 0.8 and a short-term elasticity of 0.4. ([37]) This is consistent with the fact that it is more usual for the private sector than for the government to take the lead in terms of wages, as the available literature also shows. ([38]). The DOLS cointegration estimation delivers qualitatively identical results. The results are still valid when the sample is restricted to just the euro area. ([39]) The relationship tested on real wages is symmetrical, because manufacturing wages respond to government wages, whether they are increased or reduced.

One hypothesis tested here is whether the size of the government sector determines the extent to which changes to government wages affect average conditions on the private market if for example there is cross-sector mobility. In order to test how this market-based channel works, the same EU sample is split into two groups of countries: those in which the average share of government to total employment is above the whole EU sample's median and countries in which it is below the median. Results show that, in the long-run, the impact of public on manufacturing wages is considerably higher in the case of large public sectors. This divide disappears in the short-run. In the opposite direction going from manufacturing to public wages, the split does not produce differentiated results. This confirms that government size matters when it comes to the public sector's long-term impact on the labour market. The DOLS methodology confirms these results. ([40])

Another hypothesis that is tested is whether the way wages are set in the public sector increases the chances of manufacturing wages reacting to government wages. Broadly speaking, two wage-setting systems may be identified:

- This first is that wages are mainly set on the basis of *collective bargaining*.
- The second is that wages are set on the basis of *unilateral decision by the government*. ([41])

The results show that the way wages are set does not fundamentally alter the relation between government and manufacturing wages in the long- or the short-term. It is however interesting to note that across all methodologies used, the relationship between manufacturing wages and labour productivity is weaker in countries characterised by a "unilateral decision" wage-setting system. This is probably because in such a case the spillover from public to private wages is such that private wages tend to be misaligned with sectoral productivity. This is not the case when government wages are set through a "collective bargaining" wage-setting system, possibly because bargaining processes, even in a particular type of insulated sector such as the public one, reflect market forces more than a unilateral government decision.

### The relationship between government and manufacturing wages under fiscal stress

Most countries in the euro area have recently been trying to cut government wage bills, by freezing wages, cutting or retrenching specific indemnities or benefits (including bonuses and/or holidays), or blocking turnover. As a result, the share of government compensations in total government spending has fallen. Between 2008 and 2012, this fall was particularly sharp for Latvia, Portugal, and Romania, followed by Hungary, Spain, Denmark, and Estonia (Graph II.2.1).

([37]) The results are not shown.
([38]) Perez, J.J. and A.J. Sanchez, (2011).
([39]) Still, it should be noted that the sample used excludes some key countries in the euro area.
([40]) The results from the DOLS are not shown.
([41]) For a classification of EU wage-setting systems in the government sector, see European Commission, Directorate for Economic and Financial Affairs (2014), "Government wages, and labour market outcomes", *Occasional Paper, forthcoming*.

## *Box II.2.1:* The long-run relationship between manufacturing and general government compensations per employee: size and institutions matter

The long-term relationship between manufacturing and general government wages is analysed within a cointegration framework using an unbalanced sample of 17 EU countries over the period 1980-2013. (1) It should be seen as an equilibrium relationship rather than a causal one.

The long-term wage equation is specified as:

$$lnw_{it} = \alpha_i + \beta_1 lnwp_{it} + \beta_2 lnpr_{it} + \beta_3 u_{it} + \beta_4 lncpi_{it} + \varepsilon_{it} \quad (1)$$

The letters i and t denote country and time respectively. The letter w denotes the level of the nominal compensation per employee in the manufacturing sector; wp is the level of the nominal compensation per employee in the general government sector; pr is real value added per person employed in the manufacturing sector; u is the unemployment rate and cpi is the consumer price index, and ε is the error term. (2) All variables are in logs except for the unemployment rate. Compensations in the manufacturing sector are expected to be positively related to government wages, prices and labour productivity and negatively related to unemployment.

Given equation (1), the dynamic (error-correction) wage equation is:

$$\Delta lnw_{it} = \delta_i + \theta_1 \Delta lnwp_{it} + \theta_2 \Delta lnpr_{it} + \theta_3 \Delta u_{it} + \theta_4 \Delta lncpi_{it} + \gamma \hat{e}_{it-1} + \varepsilon_{it} \quad (2)$$

where ê is the lagged error correction term.

Table 1 shows the results of the long-term (1) and the dynamic (error-correction) wage equation (2) estimated for the whole sample. All the variables except unemployment show the expected sign and are statistically significant. The error correction model (ECM) in Column 2 shows that deviations from the long term relationship are corrected over time (as the negative and significant coefficient of the error correction term shows). This confirms the findings with regard to co-integration between manufacturing compensations and all other variables, including government compensations. The short-term response of manufacturing wage growth also shows the expected sign and is significant for all the variables except the unemployment rate. Cointegration is also tested using dynamic ordinary least squares (DOLS), to account for the possibility that the error may itself include a stochastic trend (3), and the estimated relationship is applied to an ECM model (4). (3) The quality and interpretation of the results remain unchanged and confirm that there is a long-term relationship between manufacturing and general government compensations.

Table 2 shows results after splitting the sample between countries in which the ratio of government to total employment is above the EU median and those in which it is below. The results show that the elasticity of manufacturing to public wages is much greater in large than in small government sectors. The error correction term is not significant for countries with a relatively small government in the case of the linear estimation. This would indicate lack of co-integration (i.e. a weak relationship between government and manufacturing wages), yet it becomes significant when the long-term relationship is estimated using DOLS. (4)

(1) Due to the lack of sufficiently long data series, the following EU countries are not included: Austria, Bulgaria, Croatia, Cyprus, Germany, Greece, Latvia, Lithuania, Malta, Romania, and Slovenia.

(2) Nominal compensations per employee in the manufacturing sector are calculated as the ratio of total compensations to manufacturing employment. Nominal compensations per employee in the general government are calculated as the ratio of government wage consumption expenditures to government employment. Productivity is gross value added at 2005 prices per person employed.Tthe consumer price index is the national consumer price index for all times (2005=100). The data are taken from DG ECFIN's AMECO database, except for general government compensations per employee for which OECD statistics are used.

(3) The DOLS methodology is applied to the same sample with fixed country effects, one lead and one lag. Fixed effects are necessary because some variables are expressed as index numbers and therefore cannot be compared across countries. They are also useful to control for time-invariant country-specific factors. The results obtained using DOLS are not shown.

(4) The results from the DOLS are not shown.

*(Continued on the next page)*

*Box (continued)*

Another hypothesis tested here is whether the way in which government wages are set has an impact on their capacity to spill over to the manufacturing sector. Table 3 shows the results differentiating between countries in which government wages are set through collective bargaining and those in which the government unilaterally sets wages. There is no major difference between the two systems apart from the fact that manufacturing wages appear to be considerably less reactive to productivity in countries in which the government sets public wages. This could be because public sector wages unilaterally set by the government are less likely to reflect market forces and more likely to weaken the link between manufacturing wages and labour productivity. The results are confirmed and in fact slightly reinforced when the relationship is analysed using the DOLS methodology. (5)

**Table 1: Long-term and dynamic (short-term) relation between manufacturing and general government compensations per employee, EU countries 1980-2013**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Long-term relation | Error correction model | Dynamic long-term relation | Error correction model |
| Dependent variable: log of manufacturing compensation per employee, level (long-term relation) and change (ECM) | | | | |
| Δ log government compensations p.e. | | 0.293*** | | 0.249*** |
| | | [11.92] | | [7.117] |
| Δ log productivity in manufacturing | | 0.200*** | | 0.188*** |
| | | [5.186] | | [5.426] |
| Δ unemployment rate | | -0.00146 | | -0.00162* |
| | | [1.578] | | [-1.967] |
| Δ log consumer price index | | 0.716*** | | 0.693*** |
| | | [13.65] | | [19.51] |
| Log of consumer price index | 0.690*** | | 0.687*** | |
| | [6.609] | | [9.410] | |
| Log of government compensations p.e. | 0.377*** | | 0.435*** | |
| | [4.019] | | [7.968] | |
| Log of productivity in manufacturing | 0.232*** | | 0.209*** | |
| | [5.238] | | [9.004] | |
| Unemployment rate | 0.0017 | | 0.00570*** | |
| | [1.326] | | [3.421] | |
| Error correction term | | -0.112** | | -0.122*** |
| | | [-2.404] | | [-3.140] |
| Constant | -1.774*** | 0.00406* | -1.087*** | 0.00715*** |
| | [-8.115] | [1.773] | [-7.009] | [3.273] |
| Observations | 458 | 441 | 407 | 407 |
| R-squared | 0.989 | 0.736 | | 0.631 |
| Number of countries | 17 | 17 | 17 | 17 |

Robust t-statistics in brackets: *** p<0.01, ** p<0.05, * p<0.1

Estimation method: fixed effects ordinary least squares (OLS), standard errors robust with respect to heteroskedasticity and non-independence within country clusters (1-2-4) and dynamic OLS with fixed country effects and Newey West standard errors (3). Sample: 17 EU countries over the period 1980-2013.

