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European Commission  
Directorate-General for Economic and Financial Affairs

# Quarterly Report on the Euro Area

## Volume 16, No 2 (2017)



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**Marco Buti**  
Director-General

On 31 May 2017, the European Commission published the Reflection Paper on the deepening of the Economic and Monetary Union, setting out possible ways forward for deepening and completing the EMU by 2025 with a view to stimulate the debate and help reach a shared vision on its future architectural design. More recently, in his State of the Union address on 13 September 2017, Commission President Juncker called to make the most of the momentum and announced a Roadmap for a More United, Stronger and More Democratic Union. It includes initiatives and actions to be presented or completed before the European Parliament elections in June 2019, and actions and initiatives which are more ambitious, more forward-looking and that will shape the Union until 2025.

For EMU to deliver on growth, jobs, social fairness and financial stability *to the full of its potential*, it is indeed key to proceed on completing its institutional architecture. At the same time, to support the growth performance of the euro area, there is a need for action in a number of policy areas, as highlighted in this report.

The important and delicate issue of sequencing and packaging of labour and product market reforms, for instance, is analysed in Section I. These reforms ensure the efficient allocation of resources, contribute to making economies more resilient and strengthen growth potential. At the same time, the longer-term benefits of such reforms might be accompanied by negative short-term side effects, notably on aggregate demand. These shorter-term negative effects can be at least partly offset through appropriate sequencing and packaging, by exploiting synergies and complementarities between reforms. The econometric analysis indeed shows that the simultaneous implementation of labour and product market reforms in euro area countries tends to improve short-run growth dynamics. Supportive macroeconomic policies also play an

important role in the successful delivery of these reforms. A thorough understanding of all these aspects is key to devising a policy mix that allows longer term gains to be reaped without inflicting short-term pain.

Section II then zooms in on one of the main areas of structural reforms, the 'ease of doing business'. On business regulation and quality of public administration, euro area economies have made progress, but substantial differences across countries remain. In the European Semester, this policy area is still giving rise to a high number of country-specific recommendations, with implementation slow compared to other areas. Reforms on the ease of doing business are nonetheless particularly relevant for euro area members in view of their impact on increasing resilience, making progress on convergence and easing the transmission of the common monetary policy. Such reforms can furthermore deliver significant benefits in economic performance, while implying no, or a limited, budgetary cost.

A longer-term perspective is taken in Section III, which focuses on the determinants of trend total factor productivity (TFP) growth. TFP captures the efficiency in the use of production inputs and technological progress and is ultimately seen as the main determinant of long-term growth. It has been declining in the euro area, and catching-up relative to US productivity levels has slowed down over the last decade. Quality of education, investment in intangible assets, public R&D expenditure, trade openness and policies fostering job transitions and self-employment are all found to be positively associated with trend TFP growth, which suggests areas for policy measures that would support long-term growth in the euro area.

Finally, Section IV looks at bank lending constraints in the euro area and their possible macroeconomic implications in the current

economic context. The focus here is on how the combination of low bank profitability, reluctance to issue bank equity and higher target capital ratios can *temporarily* constrain bank lending. While an increase in bank capital ratios can be expected to enhance financial stability in the euro area, the ongoing transition towards higher capital ratios could result in temporary lending

constraints if the aforementioned combination of factors applies, potentially reducing growth over the short run. Restoring bank profitability, implementing conservative dividend pay-out policies and promoting equity issuance could therefore have positive macroeconomic effects in the current context, as they would reduce the risk of temporarily compressing bank lending.



# I. Maximising the impact of labour and product market reforms in the euro area – sequencing and packaging

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*Well-functioning labour and product markets ensure the efficient allocation of resources, contribute to making economies more resilient and strengthen growth potential in the long run. Structural reforms are beneficial because they improve the functioning of markets in the longer term but some reforms can have negative short-term effects, notably on aggregate demand, that need to be carefully considered in policy design. This section focusses on these shorter-term effects. It first provides a review of the transmission channels through which structural reforms may affect aggregate demand in the short term and then highlights how the negative effects could be at least partly offset through an appropriate 'sequencing' and 'packaging' of reforms that takes advantage of synergies and complementarities. Packaging also increases the political acceptability and ownership of reforms, thereby facilitating their implementation. Econometric analysis suggests that the simultaneous implementation of labour and product market reforms can indeed improve growth dynamics in the short run. Well-functioning labour and product markets are also found to increase the estimated speed of adjustment of GDP growth towards potential, thus providing support to the idea that structural reforms increase resilience. The latter is a particularly important feature for euro area members as they cannot use the nominal exchange rate as a tool for adjustment against shocks. Finally, supportive macroeconomic policies also play an important role in the successful delivery of structural reforms. <sup>(1)</sup>*

## I.1. Introduction

It is widely accepted that well-functioning labour and product markets ensure the efficient allocation of resources and that they improve the capacity of economies to adjust to shocks by limiting the depth and duration of deviations from potential output.<sup>(2)</sup> This is particularly relevant for the economies of the euro area as they are unable to use nominal exchange rates as an autonomous adjustment mechanism to cushion country-specific shocks.

Structural reforms ultimately strengthen economies' growth potential over the longer run.<sup>(3)</sup> Nevertheless, their short-term effects, notably on aggregate demand, deserve careful consideration. While exerting positive effects in the longer term, some structural reforms can have a negative short-term impact on demand. A question to be addressed is whether there are ways

to offset, at least partly, these short-term negative effects through appropriate 'sequencing' and 'packaging' of reforms, and whether supportive macroeconomic policies can play a role in this. A thorough understanding of these aspects is crucial to devising an appropriate economic policy mix that would allow policy makers to achieve long term gains while avoiding short-term pain. Crucially, such an approach would also help to increase the political acceptability and ownership of structural reforms and therefore facilitate their sustained implementation until their positive effects are clearly visible.

While most of the literature on structural reforms focuses on their impact on economic growth by considering the medium-term effects on potential output, this section focusses on two shorter-term effects, namely on aggregate demand and the speed of adjustment of growth towards potential (taken here as a proxy for the resilience of the economy). Possible transmission channels through which structural reforms may exert shorter-term effects on demand are reviewed. An econometric analysis is also carried out to test empirically the extent to which structural reforms, and in particular interactions between them ('packaging'), affect GDP growth and economic resilience in the shorter run.

The section is structured as follows. Sub-section III.2 provides an introductory analysis of structural reforms in the euro area in recent years, in terms of types of labour and product market reforms

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<sup>(1)</sup> This section was prepared by Katia Berti and Eric Meyermans. The authors wish to thank Erik Canton for useful comments.

<sup>(2)</sup> European Commission (2016), 'The Economic Impact of Selected Structural Reform Measures in Italy, France, Spain and Portugal', *European Economy Institutional Paper* 23 shows how structural reforms may induce significant output gains through higher productivity and/or higher employment rates in the medium to long run. See also, Anderson, D., Barkbu, B., Lusinyan, L., and D. Muir (2013), 'Assessing the Gains from Structural Reforms for Jobs and Growth', in IMF, *Jobs and Growth: Supporting the European Recovery*.