**Table 2: Long-run and dynamic (short-run) relation between manufacturing and government compensations per employee, conditional on the size of the government sector, EU countries 1980-2013**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Long-term relation | | Error correction model | |
| | Large government sector | Small government sector | Large government sector | Small government sector |
| Dependent variable: log of manufacturing compensation per employee, level (long-term relation) and change (ECM) | | | | |
| Δ log government compensations p.e. | | | 0.308*** | 0.300*** |
| | | | [7.727] | [9.891] |
| Δ log productivity in manufacturing | | | 0.205*** | 0.187*** |

(5) The results obtained using DOLS are not shown.

*(Continued on the next page)*

*Box (continued)*

| | | | | |
|---|---|---|---|---|
| | | | [3.769] | [3.542] |
| Δ unemployment rate | | | -0.00176* | -0.00118 |
| | | | [-2.287] | [-0.601] |
| Δ log consumer price index | | | 0.666*** | 0.745*** |
| | | | [9.838] | [10.06] |
| Log of consumer price index | 0.430** | 0.922*** | | |
| | [3.191] | [8.904] | | |
| Log of government compensations p.e. | 0.568*** | 0.187* | | |
| | [6.179] | [2.144] | | |
| Log of productivity in manufacturing | 0.223** | 0.228*** | | |
| | [3.239] | [3.766] | | |
| Unemployment rate | 0.00286 | 0.000408 | | |
| | [1.033] | [0.313] | | |
| Error correction term | | | -0.175*** | -0.107 |
| | | | [-3.352] | [-1.756] |
| Constant | -1.122*** | -2.287*** | 0.00685** | 0.00119 |
| | [-3.679] | [-12.38] | [2.381] | [0.295] |
| Observations | 217 | 241 | 209 | 232 |
| R-squared | 0.991 | 0.991 | 0.684 | 0.793 |
| Number of countries | 8 | 9 | 8 | 9 |

Robust t-statistics in brackets: *** p<0.01, ** p<0.05, * p<0.1

Estimation method: fixed effects ordinary least squares (OLS), standard errors robust with respect to heteroskedasticity and non-independence within country clusters. Sample: 17 EU countries over the period 1980-2013.

**Table 3: Long-run and dynamic (short-run) relation between manufacturing and government compensations per employee, conditional on government wage setting model, EU countries 1980-2013**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Long-term relation | | Error correction model | |
| | Bargaining | Decision | Bargaining | Decision |
| Dependent variable: log of manufacturing compensation per employee, level (long-term relation) and change (ECM) | | | | |
| Δ government compensations p.e. | | | 0.384*** | 0.260*** |
| | | | [8.201] | [8.840] |
| Δ productivity in manufacturing | | | 0.171*** | 0.222*** |
| | | | [3.542] | [4.289] |
| Δ unemployment rate | | | -0.00197** | -0.00113 |
| | | | [-2.394] | [-0.871] |
| Δ consumer price index | | | 0.594*** | 0.763*** |
| | | | [7.776] | [11.11] |
| Consumer price index | 0.746*** | 0.659*** | | |
| | [5.017] | [3.968] | | |
| Government compensations p.e. | 0.326** | 0.435** | | |
| | [3.162] | [2.996] | | |
| Productivity in manufacturing | 0.283*** | 0.131* | | |
| | [5.848] | [2.095] | | |
| Unemployment rate | -0.00196 | 0.00161 | | |
| | [0.732] | [1.200] | | |
| Error correction term | | | -0.147** | -0.124* |
| | | | [-3.340] | [-2.046] |
| Constant | -1.908*** | -1.613*** | 0.00531* | 0.00229 |
| | [-6.431] | [-5.798] | [2.132] | [0.614] |
| Observations | 248 | 210 | 240 | 201 |
| R-squared | 0.993 | 0.987 | 0.723 | 0.752 |
| Number of countries | 8 | 9 | 8 | 9 |

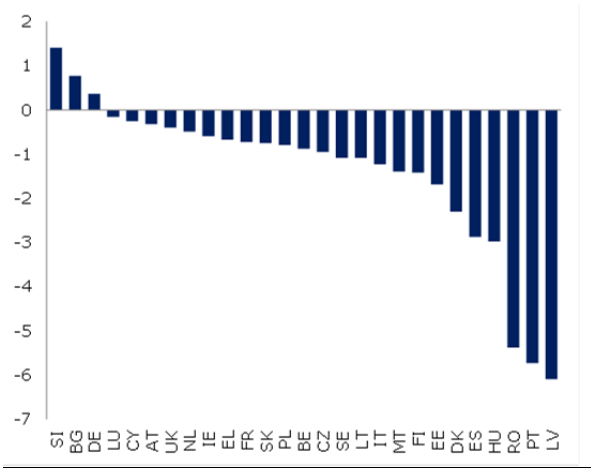
Robust t-statistics in brackets: *** p<0.01, ** p<0.05, * p<0.1

Estimation method: fixed effects ordinary least squares (OLS), standard errors robust with respect to heteroskedasticity and non-independence within country clusters. Sample: 17 EU countries over the period 1980-2013.

The recent crisis marked a watershed in the evolution of public compensations. Between 1999 and 2007, *relative* government wage growth did not vary from "cold-shower" periods (or periods of more gradual fiscal consolidation) to periods of non-consolidation. (42)

Graph II.2.1: **Change in the share of general government compensations to total spending**

*(2008-2012, in p.p.)*



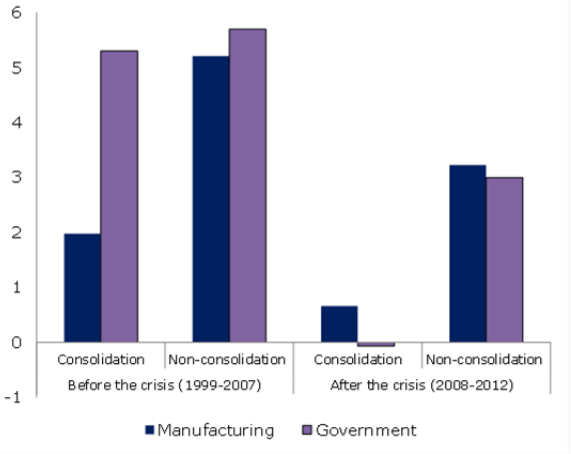

***Source:*** DG ECFIN calculations based on AMECO.

Conversely, starting with the 2008-2009 crisis, compensations per employee in the government sector grew more slowly compared with those in the manufacturing sector, and more clearly so during fiscal consolidation (Graph II.2.2).

It is possible that, under conditions of fiscal stress, the relationship between government and export sector wages differs from that of normal periods. This aspect has been neglected in previous analyses. To shed some light on it, Table II.2.1 shows the correlation between government wage growth and manufacturing wage growth under alternative fiscal conditions (consolidation and non-consolidation), differentiating between countries with large and small public sectors. The evidence shows that the two wages are closely related in periods of fiscal stress only if the government employs a large share of the labour forces. This suggests that the possibility of expenditure-based fiscal consolidation having the type of supply-side effects described in Alesina and Perotti (1997), Alesina et al (2002) and Ardagna (2004) may be a consequence of the size of the public sector, among other things.

Graph II.2.2: **Government and manufacturing compensations under alternative fiscal conditions, EU countries**

*(1999-2007 and 2008-2012, avg. annual % change)*




***Source:*** DG ECFIN calculations based on OECD.

Table II.2.1: **Correlation between government and manufacturing compensations' growth under alternative fiscal conditions, EU (1)**

| | |
|---|---|
| Consolidation | 0.3993* |
| Non-consolidation | 0.8205* |
| **Consolidation** | |
| Large public employer | 0.8100* |
| Small public employer | 0.1986 |
| **Non-consolidation** | |
| Large public employer | 0.7950* |
| Small public employer | 0.8291* |

(1) Pearson correlation coefficients. Sample: EU countries (excluding AT, BG, CY, DE, EL, LT, LV, MT, RO, SI) over 1980-2012 (1995-2012 in the case of CZ, EE, HU, SK).
***Source:*** DG ECFIN calculations based on OECD.

## Concluding remarks

Spillovers which are the result of high wages in the general government sector have been mentioned as one of the drivers of competitiveness losses in

(42) By convention, episodes of fiscal consolidation are defined as those during which the structural primary balance improves by at least 1.5 per cent of GDP in one year or at least 3 per cent in three years, with a minimum improvement of 0.5 per cent in each year. Such a definition makes it possible to distinguish between cases of "cold-shower" consolidation episodes and more gradual consolidation episodes.

some countries in the euro area before the crisis. ([43])

The results presented here speak to this debate and may be summarised as follows. Government wage levels have a long-term impact on wages in the manufacturing sector, even more so in countries in which the government sector employs a relatively large share of the labour force. That said, their short-term impact remains unaffected by the size of the public sector. Looking at it the other way round, manufacturing wages usually have a greater impact on government wages, regardless of size. This is arguably because private sector wage leadership is more common than public sector wage leadership.