<sup>(3)</sup> Structural reforms are defined here as reforms that trigger (permanent) changes in the way markets and governments function. The focus is restricted here specifically to product and labour market reforms.

introduced and reform efforts across Member States. Sub-section III.3 then reviews the different transmission mechanisms via which structural reforms may affect aggregate demand in the shorter term. In this respect, the benefits that can be achieved through sequencing and packaging of structural reforms, and their interactions with supportive macroeconomic policies, are the object of analysis in Sub-section III.4. Sub-section III.5 then presents the econometric analysis, and Sub-section III.6 concludes.

## I.2. Structural reforms in the euro area: a selective overview

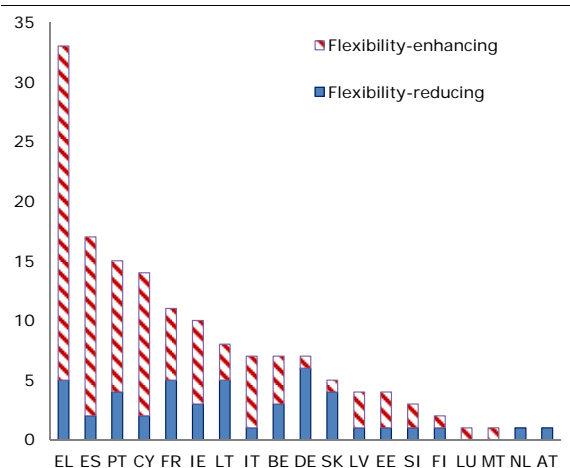
### I.2.1. Labour market reforms

Since the onset of the economic and financial crisis in 2008, a significant part of labour market reforms in the euro area Member States with unsustainable external deficits has focussed on regaining competitiveness. This has been done primarily via changes in the rules affecting wage setting and promoting the reallocation of labour to more productive jobs/sectors by, for example, reforming employment protection legislation and strengthening active labour market policies. In the rest of the euro area, labour market reforms have been driven primarily by the objective of making it easier for firms to attract skilled workers and to adjust to fast-changing markets (via adequate employment protection legislation), while providing the necessary security to employees (for example, through well-designed unemployment benefit schemes and active labour market policies).

Focussing on the period 2008-2014 (currently the last available year), the LABREF database <sup>(4)</sup> shows a strong variation in reform intensity across the euro area, which also reflects differences in initial conditions. <sup>(5)</sup> As one would expect, Member States that experienced excessive growth in nominal unit labour costs in the run-up to the crisis have since then recorded by far the highest number of wage setting reforms. Greece, for instance, introduced 33 measures in this area (ranging from

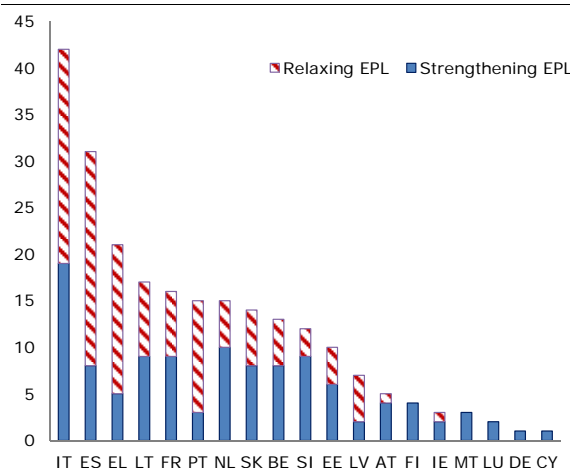
cutting the minimum wage to setting a maximum duration of collective agreements at three years), followed by Spain, Portugal and Cyprus, all with around 15 measures each (Graph I.1). The majority of the reforms introduced since the crisis have focussed on reinforcing the framework conditions for wage setting in order to strengthen the economies' adjustment capacity.

Graph I.1: **Wage setting**  
(Number of reforms 2008-2014)



Source: Labref

Graph I.2: **Employment protection legislation (EPL)**  
(Number of reforms 2008-2014)



Source: Labref

The number of employment protection reforms introduced since the crisis also varies greatly across the euro area. Italy, for instance, implemented as many as 43 measures ranging from putting limitations on on-call duty to increasing the maximum duration of temporary contracts. Spain and Greece, the next most active reformers, introduced more than 30 and 20 measures

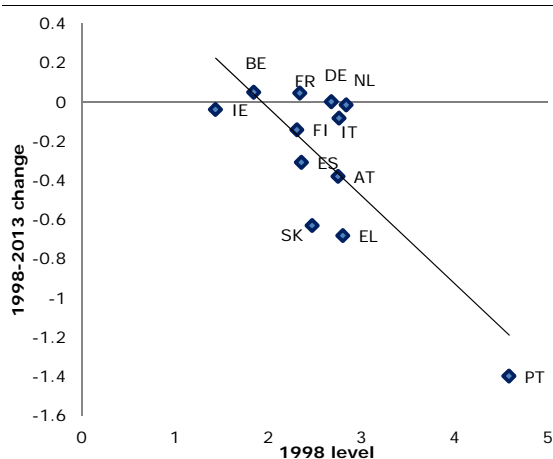
<sup>(4)</sup> The LABREF database is managed by the European Commission in cooperation with the Employment Committee. The latest version provides information on the type of labour market measures enacted in EU Member States in a particular year between 2000 and 2014.

<sup>(5)</sup> See Turrini, A., Koltay, G., Pierini, F., Goffard, C., and A. Kiss (2014), 'A Decade of Labour Market Reforms in the EU: Insights from the LABREF database', *European Economy Economic Papers* 522.

respectively (Graph I.2). As shown in the chart, and as one would expect, most reforms to employment protection legislation in the euro area periphery were flexibility-enhancing. Additional information is provided by the OECD synthetic indicator on procedures and costs for dismissals and hiring procedures related to fixed-term or temporary contracts. The indicator shows that Portugal and Greece, among the euro area Member States with the most restrictive employment protection in 1998, appear to have introduced strong reforms between 1998 and 2013, the last available year (Graph I.3).

Finally, looking at all Member States, the vast majority of active labour market reforms <sup>(6)</sup> aimed to increasing their availability, generosity and/or effectiveness, with the highest number of reforms recorded in Portugal, Belgium, Greece, and Latvia (Graph I.4).

Graph I.3: Change in employment protection legislation

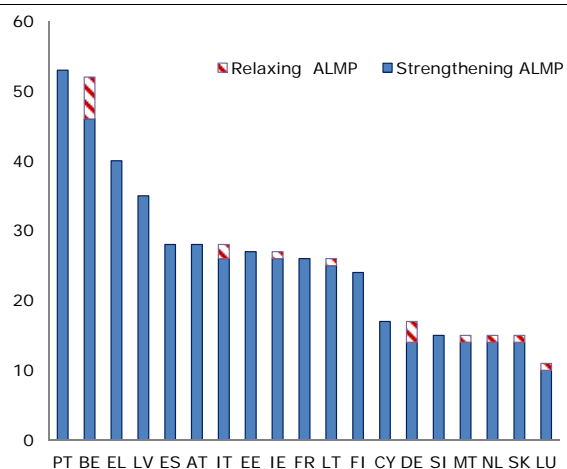


(1) Indicator ranging from 0 for least restrictions to 6 for most restrictions

Source: Authors' calculations based on OECD indicators on employment protection legislation

<sup>(6)</sup> Based on the OECD definition, "active labour market programmes includes all social expenditure (other than education) which is aimed at the improvement of the beneficiaries' prospect of finding gainful employment or to otherwise increase their earnings capacity. This category includes spending on public employment services and administration, labour market training, special programmes for youth when in transition from school to work, labour market programmes to provide or promote employment for unemployed and other persons (excluding young and disabled persons) and special programmes for the disabled".

Graph I.4: Active labour market policies (Number of reforms 2008-2014)



Source: Labref

### I.2.2. Product market reforms

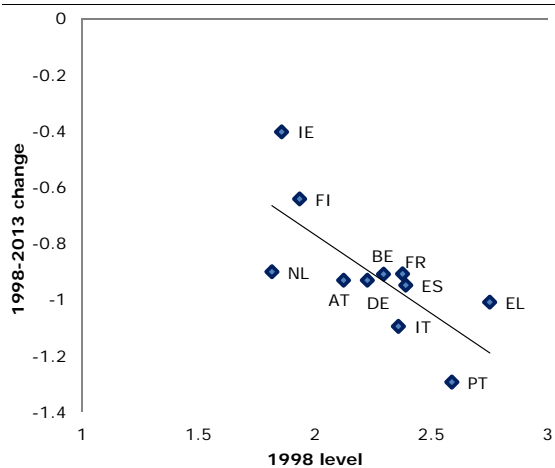
Product market reforms cover a broad range of measures primarily aimed at reducing the regulatory burden and increasing competition in product markets, including through privatisation and measures that reduce the cost and administrative burden of starting, operating or expanding a business.

The OECD product market regulation indicator suggests that Portugal, followed by Italy and Greece (all countries with relatively restrictive regulations in 1998) recorded the strongest decrease in the rigidity of their product markets between 1998 and 2013 (Graph I.5). On average, there appears to be a negative relationship between the level of product market regulation in 1998 and the change between 1998 and 2013, meaning that in general, euro area Member States with higher initial levels of regulation are the ones that introduced greater flexibility. Overall, this has led to some convergence in economic structures among euro area countries.

Although the dispersion has decreased significantly since the crisis in almost all Member States, data from 2016 show that the number of days and procedures required to start a business still differs significantly across the euro area. In 2016, it took as many as 28 days to start a business in Malta and around 20 days in both Austria and Luxembourg, compared to just 2.5 days in Portugal (Graph I.6). Between 2007 and 2016, among the Member States for which data are available, Slovenia, Spain, Estonia, Greece and Belgium made the most

progress in reducing the number of days required to start a business.

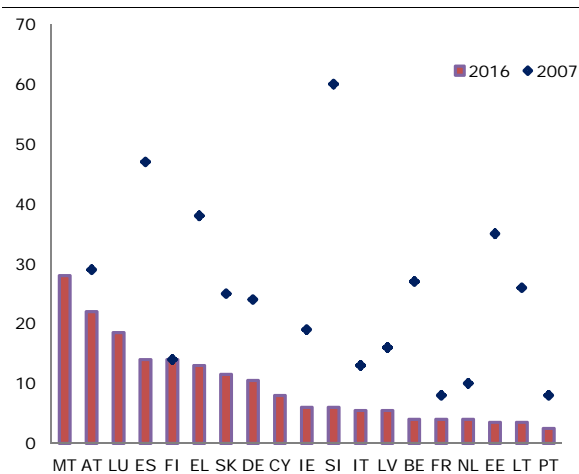
Graph I.5: Change in product market regulation



(1) Indicator ranging from 0 for least restrictions to 6 for most restrictions

Source: Authors' calculations based on OECD indicators on product market regulation

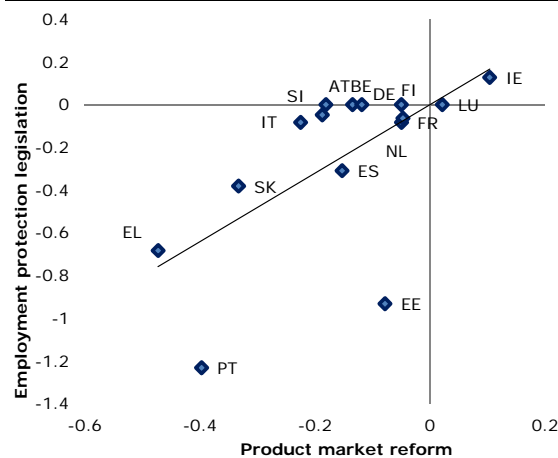
Graph I.6: Number of days to start a business



Source: World Bank Doing Business database

Finally, by looking at the interactions between structural reforms, over the period 2008-2013 (the last year for which data is available) product market reforms displayed a positive correlation with reforms to employment protection legislation, meaning that on average the two tended to go hand in hand (Graph I.7).

Graph I.7: Labour and product markets: reform effort over 2008-2013



(1) Indicator ranging from 0 for least restrictions to 6 for most restrictions. Negative values indicate a reduction in restrictions.

Source: Authors' calculations based on OECD indicators on product market regulation and employment protection legislation

### I.3. Shorter-term effects of structural reforms on aggregate demand

While in the longer run, well-designed and effectively implemented labour and product market reforms of the type described above strengthen growth potential and speed up the reallocation of labour and capital to more productive uses, in the transition to the new equilibrium there will also be jobs and firms that may be transformed or destroyed because they are no longer profitable. Structural reforms, by facilitating such an adjustment, may therefore also have important effects on aggregate demand in the short run (for instance, through their effects on employment and wages), of which the contractionary or expansionary nature depends on several factors explored below. (7)

#### I.3.1. The expectations channel

Expectations are clearly one of the channels through which structural reforms can affect demand in the shorter term. Forward-looking economic agents formulate expectations as to how

(7) This should be considered also against possible longer-term factors affecting aggregate demand, for instance the increasing propensity to save and declining propensity to invest caused by, inter alia, demographic changes, rising income inequality, etc. (the so-called 'secular stagnation hypothesis'). See Summers, L. (2016), 'The Age of Secular Stagnation: What It Is and What to Do About It', *Foreign Affairs*, February; Teulings, C., and R. Baldwin (2014), 'Secular stagnation: Facts, causes, and cures', Vox eBook.

structural reforms will affect future prices and incomes and adjust their expenditures and savings accordingly to smoothen consumption over the life-cycle and reap higher returns on investments.

However, two necessary conditions for the expectations channel to be operational are: i) reforms need to be credible; and ii) agents need to have access to financial markets. In order for structural reforms to be seen as credible they need to be coherent and have enough political support to make it likely that future governments remain committed to them. The second condition, access to financial markets, is necessary to support economic agents in adjusting their inter-temporal allocation of consumption and investment.<sup>(8)</sup> When operational, this expectations channel has the potential to dampen the possible negative short-term side effects of some structural reforms on aggregate demand,<sup>(9)</sup> which highlights the importance that the two aforementioned pre-conditions are fulfilled.