The way government wages are set also plays a role. In collective bargaining systems, not only are government and manufacturing wages related in both the long- and the short-term (as they are also when the government sets wages by unilateral decision). Also, most importantly, wages in the tradable sector are better aligned with labour productivity. The evidence provided here indicates that, if the government wage bill is inflated, for example due to unjustified wage premia, limiting public wage growth would spill over into the private export sector reducing labour costs and helping boost competitiveness and employment in the sector. Whilst structural reforms including skill upgrading in manufacturing are an important and necessary ingredient for achieving non-reversible gains in competitiveness, the adjustment of competitiveness through fiscal policy remains a complementary tool to deliver sustained external rebalancing.

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

## II.3. Latvia: maintaining sustainable growth after the boom-bust years [44]

*Latvia had been keen to join the euro area at the earliest opportunity, with entry in January 2008 the clear target. As the economy overheated, however, significant macro-economic imbalances accumulated which deferred these plans. Between 2005 and 2007, unsustainable GDP growth went hand in hand with a mounting current account deficit and a housing market spiralling out of control. When credit flows then abruptly reversed, the country's GDP contracted dramatically. Latvia was placed in the EU/IMF-led financial assistance programme and was forced to carry out ambitious fiscal consolidation and structural reforms. Reallocating resources to the tradable sector was the first important step on the road to an export-driven recovery. Under the burden of deleveraging and consolidation, the revival of domestic demand was slow at first. From 2011, however, supported by favourable labour market developments, growth in demand has accelerated. Latvia has reclaimed its position as the fastest-growing EU economy, however, the current level of growth is lower than the unstainable rates recorded in the boom years, and it is now seen as sustainable. Thanks to this balanced growth, Latvia has not been subject to the MIP since its launch in 2012. Despite the financial assistance-supported measures to preserve equity, the social burden of economic adjustment, as evidenced by poverty, social exclusion and emigration rates, has been high, but measures are being taken by the authorities to counter these effects. Continued commitment to prudent fiscal policies will be critical for the country's economic future. The use of macro-prudential tools to reduce the risks posed by large non-resident financial flows, and the implementation of ambitious structural reforms will also play an important role.*

---

### Introduction

To welcome Latvia's recent adoption of the euro, this section reviews the country's recent boom-bust experience and discusses the challenges ahead.

Five years ago, it would have been difficult to imagine that Latvia would be able to fulfil the conditions for adopting the euro and enter the euro area in January 2014. After EU accession in May 2004, significant macro-economic imbalances had started to accumulate on the back of an overheating economy, and by autumn 2008 the country was on the brink of bankruptcy. A painful and seemingly impossible economic adjustment, to be achieved by means of internal devaluation, lay ahead. This would require unprecedented fiscal consolidation, huge redundancies and difficult structural reforms, threatening political and social stability. Yet, despite pronounced scepticism from the outset and particularly at the height of the crisis in mid-2009, the economy has moved back to growth. The measures implemented took some time to take effect, with the economy continuing to decline at first before picking up, as seen in the 'V'-shaped recovery, but a protracted recession was avoided. Latvia's GDP growth has exceeded expectations, reaching levels of 5.4 % in 2011, 5.2 % in 2012 and around 4 % in 2013. The two factors that were critical to the country's economic recovery were a return to international competitiveness and the rapid correction of external imbalances. The budget deficit decreased significantly and is expected to reach a balanced position in the near future. The level of government debt is projected to stay around 40-42 % of GDP in 2013-2014 and to decline to 33 % of GDP in 2015 as the repayments to the EU take effect and sizable cash buffers will be reduced. The financial assistance programme was successfully completed in January 2012. Financial support had not been necessary since October 2010, however, and the government had re-entered international bond markets in June 2011, well ahead of schedule. [45] As of 2013, GDP per capita in constant prices has returned to the level reached at its peak in 2007. Due to the decline in the population, however, the absolute value of GDP in constant prices was still about 9 % below 2007 levels, with current projections suggesting that a full recovery to the pre-crisis peak will be achieved in 2015.

### Overheating, imbalances and a big bust

Latvia joined the EU in seemingly good macroeconomic health and, having pegged its currency to the Special Drawing Right (SDR) in

[44] Section prepared by Gatis Eglitis and Christian Weise.

[45] Occasional Paper 120 issued by the European Commission, Directorate-General for Economic and Financial Affairs: *EU Balance of Payments assistance for Latvia: foundations of success*: https://ec.europa.eu/economy_finance/publications/occasional_paper2012/op120_en.htm.

1994 and then to the euro in 2005, was keen to join the euro area in January 2008. Upon entering the Exchange Rate Mechanism II (ERM II) on 2 May 2005, the authorities unilaterally committed to maintaining a smaller fluctuation margin of ±1 % around the central rate – seen as a sign of the country's determination to join the euro area. The Latvian economy was the fastest growing in the EU between 2000 and 2007, and between 2005 and 2007 real GDP growth reached a yearly average of over 10 %. Following accession to the EU in 2004, Latvia, along with other EU countries, witnessed a rapid credit expansion. Loans to residents grew at an average annual rate of close to 50 % between 2004 and 2008, a reflection of the excess liquidity at that time and of the resulting hot money inflows into central and eastern European economies, which were rapidly converging with their western European counterparts. Foreign investment exploded, driven by commercial banks' mispricing of risk and over-optimistic expectations of convergence. A number of privatisation deals and, most importantly, a burgeoning real-estate market characterised by soaring prices also served to attract foreign investors. The tradable sector was meanwhile largely neglected. By way of illustration, foreign direct investment (FDI) reached relatively high levels of 8.4 % and 8.1 % of GDP in 2006 and 2007 respectively, but most of this was directed towards the real-estate market, while the proportion of total FDI relating to manufacturing was only 12 % in 2013. Significant imbalances were accumulating, as indicated by a current account deficit that reached around 22 % of GDP in 2006 and 2007 and by labour market tightening. Nominal wages doubled between 2004 and 2007, increasing much faster than productivity and thus damaging international competitiveness.

By early 2008, more cautious bank lending had caused economic growth to slow significantly. By autumn of the same year, this slowdown had developed into a strong contraction, reflecting the wider global economic situation. The global economy fell into recession, commodity prices reached record highs, and the general risk aversion seen in global markets following the collapse of Lehman Brothers cut off Latvia's access to financial markets. The second largest domestic bank, Parex, had to be rescued. Latvia ultimately experienced the most severe GDP contraction of all EU countries, at close to 18 % in 2009. The government deficit threatened to spiral out of control. Having been at 0.3 % of GDP in 2007 and 4.2 % in 2008, in spring 2009 it was projected to reach levels well above 15 % of GDP by the end of year in the absence of a significant consolidation package.

Faced with an economic crisis of this order, Latvia agreed a medium-term financial assistance programme, the balance of payments programme (BoP), with the EU and the IMF in December 2008.[46] The aim of this was to preserve the existing exchange-rate arrangement. The assistance offered to Latvia was made subject to a number of policy conditions relating to fiscal consolidation, financial sector stabilisation and the introduction of a wide range of structural reforms, including a significant acceleration in the absorption of EU structural funds. The Latvian government also undertook to strengthen the social safety net so as to protect the most vulnerable from the effects of the crisis.

### Brave measures in difficult times

Given that the exchange rate was at that time pegged to the euro, some economists suggested devaluation as the only way out of the crisis. The national authorities and international partners did not see that as a viable option, however, because its effectiveness would have been severely limited by the degree to which imports were used in the manufacture of exports and the high proportion of foreign liabilities. Furthermore, it would have brought with it the risk of mass bankruptcy and a partial collapse of the domestic banking system at a time when the judicial system was clearly not capable of coping with such a fall-out. In addition, devaluation would have provided no incentive to solve Latvia's structural problems, including weak fiscal governance, the unsustainability of pension expenditure, loss-making state-owned banks, a lack of competitiveness and weak institutions.

Between 2009 and 2011, the Latvian government carried out an ambitious programme of fiscal adjustment designed to correct the previously loose fiscal policy, the weaknesses of which had been hidden by the country's strong economic growth. This difficult adjustment restored Latvia's public finances to better health and established a

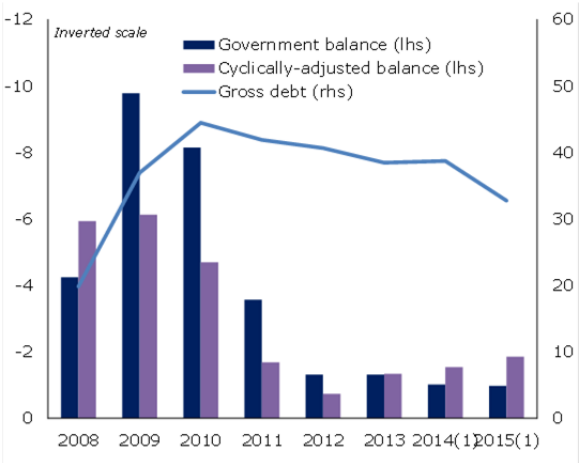
[46] Funds available from EU countries, IMF, World Bank, EBRD and Norway amounted to € 7.5 billion, of which Latvia used € 4.5 billion (60%), with € 2.9 billion lent by the European Commission, on behalf of the EU. The first tranche of EUR 1 billion (1/3 of the total) was repaid by Latvia on 25 March 2014.

framework which would be sustainable in the long term. The nominal balance improved, with the deficit being cut from 9.8 % of GDP in 2009 to 1.3 % of GDP in 2012 and 2013 (see graph II.3.1). The structural deficit also fell from its peak of 5.5 % of GDP in 2008 to around 0.25 % of GDP in 2012 and 2013, beating Latvia's medium-term objective of -0.5 % of GDP as set in the convergence programmes.