### I.3.2. The role of the business cycle

The state of the business cycle also influences the short-term impact of structural reforms on aggregate demand. Some of the transmission mechanisms identified have positive effects while others have a negative impact, pointing to an ambiguous overall net effect:

- **Direct aggregate demand effects.** Some structural reforms have a direct impact on aggregate demand. For example, they can increase the profitability of investment or raise the disposable income of liquidity-constrained households, or to the contrary, facilitate dismissals which may in the short run lead to higher unemployment and lower consumption.<sup>(10)</sup>

- **Price effects.** Structural reforms that improve potential productivity may decrease expected and actual inflation in the near future. As lower prices increase real disposable income, aggregate demand may get a boost, especially in case a significant part of economic agents is liquidity constrained.
- **Rising real interest rates at the zero lower bound.** With falling (expected) inflation, there may be upward pressure on the real interest rate. This is particularly the case when further decreases in the nominal interest rate are constrained by the zero lower bound of interest rates.<sup>(11)</sup> In turn, this real interest rate rise may induce an appreciation of the euro exchange rate in the short run. Both effects may have a negative impact on aggregate demand. In addition, lower (than expected) inflation also increases the real debt burden, which in turn may reduce (domestic) aggregate demand.<sup>(12)</sup>
- **Financial constraints.** The materialisation of consumption and investment effects from expected changes in future incomes related to structural reforms may depend on the financial constraints faced by economic agents. If many are unable to borrow and spend due to excessive debt or elevated uncertainty, the anticipation of future increases in income triggered by structural reforms may not translate into short-term increases in spending.<sup>(13)</sup>
- **Wealth effects.** Supply-side policies that open up new opportunities and/or raise overall productivity may generate wealth effects (such as increases in stock value), raising the value of what can potentially be used as collateral to

<sup>(8)</sup> See Buti, M., Turrini, A., Van den Noord, P., and P. Biroli (2008), 'Defying the 'Juncker Curse': Can Reformist Governments Be Re-elected?', *Economic Papers* 324.

<sup>(9)</sup> For instance, Fernández-Villaverde, J., Guerrón-Quintana, P., and J. Rubio-Ramírez (2011), 'Supply-Side Policies and the Zero Lower Bound', *NBER Working Paper* No. 17543, argue that reforms that improve productivity in the future may generate wealth effects that increase consumption and reduce savings today.

<sup>(10)</sup> See Vogel, L. (2014), 'Structural reforms at the zero bound', *Quarterly Report on the Euro Area*, Vol. 13, No. 3; Duval, R., and D. Furceri (2016), 'The Effects of Labor and Product Market Reforms: The Role of Macroeconomic Conditions and Policies', International Monetary Fund.

<sup>(11)</sup> See Eggertsson, G., Ferrero, A., and A. Rao (2014), 'Can Structural Reforms Help Europe?', *Journal of Monetary Economics*, Vol. 61, pp. 2–22. However, not all structural reforms will induce a price decrease. For example, structural reforms reducing labour-market duality strengthen labour market efficiency and also workers' bargaining power, and can therefore also put upward pressure on wages and prices. See, for example, for the case of Japan, Porcellacchia, D. (2016), 'Wage-Price Dynamics and Structural Reforms in Japan', *IMF Working Paper* 16/20.

<sup>(12)</sup> This is based on the assumption that the marginal propensity of debtors to spend is greater than that of creditors.

<sup>(13)</sup> See Koo, R. (2014), 'The Escape from Balance Sheet Recession and the QE Trap: A Hazardous Road for the World Economy', John Wiley & Sons.



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finance contemporaneous consumption and investment, thereby boosting demand. <sup>(14)</sup>

### I.3.3. The role of cross-border spillovers

Structural reforms may also generate shorter-term effects on demand through cross-border spillovers via, such channels as changes in international prices and financial flows. <sup>(15)</sup> Simulations run with dynamic stochastic general equilibrium models nonetheless suggest that cross-country spillovers from structural reforms might be small. However, a simultaneous and coordinated implementation of structural reforms throughout the euro area would have a bigger effect on output than if reforms were implemented by Member States in isolation. <sup>(16)</sup>

The effectiveness of structural reforms introduced in one Member State might nonetheless be affected by reforms elsewhere. For example, structural reforms that reduce labour costs in one Member State, such as a cut in labour taxes financed by an increase in value added taxes, may generate reactions in other Member States, which could trigger second-round effects on domestic aggregate demand. In this respect, a well-balanced coordination of structural reforms across Member States (seeking a symmetric rebalancing between current account surplus and deficit countries) appears important to promote sustainable growth in the area.

## I.4. Complementarities between structural reforms and supportive macroeconomic policies

### I.4.1. Benefits expected from sequencing and packaging of structural reforms

The possible short-term side effects on aggregate demand described above can be at least partly offset by exploiting synergies and complementarities between different types of structural reforms.

Labour and product markets are clearly closely related to each other: the wages that employees earn are used to buy goods and services, while the

revenues of these sales are used to pay labour and capital. As such, there are inevitable interactions between reforms in labour and product markets (including with regard to shorter-term effects on demand), which should be accounted for when designing reform packages. <sup>(17)</sup>

Product market reforms can be expected to lower prices, thereby creating a cushion for labour market reforms that trigger a decrease in nominal wages. However, the price effects of product market reforms may take significant time to materialise, while labour market reforms seem to have a faster impact on wages. As such, an appropriate sequencing would be useful to limit the impact on real wages. This can importantly help not to depress domestic demand (especially in a macroeconomic context already characterised by subdued aggregate demand), make necessary labour market reforms politically more acceptable and contain possible social costs of the reforms (again with beneficial effects in terms of domestic demand and growth). <sup>(18)</sup>

To the extent that product market reforms create new opportunities, facilitate firms' entry and increase competition, output and employment may be expected to increase, thus strengthening the case for introducing product market reforms before flexibility-enhancing labour market reforms. On the other hand, if product market reforms increased the price-elasticity of product demand, labour demand could also become more wage-elastic, which could weaken employees' bargaining power and put downward pressure on wages, potentially offsetting at least some of the gains obtained from the initial price decrease. <sup>(19)</sup> In general terms, nevertheless, in rigid economies where both product and labour market reforms are needed, having product market reforms preceding labour market reforms can be expected to make more likely that the long-term benefits from

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<sup>(14)</sup> See Fernández-Villaverde, J, Guerrón-Quintana, P., and J. Rubio-Ramírez (2011), 'Supply-Side Policies and the Zero Lower Bound', *NBER Working Paper* No. 17543.

<sup>(15)</sup> See European Commission (2014), 'Cross-border spillovers in the euro area', *Quarterly Report on the Euro area*, Vol. 13, No. 4, pp. 7-22.

<sup>(16)</sup> See European Commission (2014).

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<sup>(17)</sup> Interactions are complex. Those with financial markets and the public sector are also relevant, for instance, even though not assessed in detail here.