Latvia's fiscal consolidation measures were undoubtedly bold, with fiscal savings equivalent to around 17 % of GDP implemented within three years. The measures were frontloaded, and half of these savings were implemented in the first year alone. The measures were on the whole expenditure-oriented, with over half of the savings coming from cuts to health, education and public administration budgets. The most notable measure relating to revenue was an increase in VAT from 18 % to 22 %. The consolidation strategy was eventually successful in containing the adverse effects of the budget deficit on the economy. In fact, it even appears to have triggered 'non-Keynesian' effects on demand, by restoring confidence and stimulating demand and investment at the point when it was most needed. ([47])

Graph II.3.1: **Latvia's government budget balance and debt**

*(2008-15, % of GDP)*




***Source:*** DG ECFIN, Commission's spring 2013 forecast.

The fiscal framework was also strengthened significantly by the law on fiscal discipline coming into force in March 2013 and the creation of a fiscal council in January 2014. The signing of the Treaty on Stability, Coordination and Governance in the EMU ([48]) in March 2012 provided further EU-level support for the national fiscal framework.

An additional factor that was critical to the success of the consolidation strategy, but is often overlooked, was the availability of significant EU funds (particularly from around 2009 onwards), which acted as a much-needed demand trigger in sectors affected by the decline in economic activity. Between 2007 and 2013, Latvia benefited from the third highest allocation of EU funds, after Hungary and Lithuania, receiving a yearly average equivalent to around 2.8 % of GDP or 70 % of gross fixed capital formation.([49]) As on average every euro of national budget spending was supplemented by five to six euros co-financing from EU funds, national expenditure on items such as road and public building construction, vocational education and training of unemployed, science infrastructure development, and healthcare was often replaced by Structural funds financing, despite being in conflict with the EU funds "additionality principle". Clearly, such large inflows of EU financing also generated substantial tax revenues, in particular VAT, at a time when private consumption was weak.

The Latvian labour market demonstrated a high level of flexibility during the crisis, thanks in part to a decentralised wage-setting system. Significant public-sector wage cuts indirectly supported nominal wage reduction in the private sector in 2009 and 2010, when earnings per employee fell by a total of 19 % over two years. Employment levels fell sharply, especially in the private sector, as jobs were cut in construction and manufacturing. The unemployment rate reached around 20 % in early 2010, but had fallen back to 11.9 % by 2013, due mainly to growth in employment, with the participation rate also increasing significantly over this period. The projection from the Commission's 2014 winter forecast shows wages in 2014-15 growing broadly in line with productivity, although the labour market is tightening and structural problems, in particular regional differences and skill mismatches, could create pressures in the economy.

([47]) Ibid, see Chapter 4: Fiscal consolidation in the midst of the crisis.

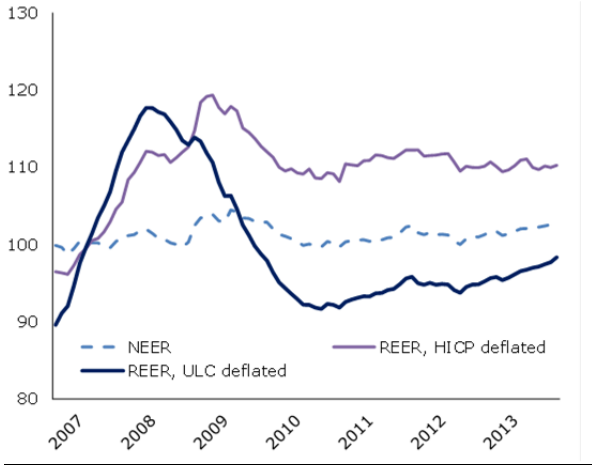
([48]) http://european-council.europa.eu/media/639235/st00tscg26_en12.pdf

([49]) Source: Directorate-General for Regional Policy, Infoview.

External cost competitiveness has improved noticeably since 2008, with labour costs falling significantly and labour productivity, in particular in the tradable sector, increasing. In 2008, the real effective exchange rate (REER) adjusted for unit labour costs reached a peak of 64 % above the 2000 level, before falling by about 20 % in 2009-10, since when it has remained broadly stable (see graph II.3.2). This level of REER is considered sustainable, as the country has been seen to be steadily gaining market share over recent years (including as measured by exports adjusted for the growth of markets). The percentage of the country's GDP attributable to exports rose to 60 % in 2013, from 43 % in 2007, with some 60 % of exports destined for the EU and 12 % for Russia.

Graph II.3.2: **Effective exchange rates Latvia v. 35 trading partners**

*(Jan 2007-Dec 2013, monthly avg., 2007 = 100)*




***Source:*** DG ECFIN.

The social burden of economic adjustment has admittedly been high in Latvia, despite the policy measures contained in the Memorandum of Understanding stipulating, inter alia, establishment of a comprehensive social safety net, supporting local governments in providing social assistance, and discounting social payments from overall budget targets. High unemployment has led to a wave of emigration to richer EU countries, which, coupled with Latvia's low fertility and high death rates, has seen the population decrease by 8-10 % since 2008. Net emigration has now fallen substantially, however, since the peak of the crisis years. The rates of poverty and social exclusion in Latvia are among the highest in the EU: families with children, unemployed people, people with disabilities, and people living in rural areas are particularly at risk. The country's spending on social protection and healthcare as a percentage of GDP is among the lowest in the EU. Furthermore, the social protection measures which do exist to reduce poverty tend to be ineffective, highlighting the importance of a robust social safety net. It appears however that, with the improved economic situation and increasing levels of general social awareness, the authorities are finally starting to address the challenges of poverty and social exclusion with greater determination. In recent years, for example, taxation of low-income earners has been cut slightly and child poverty has been reduced thanks to increases in various child-related benefits. Proposals for reforms to social assistance in line with 2013 World Bank's study are being gradually implemented. Better targeted, more effective policies relating to the active labour market, mostly financed by the European Social Fund, are helping unemployed people, in particular the long-term unemployed and young people, to find work or to obtain relevant training.

As part of the BoP programme, and in the context of the assessment of Latvia's readiness to join the euro area, financial supervision has been tightened and EU resources for supervision and monitoring increased, in particular for monitoring the growing non-resident banking sector. Additional liquidity and capital adequacy requirements for non-resident banks were introduced in 2013, regular on- and off-site checks of these banks are being performed, the deposit guarantee fund has been further strengthened, and monitoring has been stepped up in relation to pledged assets and the origin of funds in bank recapitalizations. This strengthened regulatory policy has been introduced partly as a result of lessons learnt, at significant cost, in the past five years, most notably with the Parex and Krajbanka failures.

Latvia has implemented a series of ambitious reforms to the business environment in recent years, with the aim of reducing start-up costs, simplifying procedures for property registration, construction permits and tax collection, and introducing out-of-court settlement of insolvencies. In doing so, Latvia has brought its regulatory framework a significant step closer to what is regarded as best practice. In the World Bank's 2014 *Doing Business* report, Latvia was ranked 25th out of 185 countries, with only four euro-area members faring better.

## Conclusion

The origins of Latvia's years of boom and bust can be traced back to the domestic, regional and global circumstances at that time: globally, excess liquidity and hot money flowing into vulnerable countries; regionally, unrealistic expectations of income convergence in central and eastern Europe; and domestically, undue optimism about growth in personal incomes and mispricing of risk by commercial banks, amplified by the behaviour of both policymakers and individuals.

A broad range of country-specific and general economic factors have contributed to the successful economic adjustment seen in Latvia since the height of the crisis. Ambitious, front-loaded and largely expenditure-based fiscal consolidation helped to contain the budget deficit whilst the confidence generated by the introduction of a credible programme itself aided the economic recovery. The flexibility of the labour market meanwhile helped companies to restore competitiveness by means of wage reductions and job cuts. Competitiveness was also improved by steps taken to shift the tax burden from labour to consumption and property. The recovery in Latvia was very much export-driven, with the growth in exports made possible by the openness of the economy and the faster-than-expected economic growth experienced by major trading partners. A number of structural reforms, including bank restructuring and measures improving the use of EU funds, have contributed to the development of a more favourable business environment. A generous allocation from the European structural funds meanwhile helped to boost public investment and supported financing and reforms in many important sectors. Above all, the success of the recovery measures implemented in Latvia proved that, for a tough internal economic adjustment to be effective, there needs to be both a determined political will to carry out unpopular reforms and also a fully-developed, comprehensive social safety net to protect more vulnerable groups in society during difficult times. In addition, Latvia benefited from the fact that those looking for work were able to migrate to other EU countries, which helped to alleviate the social tension created by the effects of the crisis. Some of the lessons above are clearly applicable to other Member States undergoing challenging economic adjustment, while others are more Latvia-specific.

While Latvia's current level of economic growth is regarded as sustainable ([50]) and the adoption of the euro is recognised as a significant and hard-earned achievement, it is not the end of the road. The current robust economic situation should be used to advance reforms and improve Latvia's long-term growth potential, rather than lead to complacency and relaxation of reform efforts. Sustainable convergence of the economy in the longer term will require, *inter alia*, ongoing commitment to prudent fiscal policies (there are some recent signs of less prudent fiscal decision-making), a continuous use of macro-prudential tools to reduce risks from growing non-resident financial flows, especially in view of recent Ukraine events, and the implementation of reforms in a number of vested-interest-heavy areas. These include higher education and science, state owned enterprise management, electricity and gas market liberalization, and the judiciary, including insolvency framework. But above all, and in order to ensure economic and social sustainability for years to come, high rates of poverty, social exclusion and dismal demographic trends need to be addressed boldly. These and other structural challenges are being addressed by the Commission under the European Semester and the Post Program Surveillance frameworks. Also, Latvia has joined a euro area that is very different from what it was just a few years ago: the euro area economic governance framework has been greatly strengthened, entailing stricter obligations.

([50]) The Commission's alert mechanism reports issued under the Macroeconomic Imbalance Procedure have not identified economic imbalances in Latvia requiring further in-depth investigation for possible policy action.
http://ec.europa.eu/europe2020/pdf/2014/amr2014_en.pdf.

## II.4. Corporate balance sheet adjustment in the euro area and the United States ([51])

*This section compares balance sheet adjustment in the non-financial corporate sector in the euro area and the United States. It shows that the adjustment since the crisis has been faster in the latter. Despite similar steep rises in corporate debt in pre-crisis years, US corporations have cut debt more than those in the euro area. Shifts from loans to bonds and extensions of debt maturity have also been more pronounced in the United States. Much of the difference in balance sheet consolidation can be traced back to more positive profitability trends providing US firms with the internal funds necessary to adjust balance sheets. Differences in dividend distribution strategies and in corporations' physical investment behaviours also played a role. Profitability differences reflect differences both in cyclical conditions and labour market adjustment. Comparatively slow progress in balance sheet consolidation is likely to weigh on investment recovery in the euro area.*

---

### Introduction

Both the euro area and the United States experienced a surge in corporate indebtedness in the years preceding the global financial crisis and in its early stages. The ratio of debt to gross value added by non-financial corporations (NFCs) rose by about 40 pp between 2005 and 2009. Deteriorating growth prospects and changing attitudes to risk have prompted NFCs in both economies to adjust their balance sheets. As previously argued in the Quarterly Report, balance sheet adjustment can have a substantial effect on economic activity and it is important to monitor regularly the ongoing adjustment in the euro area. ([52]) This section contributes to the monitoring by comparing progress in corporate deleveraging in the euro area and in the United States, two regions where firms entered the crisis with excessive debt.

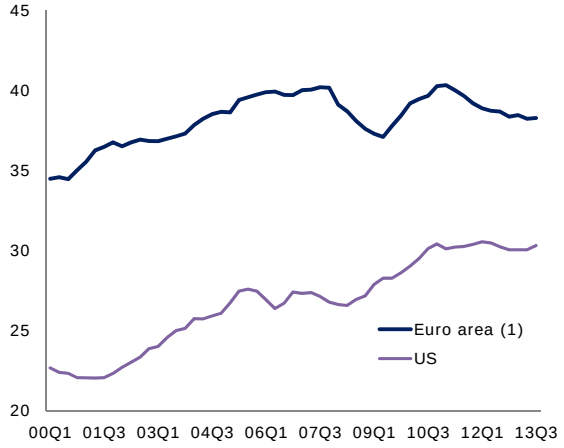
Firms consolidate their balance sheets primarily by raising their net lending/borrowing (NLB), i.e. the cash obtained from their production activity and available for financial operations. ([53]) A rise in NLB is achieved either by increasing savings or cutting/postponing physical investment. Firms increase savings by raising profits and reducing the dividends distributed to shareholders. In firms' financial accounts, a rise in corporate NLB is associated with a rise in financial assets and/or a cut in financial liabilities. The section reviews recent developments in euro area and US profitability, savings and NLB, and looks at the instruments that the corporate sector has used to consolidate its balance sheet, on both the asset and the liability side.

### Corporate profits have disappointed in the euro area …

National account data show that corporate profitability in the euro area reached a pre-crisis peak in 2007Q3, i.e. later than in the United States, where it had already started to decline in 2007. ([54])

Graph II.4.1: **NFC profitability, euro area and US**

*(2000Q1-2013Q3, % of GVA)*




(1)Excluding Latvia.
***Source:*** Eurostat, US Bureau of Economic Analysis, DG ECFIN calculations.

([51]) Section prepared by Plamen Nikolov.
([52]) See European Commission (2010): "Focus: Balance sheet adjustment in the corporate sector", *Quarterly Report on the Euro Area*, Vol.9 (3), pp 9-19. A more detailed overview of the literature on the impact of balance sheet adjustment can be found in Cuerpo C., I. Drumond, J. Lendvai, P. Pontuch and R. Raciborski (2013), "Indebtedness, deleveraging dynamics and macroeconomic adjustment", *European Economy Economic Papers* 477.

([53]) Firms can also consolidate their balance sheets by raising equity.
([54]) Profitability, like the other national account variables for the corporate sector presented in this section, is measured as a proportion of corporate sector activity, represented by gross value added (GVA). It is calculated as the gross operating surplus plus financial revenues and subsidies and minus financial and tax expenses. Financial expenses do not include earnings distributed to shareholders.

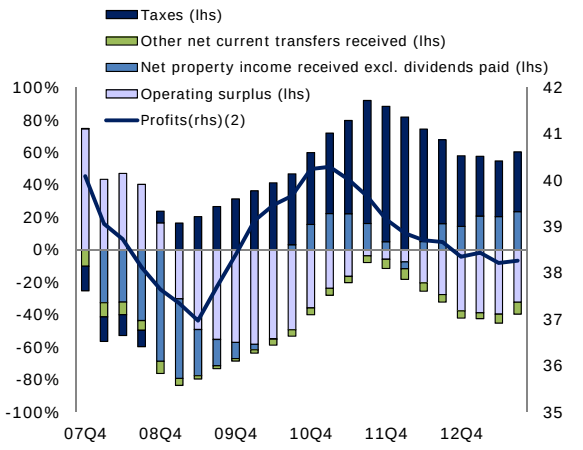
The 2008-09 recession brought a sharp drop in corporate profitability in the euro area. Profitability recovered briefly in 2010 to reach a new peak in 2011 but has declined again since then (Graph II.4.1). In the United States, the impact of the crisis was rather muted, with profits recovering vigorously after 2008. As a ratio to gross value added (GVA), US corporate profits had already passed their pre-crisis level in 2009, before flattening out in the past two years. Overall, by 2013, profitability in the euro area was still about 2 pp below its pre-crisis peak, while in the United States it stood around 3 pp above.

### … mostly due to weak operating surplus

The disappointing profit performance in the euro area relative to the United States is largely due to differing developments in gross operating surplus. Looking at the breakdown of the contribution to the cumulative change in corporate profitability since the start of the crisis, there is a marked difference between firms in the euro area and those in the United States (Graphs II.4.2 and II.4.3). ([55])

Graph II.4.2: **Profitability breakdown of NFCs, euro area (1)**

*(cumulative change in % from 2007Q3 peak to 2013Q3)*

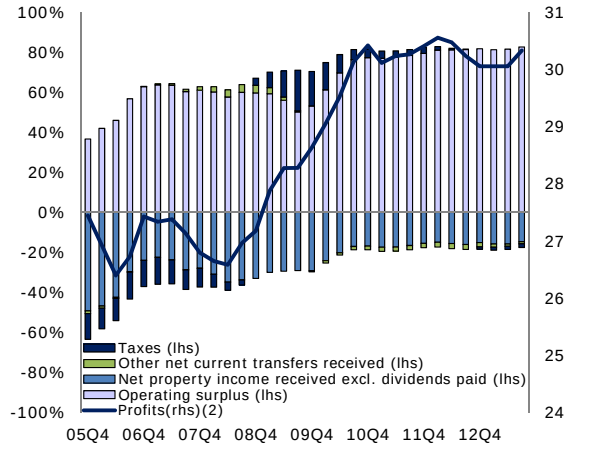



(1)Excluding Latvia.
(2)Profits in % of GVA.
***Source:*** Eurostat, DG ECFIN calculations.

In the euro area, a fall in the ratio of operating surplus to GVA dragged overall profitability down after 2008. Despite an improvement in 2011, in 2013 operating surplus was still contributing negatively to the cumulative change in profitability since the pre-crisis peak. In contrast, operating surplus in the United States responded to the crisis earlier than in the euro area, but its contribution to the change in profits remained positive.

Graph II.4.3: **Profitability breakdown of NFCs, US**

*(cumulative change in % from 2005Q3 peak to 2013Q3)*




(1) Profits in % of GVA.
***Source:*** Federal Reserve Board, US Bureau of Economic Analysis, DG ECFIN calculations.