<sup>(18)</sup> See Blanchard, O., and F. Giavazzi (2003), 'Macroeconomic Effects of Regulation and Deregulation in Goods and Labour Markets', *Quarterly Journal of Economics*, Vol. 118, pp. 897-907; Alesina, A., Ardagna, S., and V. Galasso (2011), 'The Euro and Structural Reforms', *Review of Economics and Institutions*, Vol. 2, No. 1, pp. 1-37.

<sup>(19)</sup> See Knell, M. (2004), 'Institutional Interactions in Open Economies: Implications for EMU', Chapter 4 in Solow, R. (2004), 'Structural Reforms and Economic Policy', Palgrave MacMillan.

reforms are reaped while containing possible short-term side effects. <sup>(20)</sup>

Given that the potential for synergies between product and labour market reforms are evident in terms of their pass-through from one market to the other, this calls for an appropriate combination and synchronisation, or ‘packaging’ of reforms. If wages, for instance, decreased under the effect of labour market reforms and output prices adjusted only sluggishly due to rigidities in product markets, the delayed price adjustment would lead to a decrease in the purchasing power of employees. As a consequence, aggregate demand could weaken in the short run. Labour market reforms are therefore better accompanied by appropriate product market reforms that strengthen the pass-through. <sup>(21)</sup>

Vice versa, when product market reforms create the conditions to reallocate production factors to more productive activities they should be accompanied by labour market reforms that improve the smooth reallocation of labour so as to exploit the new opportunities as soon as possible and contain the costs of transition to the new equilibrium. Here too appropriate packaging is key to maximising the benefits of reforms.

Building upon mutually reinforcing reform incentives in product and labour markets can also help ease the implementation of reform packages. Product market reforms related to the further opening of domestic markets to foreign competition, for instance, may strengthen incentives to decentralise wage bargaining to better set wages in line with productivity, supporting competitiveness and growth. <sup>(22)</sup> In turn, if wage setting becomes more decentralised, firms may have stronger incentives to operate in open product markets, again with beneficial effects on growth.

Appropriate packaging of reforms is clearly important also within policy areas, not only across them. For instance, reforms that lead to a reduction in unemployment benefits, which may reduce aggregate demand in the short term, should take place after active labour market policies

reforms and in combination with macro-policies that are supportive of aggregate demand. Also, as in the short run some structural reforms in labour markets might involve less job security and more wage moderation, reforms that strengthen flexibility should at least be complemented – if not preceded - by reforms that improve security for workers, along flexicurity principles. This calls, for instance, for well-designed life-long learning policies, active labour market policies (including career guidance during job transitions), modern labour laws (including more flexible and secure contractual arrangements for employers and employees), as well as social security provisions that strengthen occupational and geographical mobility within and between firms (including the portability of social security rights).

More generally, well-functioning social welfare systems have the potential to temper precautionary savings associated with the uncertainty inherently related to the implementation of structural reforms. This can be expected to have a positive impact on aggregate demand in the short run.

#### I.4.2. Reform packaging and political economy barriers to reforms

The packaging of structural reforms can also prove beneficial for reasons related to the political economy of reforms. Past experience clearly shows that, while certain structural reforms are expected to provide substantive net benefits at aggregate level over the medium term, it can nonetheless remain politically very difficult to implement them. The economic literature has identified a whole range of political economy considerations explaining this sub-optimal outcome. They range from the fact that voters might prefer the familiar status-quo to the uncertainty inherent to structural reforms <sup>(23)</sup> and the fact that ageing societies (like those in the euro area Member States) may provide less political support for these reforms (as older people may discount the future uncertain benefits of structural reforms at a higher rate than the young), <sup>(24)</sup> to the short-termism of politicians (the

<sup>(20)</sup> Coere, B. (2016), 'Structural reforms on the way to a complete Economic and Monetary Union', speech delivered at the International Conference on Structural Reforms in Advanced Economies, Hertie School of Governance, Berlin, 17 June.

<sup>(21)</sup> A slow pass-through may be due to, inter alia, menu costs, rigid price regulations, or strong market power.

<sup>(22)</sup> See Knell, M. (2004).

<sup>(23)</sup> See Fernandez, R., and D. Rodrik (1991), 'Resistance to Reform: Status Quo Bias in the Presence of Individual-Specific Uncertainty', *American Economic Review*, Vol. 81, No. 5, pp. 1146-1155; Banerji, A. et al. (2015), 'Building a Better Union: Incentivizing Structural Reforms in the Euro Area', *IMF Working Paper* 15/2015.

<sup>(24)</sup> See Hoj, J., Galasso, V., Nicoletti, G., and T. Dang (2006), 'The Political Economy of Structural Reform, Empirical Evidence

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costs of reforms might immediately hit society while gains are expected to materialise only beyond the electoral cycle).<sup>(25)</sup> Distributive issues have also been identified as potentially affecting the smooth implementation of structural reforms, especially when the costs of reforms are up-front and concentrated on specific well-organised groups, while the benefits are longer-term and more diffused.<sup>(26)</sup>

Political economy factors that hinder the effective implementation of structural reforms may in turn raise precautionary savings (thus lowering demand), and also lead to a polarisation of the political debate that can create significant uncertainty and make the implementation of the reforms even more difficult, or simply not possible.<sup>(27)</sup> Packaging reforms can temper these risks. Structural reforms that increase labour market flexibility may face less resistance if accompanied by reforms that strengthen the social welfare system (for instance, measures that facilitate job transitions associated with measures that strengthen coverage and adequacy of the unemployment benefit scheme). Structural reforms that increase product market flexibility may face less resistance if accompanied by reforms that help to bring forward some of the benefits of the reforms and help to reallocate resources to growing sectors (like measures that improve the functioning of financial markets). The packaging of structural reforms should also factor in political economy considerations as appropriate packaging and sequencing could limit any short-term side effects from the structural reforms and thereby raise the political acceptability of the reforms and ease their implementation.

#### **I.4.3. The role of supportive macroeconomic policies**

When designing structural reforms, due consideration should also be given to the interactions between structural reforms and macroeconomic policies. Supportive monetary and fiscal

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from OECD Countries', *OECD Economics Department Working Papers* No. 501.

<sup>(25)</sup> See Bouis, R., Causa, O., Demmou, L., Duval, R., and A. Zdzienicka (2012), 'The Short-Term Effects of Structural Reforms: An Empirical Analysis', *OECD Economics Department Working Papers* No. 949; Hoj et al. (2006).

<sup>(26)</sup> See OECD (2014), 'The Political Economy of Reform'.

<sup>(27)</sup> See Mian, A., Sufi, A., and F. Trebbi (2014), 'Resolving Debt Overhang: Political Constraints in the Aftermath of Financial Crises', *American Economic Journal: Macroeconomics*, Vol. 6, No.2, pp. 1–28.

policies have the potential to ease the short-term costs of structural reforms.<sup>(28)</sup> The latter may in turn increase the effectiveness of fiscal and monetary policies, further highlighting the synergies between micro- and macro-economic policies (structural reforms that strengthen the working of the price mechanism, for instance, tend to make the transmission of the common monetary policy across the euro area more effective).<sup>(29)</sup>

There is evidence that supportive macroeconomic policies enhance the positive effects of structural reforms on employment in the short run.<sup>(30)</sup> If policy space is available, structural reforms should therefore better be implemented together with supportive macroeconomic policies.