Unlike operating surplus, income tax payments and net income from non-operational activities did not differ significantly between the euro area and the United States. ([56]) In both economies, lower corporate tax payments resulting from lower profits generated by NFCs naturally had a positive impact on the cumulative change in profits from the pre-crisis peak.

### Differences in labour market developments are at the root of differences in profitability

Differences in operating surplus and profitability between the United States and the euro area can be attributed partly to differences in the business cycle. In 2011Q1, NFCs' gross value added was still 1.2 % below its pre-crisis peak in the euro area but 1.1 % above in the United States. The main channel through which cyclical developments can affect operating surplus is the labour market.

([55]) The illustration of the contributions to the cumulative change in profitability only serves to depict the relative importance of the various components of the change in profits since the crisis. The starting point for the cumulative change should not be interpreted as a reference point for a desirable profit recovery.

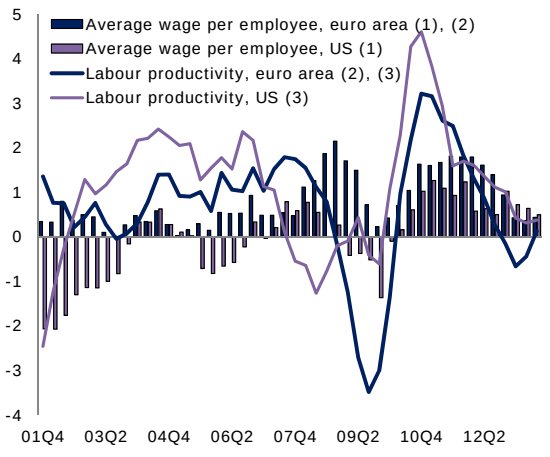
([56]) In fact, the ratio of profit tax payments to profits (a crude measure of an aggregate tax rate) in the euro area and the United States has been almost the same since the start of the crisis, falling substantially in 2008-09, indicating that tax policy was not more favourable for profits in one economy than in the other.

The cyclicality of operating surplus depends on the impact of the cycle on labour productivity as well as on wages. The worse performance of operating surplus in the euro area since 2008, as compared with that in the United States, reflects a stronger deterioration in labour productivity accompanied by unfavourable developments in wages per employee.

Labour productivity growth in the euro area turned sharply negative in 2009, opening a big gap with the positive (albeit modest) wage growth (Graph II.4.4). In the United States, on the other hand, labour productivity growth became negative earlier, but to a lesser extent and some downward wage adjustment took place in 2009.

Graph II.4.4: **Labour productivity and wages, euro area and US**

*(2001Q4-2013Q3, y-o-y % change)*




(1)Real wages calculated by the GDP deflator. (2)Euro area excluding Latvia. (3)In terms of total employment (thousands).
***Source:*** Eurostat, US Bureau of Economic Analysis, US Bureau of Labour Statistics, DG ECFIN calculations.

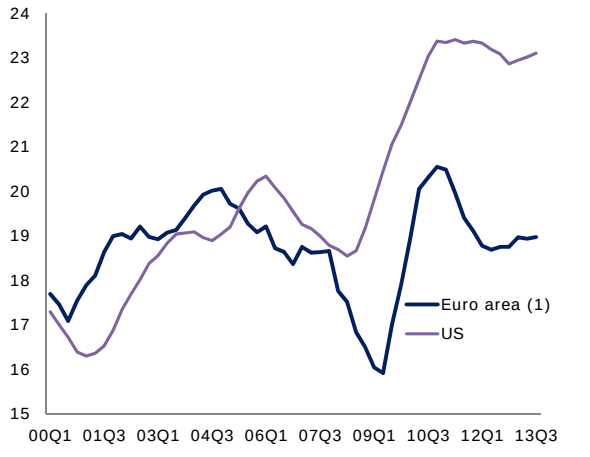
There are a number of reasons for the different labour adjustments in the euro area and the United States. In the former, apart from a higher level of employment protection, short-term work schemes were put in place in the early stages of the crisis. ([57]) In addition, as labour force adjustment tends to be more costly in the euro area, some firms (particularly small firms and those with highly qualified employees) preferred to retain their labour force. ([58]) Because of a lack of wage flexibility, the higher degree of 'labour hoarding' in the euro area came at the expense of lower operating surplus and profits and consequently put a downward pressure on the capacity accumulate internal funds to deleverage.

### Corporate savings are much lower in the euro area

Negative developments in euro area corporate profitability were reflected in corporate savings, which together with physical investment determines the internal funds available for balance sheet adjustment. In 2009-10, there was a sharp drop in euro area savings because profits acted as shock absorbers and fell more rapidly than dividend payments, leaving less spare cash available. In contrast, savings by US NFCs increased substantially on rising profits after an early-crisis low point and reached a historically high level of around 23 % of GVA in 2010Q3 (Graph II.4.5).

Graph II.4.5: **Savings of NFCs**

*(2000Q1- 2013Q3, % of GVA)*




(1)Euro area excluding Latvia.
***Source:*** Eurostat, Bureau of Economic Analysis, DG ECFIN calculations.

The impression that US corporate behaviour has been more geared towards accumulating savings than that in the euro area is reinforced when one looks at dividend distribution. Dividends paid by euro area NFCs have been on a declining trend since the start of the crisis, but those paid by US firms have also decreased. This is remarkable given

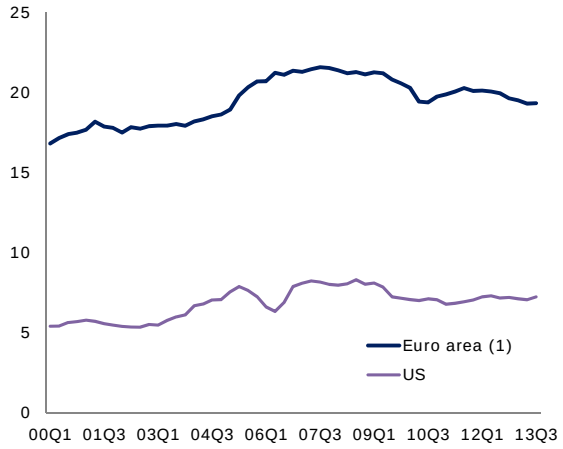
([57]) According to the OECD: "Public short-term work schemes have played an important role in preserving jobs during the crisis in a number of countries, although significant hours reductions were also achieved via lower overtime hours, hours averaging arrangements and employer initiatives.", see OECD Employment Outlook 2010 – Moving Beyond the Job Crisis.

([58]) See Box 1.2. Labour hoarding across different types of firms, in OECD Employment Outlook 2010 – Moving Beyond the Job Crisis.

the positive profit developments in the United States (Graph II.4.6). A drop in dividends alongside profit growth suggests that, after 2008, US companies preferred to direct a bigger proportion of the profit recovery to corporate savings and, thereby, balance sheet adjustment. The ratio of dividends to profits in the United States has fallen from about one third before the crisis to one quarter now. This ratio also dropped in the euro area, although by less. ([59])

Graph II.4.6: **Dividends paid of NFCs**

*(2000Q1-2013Q3, % of GVA)*




(1)Euro area excluding Latvia.
***Source:*** Eurostat, Federal Reserve Board, DG ECFIN calculations.

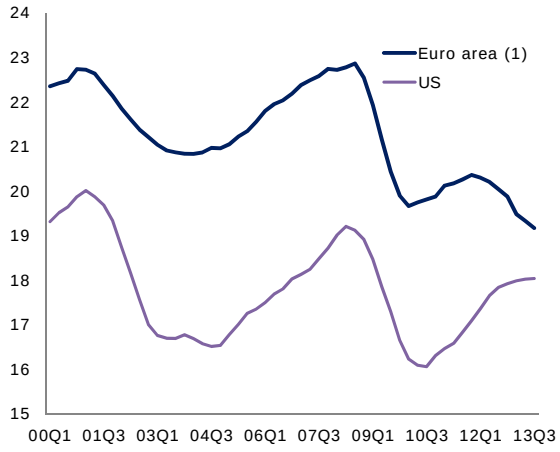
## Disappointing physical investment in the euro area and the United States

Cutting investment in physical assets is another way of reducing excessive indebtedness. Corporate investment as a proportion of activity dropped sharply both in the euro area and in the United States in the early stages of the crisis (Graph II.4.7).

After a modest recovery in 2010-11, the investment rate decreased again in the euro area. The investment recovery was more solid in the United States but has lost momentum since the end of 2012 and the investment rate remains below its pre-crisis peak. Overall, it seems that euro area corporations partly compensated for less supportive savings developments than in the US by curbing physical investment more than their US counterparts.

Graph II.4.7: **Investment of NFCs**

*(2000Q1- 2013Q3, % of GVA)*




(1)Excluding Latvia.
***Source:*** Eurostat, US Bureau of Economic Analysis, DG ECFIN calculations.

## A more modest increase in net lending in the euro area than in the US

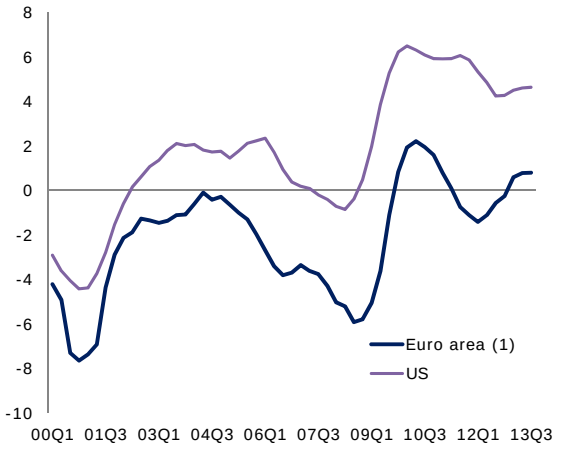
Since 2013, firms' net lending in the euro area has been in positive territory, but substantially less so than that in the United States (Graph II.4.8). Positive NLB in the euro area, unlike that in the United States, is mostly due to a low investment rate alone, rather than low investment combined with high savings. The combination of disappointing investment and high savings has translated into historically high and sustained NLB for US firms.

This persistent net lending position in the United States is atypical, as firms usually invest more than they save. It suggests that US firms have been adjusting their balance sheets significantly since the beginning of the crisis via their internal funds, while euro area firms seem to have opted for much slower balance sheet adjustment.

([59]) Dividend payments are not the only way of distributing profits to shareholders. Equity buybacks can also be used for this purpose and firms that choose this option will tend to have higher savings and lower dividends paid.

Graph II.4.8: **Net lending/borrowing of NFCs**

*(2000Q1- 2013Q3, % of GVA)*




(1)Excluding Latvia.
***Source:*** Eurostat, US Bureau of Economic Analysis, DG ECFIN calculations.

## Debt deleveraging has been more pronounced in the US than in the euro area

The faster pace of adjustment of balance sheets in the United States is confirmed by the corporate debt data (Graph II.4.9). ([60]) ([61]) While both the euro area and the United States entered the crisis with swiftly rising and historically high levels of debt, deleveraging has progressed more rapidly in the latter since the crisis. By the beginning of 2012, US corporate debt had fallen by approximately 15 pp as a proportion of activity, while euro area debt had dropped by 7 pp. ([62])

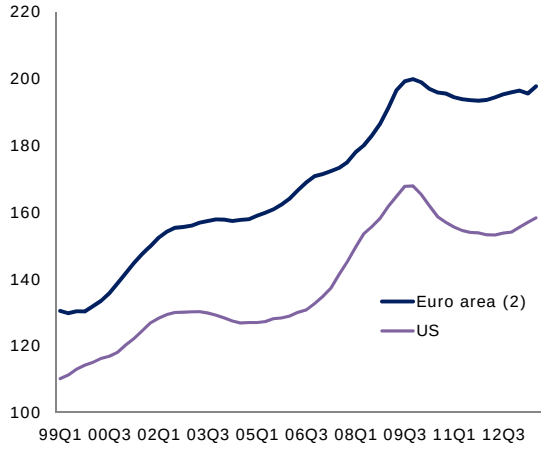
([60]) Non-financial corporate debt consists of loans and securities other than shares (corporate bonds); both can be classified as short- or long-term, depending on whether their original maturity is less or more than one year.

([61]) This section analyses developments in non-consolidated financial flows and stocks in the euro area and in the United States for two reasons: it is important to have a sense of financial positions within the institutional sector, e.g. loans between NFCs are an important part of intra-firm relationships, as head offices use them to finance subsidiaries, for example, perhaps for tax reasons. This is relatively more important in the euro area than in the United States. Consolidated financial asset and flow data eliminate these intra-sector positions; and different approaches may be taken to consolidation, as in the euro area there is the additional issue of cross-border consolidation between Member States, while there is no need for flows and positions between firms in different US states to be treated separately.

([62]) The debt-to-equity ratio is another measure of corporate leverage widely followed by investors. Faster stock market recovery helped US firms reduce this ratio more than those in the euro area.

Graph II.4.9: **Debt levels of NFCs(1)**

*(1999Q1-2013Q3, % of GVA)*

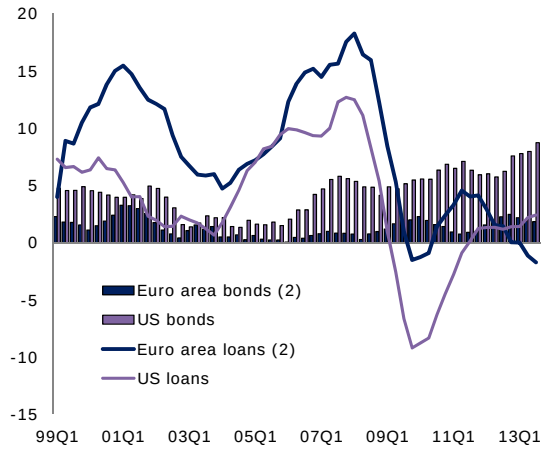



(1)Securities other than shares and loans. (2)Excluding Latvia.
***Source:*** Eurostat, US Bureau of Economic Analysis, DG ECFIN calculations

Firms in the euro area and the United States entered the crisis with almost the same level of short-term debt as a proportion of total debt. Since the crisis, the adjustment away from short-term debt has been significantly more pronounced in the United States, suggesting more active balance sheet restructuring.

Graph II.4.10: **Debt flows of NFCs(1)**

*(1999Q1- 2013Q3, % of GVA)*




(1)Securities other than shares and loans.
(2)Excluding Latvia.
***Source:*** Eurostat, US Bureau of Economic Analysis, DG ECFIN calculations.

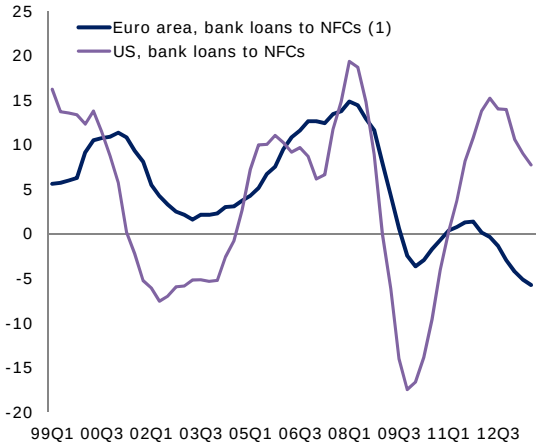
Due to differences in the structure of corporate finance, loans (as opposed to bonds) tend to form a bigger proportion of debt in the euro area than in the United States. An important element of the

corporate balance sheet adjustment process in both economies has been a movement away from an excessive reliance on loans (Graph II.4.10) and towards bond financing. This trend has been substantially more pronounced in the United States, presumably reflecting the fact that bond markets are more developed in that country.

Developments in non-financial corporate debt were also influenced by developments in financial intermediation, in particular in the banking sector. Financial accounts show NFCs' debt exposure, but do not indicate whether the debt holder is a bank. According to bank balance sheet statistics, the nominal growth of loans vis-à-vis NFCs has been mostly negative in the euro area since 2009Q4 (Graph II.4.11). Coupled with the positive loan inflows seen in the national accounts between 2010Q3 and 2012Q3 (Graph II.4.10), this shows a degree of substitution in corporate loan liability ownership between banks and other financial firms and sectors (including other NFCs) in this period. According to the counterparty breakdown of NFC domestic loans published by the ECB, corporate borrowings from other NFCs represented 29 % of all loans by 2013Q3 (up from 26 % in 2008Q1), while the proportion of borrowings from monetary financial institutions (MFIs) had dropped (from 60 % in 2008Q1) to an all-time low of 53 %. The proportion of loans from other non-bank financial intermediaries also increased. There is less evidence of a shift from banks to other loan providers in the United States, where loans between NFCs are much more limited.

Graph II.4.11: **Bank loans to NFCs**

*(1999Q1- 2013Q3, y-o-y % change)*




(1)Excluding Latvia.
***Source:*** ECB, US Federal Reserve Board, DG ECFIN calculations.

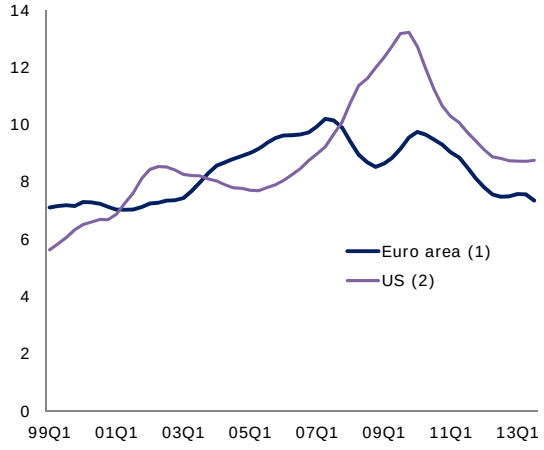
## Positive NLB has been used to acquire safe financial assets in both regions

In both the euro area and the United States, the positive NLB has been used to deleverage, but also to invest in safe financial assets. At the beginning of the crisis, much of the positive corporate NLB in the United States was invested in money market mutual funds, which is essentially investment in short-term low-risk assets (Graph II.4.12). (63)

Currency and deposits (another type of safe asset) have increased substantially in the euro area in recent years as a proportion of total firm activity (Graph II.4.13). This rise was driven almost exclusively by a rapid increase in firms' savings deposits. To some extent, a similar trend is observable in the United States. In particular, US cash balances (a sub-component of currency and deposits) approached 12 % of GVA by the end of 2013, a level not seen since the early 1990s. On the other hand, savings deposits have grown more modestly, resulting in a moderately positive overall trend in currency and deposits.