On the fiscal side, to the extent that fiscal space is available, a supportive fiscal policy can be used to offset potential short-term contractionary effects of structural reforms. In countries with no or limited fiscal space, on the contrary, the focus should clearly be on implementing productivity-enhancing structural reforms that are budgetary neutral or carry the least budgetary impact.

Additionally, from a political economy perspective, providing financial compensation to those that stand to lose from socially beneficial reforms may ease resistance and facilitate reform implementation.<sup>(31)</sup><sup>(32)</sup> This is nonetheless not possible when fiscal authorities face public finance constraints.<sup>(33)</sup>

#### **I.5. Shorter-term effects of structural reforms: an econometric analysis**

The shorter-term effects of structural reforms are further investigated in this sub-section through a simple econometric analysis on euro area countries. The focus is on the shorter-term impact of such reforms on output growth (as the synthesis of

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<sup>(28)</sup> IMF (2016), 'World Economic Outlook: Too Slow for Too Long', April.

<sup>(29)</sup> See Draghi, M. (2015), 'Monetary policy and structural reforms in the euro area', speech at Prometeia, Bologna, 14 December 2015.

<sup>(30)</sup> Bordon, A.R., Ebeke, C., and K. Shirono (2016), 'When do structural reforms work? On the role of the business cycle and macroeconomic policies', *IMF Working Paper* 16/62.

<sup>(31)</sup> See Grüner, H. (2013), 'The Political Economy of Structural Reform and Fiscal Consolidation Revisited', *European Economy Economic Papers* 487.

<sup>(32)</sup> See IMF (2015), 'Structural Reforms and Macroeconomic Performance: Initial Considerations for the Fund'.

<sup>(33)</sup> See Poplawski Ribeiro, M., and R. Beetsma (2008), 'The political economy of structural reforms under a deficit restriction', *Journal of Macroeconomics*, Vol. 30, No 1, pp. 179–198.



demand and supply conditions), considering both the direct impact of reforms as well as their interactions with the speed of adjustment towards potential and the macroeconomic environment. As the focus is on short-run effects, the impact of structural reforms on potential output is not analysed.

It would be clearly beyond the scope of this section to specify and estimate all the transmission mechanisms reviewed in the previous sub-sections, partly due to difficulties related to the non-observability of expectations and the lack of sufficiently detailed quantitative information on structural reforms. The econometric analysis presented below therefore simply aims to capture the relevant transmission channels via reduced form regression analysis, relying on the following assumptions:

- The change in output towards potential is only partially achieved in the short run. Such partial adjustment reflects the sluggish reallocation of labour and capital in the absence of perfectly flexible markets. In the specification of the regression equation it is explicitly modelled that the transition speed towards potential depends on product, labour and financial market efficiency.<sup>(34)</sup>
- In the short run, structural reforms are assumed also to have an impact on economic activity through the behavioural changes they trigger, such as firms starting to enter and exit markets, new jobs being created and old jobs being transformed or eliminated. These effects are only indirectly captured here by explanatory variables that measure the change in labour, product and financial market efficiency and their interactions, as specified in Box I.1.
- Finally, other macroeconomic variables that may affect output growth in the short run are included as control variables in the regression. These include the nominal short-term interest rate, the real effective exchange rate, inflation, public sector balance and stock market index.

### I.5.1. Estimation results

Structural reforms are difficult to measure in quantitative terms that can be used for regression

<sup>(34)</sup> See Box II.1, equation (2).

analysis.<sup>(35)</sup> In what follows, they are measured indirectly through outcome variables. The World Economic Forum (WEF)<sup>(36)</sup> publishes its annual competitiveness index, which covers a whole range of sub-indicators including measures of product and labour market efficiency as well as financial market development. It is the level and change of these indicators, giving an indication of the underlying structural reforms that are used in the empirical analysis.

Table I.1 shows the estimated coefficients and significance levels from a pooled instrumental variables regression of GDP annual growth on a set of explanatory variables, including indicators measuring labour, product and financial market efficiency (see Box I.1 for more details).<sup>(37)</sup> The analysis covers the euro area Member States (except Greece) for the period from 2008 until 2015.<sup>(38)</sup> Estimation results are presented in Table I.1 for different variants as a sensitivity analysis around the baseline variant 1, on which the following discussion is based (unless differently specified).

Focussing on the speed at which the gap between potential and lagged GDP is closed (keeping all other factors constant), the first four point estimates of variant 1 in Table I.1<sup>(39)</sup> suggest that increases in the efficiency of labour markets and in product market competition<sup>(40)</sup> have a highly significant positive impact on the adjustment speed towards potential.<sup>(41)</sup> The insignificant point

<sup>(35)</sup> See European Commission (2016c), 'The Economic Impact of Selected Structural Reform Measures in Italy, France, Spain and Portugal', *Institutional Paper* 023, for a methodology to translate actual reform measures into model shocks.

<sup>(36)</sup> Using and aggregating data from a variety of sources such as the World Bank Doing Business database.

<sup>(37)</sup> Apart from the short-term interest rate and government deficit the point estimates of the other variables are not shown in Table III.1 in order to keep it concise. They are available upon request.

<sup>(38)</sup> 2008 is the earliest year for which the regressions (with lagged variables) can be run. Other datasets such as the OECD Indicators of Product Market Regulation provide data on product market reforms going back to 1998, but these indicators are only published every 5 years.

<sup>(39)</sup> Labelled respectively as GAP, GAP\_LM, GAP\_PM and GAP\_FM.

<sup>(40)</sup> These indicators are interacted with the gap relative to potential in the regression.

<sup>(41)</sup> For variants V2, V3, V4, V6 and V7 in Table III.1, the estimate attached to the gap between potential output and output the year before (GAP) provides a direct measure as to how much of the gap will be closed each year. The higher this value, the faster the economy will reach potential. If this coefficient were smaller than 0, output would tend to diverge away from its equilibrium, while if it would be (much) larger than 1, output would converge along an oscillating path towards its equilibrium. For variants V1, V5 and V6, the estimates have to be added up taking into account the

estimate on financial market development, on the contrary, does not permit any conclusions to be drawn with regard to this dimension. Evaluating the speed of adjustment to potential<sup>(42)</sup> at the value of the labour, product and financial efficiency indicators in each of the Member States suggests strong differences across euro area countries, with a relatively high speed of adjustment in the Netherlands, Estonia, Austria and Germany, and a relatively slow adjustment in Portugal, Slovenia and Spain.<sup>(43)</sup>

The next three estimated coefficients in Table I.1 capture the immediate impact of structural reforms.<sup>(44)</sup> They suggest that changes in the efficiency of financial markets have a significant estimated positive impact on GDP growth. The estimated coefficient on labour market reforms, on the contrary, suggests a significant negative short-run impact. While it would certainly require more in-depth analysis to identify the exact transmission mechanisms that trigger this result, the estimate could suggest that labour market reforms may have involved, on average, measures that on impact induced a stronger job loss than job gain in the short run, which in turn may have restrained aggregate demand and output.