Graph II.4.12: **Mutual fund shares of NFCs**

*(1999Q1- 2013Q3, % of GVA)*




(1)Excluding Latvia.
(2)In the USA, these asset series can be broken down into investment in money market mutual funds and investment in other mutual funds. The 2009-11 increase is fully attributable to the former.
***Source:*** Eurostat, US Bureau of Economic Analysis, DG ECFIN calculations.

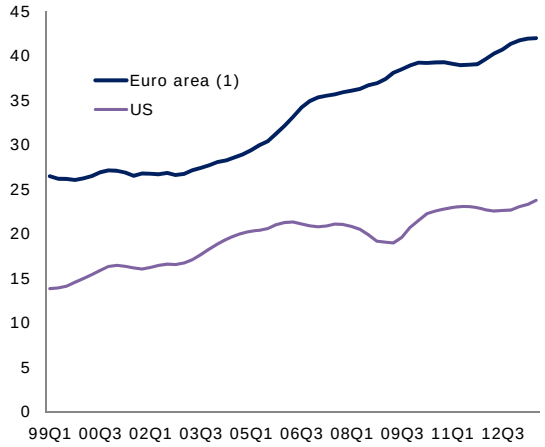
Overall, these two aspects of corporate financial investment behaviour signify considerable liquidity concerns on the part of firms in both the euro area

(63) Euro area financial accounts only show firms' investment in mutual funds overall and do not distinguish between types of mutual funds.

and the United States. They also represent a drive towards lower-risk assets, perhaps indicating increased risk aversion by corporations or a tendency to postpone physical investment in a context of perceived high uncertainty.

Graph II.4.13: **Currency and deposits – NFCs**

*(1999Q1- 2013Q3, % of GVA)*




(1)Excluding Latvia.
***Source:*** Eurostat, US Bureau of Economic Analysis, DG ECFIN calculations.

## Conclusion

Although both regions saw similar steep rises in corporate debt in the pre-crisis years, balance sheet adjustment since the crisis has been significantly slower in the euro area than in the United States. The more rapid adjustment in the United States can be explained by a stronger cyclical recovery, more supportive profitability developments and reduced dividend payment ratios. In the euro area, profitability has been hindered by a combination of lower flexibility in the labour markets and slow wage adjustment.

The slower balance sheet adjustment in the euro area corporate sector is visible in a slower fall in indebtedness but also a slower adjustment of the structure of balance sheets. In particular, the shift from loans to bonds and the extension of debt maturity have been more pronounced in the United States. In both regions, firms have used their positive NLB to accelerate the accumulation of safe and liquid financial assets. This could reflect continuing uncertainty regarding future demand and growth prospects.

Overall, the evidence discussed in this section shows that euro area firms are lagging significantly behind their US counterparts in terms of balance sheet consolidation. Given that investment rates remain disappointing even in the more advanced US corporate sector, a degree of caution appears warranted when assessing short-term prospects for corporate investment in the euro area.

# III. Recent DG ECFIN publications

### 1. Occasional Papers

European Economy. Occasional Papers. 170. January 2014
Financial Assistance Programme for the Recapitalisation of Financial Institutions in Spain. Fifth Review – Winter 2014
http://ec.europa.eu/economy_finance/publications/occasional_paper/2014/pdf/ocp170_en.pdf

European Economy. Occasional Papers. 169. December 2013
The Economic Adjustment Programme for Cyprus Second Review – Autumn 2013
http://ec.europa.eu/economy_finance/publications/occasional_paper/2013/pdf/ocp169_en.pdf

European Economy. Occasional Papers. 168. December 2013
Fiscal frameworks in the European Union: ommission services country factsheets for the Autumn 2013 Peer Review
http://ec.europa.eu/economy_finance/publications/occasional_paper/2013/pdf/ocp168_en.pdf

European Economy. Occasional Papers. 167. December 2013
Economic Adjustment Programme for Ireland - Autumn 2013 Review
http://ec.europa.eu/economy_finance/publications/occasional_paper/2013/pdf/ocp167_en.pdf

European Economy. Occasional Papers. 166. December 2013
Progress towards meeting the economic criteria for EU accession: the EU Commission's 2013 assessments
http://ec.europa.eu/economy_finance/publications/occasional_paper/2013/pdf/ocp166_en.pdf

European Economy. Occasional Papers. 165. November 2013
Romania: Balance-of-Payments Assistance Programme 2013-2015
http://ec.europa.eu/economy_finance/publications/occasional_paper/2013/pdf/ocp165_en.pdf

European Economy. Occasional Papers. 164. November 2013
The Economic Adjustment Programme for Portugal. Eighth and Ninth Review
http://ec.europa.eu/economy_finance/publications/occasional_paper/2013/pdf/ocp164_en.pdf

European Economy. Occasional Papers. 163. November 2013
Financial Assistance Programme for the Recapitalisation of Financial Institutions in Spain. Fourth Review – Autumn 2013
http://ec.europa.eu/economy_finance/publications/occasional_paper/2013/pdf/ocp163_en.pdf

European Economy. Occasional Papers. 162. October 2013
Economic Adjustment Programme for Ireland. Summer 2013 Review
http://ec.europa.eu/economy_finance/publications/occasional_paper/2013/pdf/ocp162_en.pdf

### 2. Economic papers

European Economy. Economic Papers. 514. February 2014
Martin Larch, Kristin Magnusson Bernard, Balint Tatar
Hard work, and More: How to successfully conduct adjustment with official assistance
http://ec.europa.eu/economy_finance/publications/economic_paper/2014/pdf/ecp514_en.pdf

European Economy. Economic Papers. 513. February 2014
Florian Wöhlbier, Caterina Astarita, Gilles Mourre
Consolidation on the revenue side and growth-friendly tax structures: an indicator based approach
http://ec.europa.eu/economy_finance/publications/economic_paper/2014/pdf/ecp513_en.pdf

European Economy. Economic Papers. 512. December 2013
Alexander Schwan, Etienne Sail
Assessing the economic and budgetary impact of linking retirement ages and pension benefits to increases in longevity
http://ec.europa.eu/economy_finance/publications/economic_paper/2013/pdf/ecp512_en.pdf

### 3. Other publications

Winter forecast 2014 - EU economy: recovery gaining ground
http://ec.europa.eu/economy_finance/publications/european_economy/2014/pdf/ee2_en.pdf

### 4. Regular publications

Business and Consumer Surveys (harmonised surveys for different sectors of the economies in the European Union (EU) and the applicant countries)
http://ec.europa.eu/economy_finance/db_indicators/surveys/index_en.htm

Business Climate Indicator for the euro area (monthly indicator designed to deliver a clear and early assessment of the cyclical situation)
http://ec.europa.eu/economy_finance/db_indicators/surveys/documents/2013/bci_2013_11_en.pdf

Key indicators for the euro area (presents the most relevant economic statistics concerning the euro area)
http://ec.europa.eu/economy_finance/db_indicators/key_indicators/index_en.htm

Monthly and quarterly notes on the euro-denominated bond markets (looks at the volumes of debt issued, the maturity structures, and the conditions in the market)
http://ec.europa.eu/economy_finance/publications/bond_market/index_en.htm

Price and Cost Competitiveness
http://ec.europa.eu/economy_finance/db_indicators/competitiveness/index_en.htm

Editor-in-Chief: Elena Flores

Overall coordination: Eric Ruscher

Data assistance: Christos Zavos

**Comments on the report would be gratefully received and should be sent to:**

Elena Flores
Director – Policy Strategy and Coordination
Directorate-General for Economic and Financial Affairs
Office CHAR 15/66

B-1049 Brussels

Email: elena.flores@ec.europa.eu

or

Eric Ruscher
Head of Unit – Macroeconomy of the euro area
Directorate-General for Economic and Financial Affairs
Office CHAR 15/248

B-1049 Brussels

Email: eric.ruscher@ec.europa.eu

**HOW TO OBTAIN EU PUBLICATIONS**

**Free publications:**

- one copy:
  via EU Bookshop (http://bookshop.europa.eu);

- more than one copy or posters/maps:
  from the European Union's representations (http://ec.europa.eu/represent_en.htm);
  from the delegations in non-EU countries (http://eeas.europa.eu/delegations/index_en.htm);
  by contacting the Europe Direct service (http://europa.eu/europedirect/index_en.htm) or
  calling 00 800 6 7 8 9 10 11 (freephone number from anywhere in the EU) (*).

  (*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

**Priced publications:**

- via EU Bookshop (http://bookshop.europa.eu).

**Priced subscriptions:**

- via one of the sales agents of the Publications Office of the European Union
  (http://publications.europa.eu/others/agents/index_en.htm).

KC-AK-14-001-EN-N

Publications Office