The short-run impact of the interaction between the three different markets is captured by the following three estimated coefficients in Table I.1.<sup>(45)</sup> The interaction between product and labour markets shows that simultaneously improving product and labour market efficiency has a statistically significant positive impact on growth in the short run.

values of the indicators measuring labour, product and financial market efficiency (see equation (2), Box III.1). The estimation results suggest that for IT the value of this parameter is negative, which implies that output will not converge to its equilibrium.

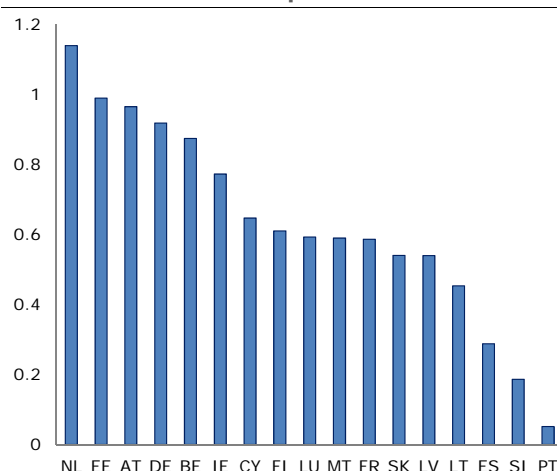
<sup>(42)</sup> This is coefficient  $\alpha$  in equation (2), Box II.1.

<sup>(43)</sup> A negative value would suggest that the economy does not converge to its long-run equilibrium (the case of IT that is therefore not considered). EL is not included in the sample.

<sup>(44)</sup> Labelled respectively as LM, PM and FM. The values of these indicators range from 1 to 7 with 7 best. In other words, a rise by 1 unit implies an efficiency gain of about 14 percentage points. Hence, for a point estimate of 0.1 a rise in the indicator by 1 unit would induce GDP growth of 1.4%.

<sup>(45)</sup> Labelled respectively LM\_FM, PM\_FM and LM\_PM.

Graph I.8: Estimated adjustment speed towards potential



(1) The parameter of adjustment is the weighted sum of the point estimates of the indicators GAP, GAP\_LM, GAP\_PM and GAP\_FM in Table II.1. This parameter measures the proportion of the gap between potential output and output the year before that will be closed – keeping all other factors constant. The higher the value the faster the economy will reach its equilibrium. No convergence if coefficient < 0, oscillating if > 1.

(2) EL not included. IT not converging.

Source: Authors' estimate.

Finally, variants 6 and 7 of the econometric specification focus more on the interactions between structural reforms and macroeconomic policies. The estimation results suggest a rather low statistical significance of the growth impact of the interaction between market efficiency and monetary policy (captured by the nominal short-term interest rate). This low significance can partly be explained by the weak variability of short-term interest rates during the 2008-2015 sample period, when interest rates remained at their lower bound in most Member States. The estimation results suggest, on the contrary, a significant interaction between fiscal policy,<sup>(46)</sup> on the one hand, and product market and financial market efficiency on the other.

While no definitive conclusions can be drawn from this simple reduced form econometric analysis, the estimation results suggest the following: i) in the short run, well-functioning labour and product markets have the potential to bring GDP growth quickly in line with potential growth (i.e. to make the economy more resilient); ii) deepening of financial markets appears to have a significant

<sup>(46)</sup> Fiscal policy is captured by the public sector balance as percentage of GDP, with positive values indicating net lending. A negative estimate (as in Table III.1) implies that net borrowing yields a positive impact on growth.

positive effect on GDP growth in the short run; iii) simultaneously implementing labour and product market reforms (i.e. packaging of labour and product market reforms) appears to improve growth dynamics in the short run; iv) individually, the effects of labour and product market reforms in the short run are less clear-cut as they both appear to have negative effects (not highly significant for the latter though).

## I.6. Conclusions

Well-functioning labour and product markets ensure the efficient allocation of resources, contribute to making economies more resilient by increasing their shock-absorption capacity and strengthen growth potential in the longer run.

While beneficial in the longer term, some structural reforms might nonetheless also have some negative short-term effects, notably on aggregate demand. A number of transmission channels have been reviewed in this section, through which structural reforms can affect aggregate demand in the short run in a contractionary or expansionary way. Expansionary effects of structural reforms may, for instance, be triggered by bringing forward the expected rises in permanent income and wealth (conditional on smooth access to well-functioning financial markets). Contractionary effects, on the contrary, may be triggered by rises in real interest rates stemming from decreases in the general price level, and reduced job security.

Negative shorter-term effects of structural reforms can nonetheless be at least partly offset through appropriate 'sequencing' and 'packaging' of reforms, as well as interactions with supportive macroeconomic policies. In general terms, having product market reforms preceding labour market reforms, for instance, when both needed, can be expected to make more likely that long-term benefits from structural reforms are reaped while containing possible short-term side effects of some labour market reforms. Also, product market reforms importantly strengthen the pass-through of reforms on the labour market to product markets, thus containing possible negative short-term demand effects, while at the same time labour market reforms can ensure a smooth reallocation of labour in response to adjustments triggered by product market deregulation. Synergies and complementarities between reforms are apparent.

The packaging and sequencing of reforms within policy areas is also important. Reforms that lead to a reduction in unemployment benefits, which may reduce aggregate demand in the short term, should take place after active labour market policy reforms and in combination with macro policies that are supportive of aggregate demand. Also, because some structural reforms in labour markets might involve less job security and more wage moderation in the short run, reforms that strengthen flexibility should be complemented by reforms that improve security, along flexicurity principles. This calls, for instance, for well-designed life-long learning policies, active labour market policies, modern labour law (including more flexible and secure contractual arrangements for employers and employees), as well as social security provisions that strengthen occupational and geographical mobility within and between firms (including the portability of social security rights).

From a political economy perspective, containing and/or compensating for the short-term side effects of some structural reforms through packaging and sequencing is also key to increasing the political acceptability and ownership of the reforms and therefore their implementation. Structural reforms that increase labour market flexibility may face less resistance if accompanied by reforms that strengthen the social welfare system. Structural reforms that increase product market flexibility may face less resistance if accompanied by reforms that help to bring forward some of the benefits of the reforms and help to reallocate resources to growing sectors (like measures that improve the functioning of financial markets).

The beneficial effects of packaging of reforms are indeed suggested by the reduced form econometric analysis presented in this section: the simultaneous implementation of labour and product market reforms is estimated to improve growth dynamics in the short run. At the same time, well-functioning labour and product markets are found to increase the estimated speed of adjustment of GDP growth towards potential, thus providing support to the idea that structural reforms increase resilience, which is particularly important for euro area members as they cannot independently use the nominal exchange rate as an adjustment mechanism against asymmetric shocks.

Table I.1: GDP growth impact of structural reforms

Dependent variable: GDP growth	V1	V2	V3	V4	V5	V6	V7	V8
<b>Gap between potential and lagged observed GDP (GAP)</b>	-5.80 *** (-3.92)	0.73 *** (8.66)	0.72 *** (9.11)	0.74 *** (9.39)	-3.06 (-1.34)	0.75 *** (8.65)	0.78 *** (9.41)	-3.36 *** (-3.60)
<b>GAP_labour market efficiency interaction (GAP_LM)</b>	0.74 *** (4.44)				0.2 (0.68)			0.56 *** (4.48)
<b>GAP_intensity of local competition interaction (GAP_PM)</b>	0.57 *** (2.83)				0.27 (0.77)			0.31 ** (2.37)
<b>GAP_financial market development interaction (GAP_FM)</b>	0.02 (0.12)				0.31 (1.19)			-0.04 (-0.37)
<b>Change in labour market efficiency (LM)</b>	-0.57 ** (-2.09)	-0.3 (-1.04)	-0.05 ** (-2.08)		-0.73 * (-1.76)	0.17 (0.42)	-0.33 (-1.18)	-0.23 * (-1.70)
<b>Change in intensity of local competition (PM)</b>	-0.39 * (-1.69)	-0.39 (-1.63)	0.04 * (1.82)		-0.31 (-0.86)	-0.2 (-0.75)	-0.28 (-1.18)	-0.08 (-0.64)
<b>Change in financial market development (FM)</b>	0.43 * (1.93)	0.81 *** (3.61)	0.02 (1.54)		0.70 ** (2.12)	0.62 ** (2.01)	0.68 *** (2.80)	0.22 * (1.95)
<b>Change in LM_FM interaction (LM_FM)</b>	-0.05 (-1.45)	-0.12 *** (-3.80)			-0.06 (-1.22)	-0.12 *** (-3.44)	-0.09 ** (-2.61)	-0.02 (-0.89)
<b>Change in PM_FM interaction (PM_FM)</b>	-0.03 (-1.31)	-0.04 (-1.63)			-0.08 ** (-2.25)	-0.01 (-0.15)	-0.05 (-1.66)	-0.02 (-1.63)
<b>Change in LM_PM interaction (LM_PM)</b>	0.13 ** (2.53)	0.14 ** (2.55)			0.17 * (1.98)	0.06 (0.73)	0.12 ** (2.23)	0.05 * (1.74)
<b>Short-term nominal interest rate</b>	-0.01 (-0.05)	0.22 (1.12)	0.07 (0.39)	-0.13 (-0.74)	0.59 ** (2.34)	0.17 (0.06)	0.33 * (1.70)	0.02 (0.18)
<b>LM_Short-term nominal interest rate interaction</b>						-0.72 (-1.35)		
<b>PM_Short-term nominal interest rate interaction</b>						0.78* (1.7)		
<b>FM_Short-term nominal interest rate interaction</b>						-1.7 (-0.36)		
<b>Public sector balance (net lending (+) or net borrowing (-)) (% of GDP)</b>	-0.14 (-1.65)	-0.04 (-0.43)	-0.03 (-0.41)	0.02 (0.25)	-0.36 * (-1.93)	0.02 (0.22)	-1.74 (-0.79)	-0.04 (-0.64)
<b>LM_Public sector balance interaction</b>							-0.26 (-1.20)	
<b>PM_Public sector balance interaction</b>							0.95*** (2.90)	
<b>FM_Public sector balance interaction</b>							-0.49*** (-3.71)	
<b>Additional macro-economic variables</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Adjusted R-squared</b>	0.74	0.69	0.71	0.71	0.71	0.68	0.71	0.77
<b>Fixed country effects</b>	No	No	No	No	Yes	No	No	No
<b>Least squares with instrumental variables</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
<b>Number of observations</b>	135	135	135	135	135	135	135	144

(1) Additional macro-economic variables are nominal interest rate, inflation, real effective exchange rate, stock price, EA Membership dummy, population growth and change in share of older people in population  
(2) t-values between brackets; \*\*\* for  $p < 0.01$ , \*\* for  $p < 0.05$ , \* for  $p < 0.1$ .  
(3) GAP measures % difference between potential output and observed output year before; GAP\_XX: GAP multiplied with value of XX indicator, with XX= LM for labour market indicator, XX= PM for domestic product market competition, and XX=FM for financial market development. XX ranges from 1 to 7 with 7 best. XX\_YY: variable XX multiplied by variable YY with XX and YY = LM, GM and FM.  
(4) EA share price is indicator of euro area share price, source OECD. More technical details on regression analysis in Box 1.  
**Source:** Authors' estimates; pooled regression analysis using instrumental variables.

**Box 1.1: Specification of output responses to structural reforms in the shorter run**

The regression analysis is based on the assumption that output adjusts only gradually to its potential due to inefficiencies in product, labour and financial markets. As a consequence, the actual change in output is only a fraction of the desired change:

$$(1) \quad (\ln(Y_t) - \ln(Y_{t-1})) = \alpha (\ln(\bar{Y}_t) - \ln(Y_{t-1}))$$

where  $Y_t$  is GDP in constant prices in year  $t$ ,  $\bar{Y}_t$  is potential GDP in  $t$  and  $0 < \alpha \leq 1$ . <sup>(1)</sup> The closer  $\alpha$  is to 1, the quicker adjustment will occur. Here it is assumed that  $\alpha$  is not constant but conditioned by developments in product, labour and financial markets efficiency:

$$(2) \quad \alpha = b + g_1 LM_t + g_2 PM_t + g_3 FM_t$$

where  $LM_t$ ,  $PM_t$  and  $FM_t$  measure respectively labour, product and financial market efficiency (gauged by respectively pillars 6.1, 7 and 8 of the World Economic Forum database).  $g_1$ ,  $g_2$ , and  $g_3$  are parameters.

In the shorter run output adjustment is also affected by changes in labour, product and financial market efficiency as well as by changes in the interaction between markets. As macro-economic conditions may speed-up or delay adjustment, the regression also includes macro-economic variables, i.e. nominal short-term interest rate (IR), inflation (INFL), the real effective exchange rate (REER), public sector balance (as % of GDP) (PB) and share price (adjusted for consumer price index) (SP) (data from AMECO, integrated with OECD for SP). Population growth has also been included as explanatory variable (Eurostat data).

On collecting terms, the regression equation is specified as follows:

$$(3) \quad (\ln(Y_t) - \ln(Y_{t-1})) = \alpha (\ln(\bar{Y}_t) - \ln(Y_{t-1})) + \sum_{zi=LM,PM,FM} g_{zi} ZI_t (\ln(\bar{Y}_t) - \ln(Y_{t-1})) + \sum_{zi=LM,PM,FM} h_{zi} (ZI_t - ZI_{t-1}) + k_1 [(LM_t FM_t) - (LM_{t-1} FM_{t-1})] + k_2 [(PM_t FM_t) - (PM_{t-1} FM_{t-1})] + k_3 [(LM_t PM_t) - (LM_{t-1} PM_{t-1})] + \sum_{xi=IR,INFL,REER,SP,PB,EA,DUM,pop,pop\_65} l_{xi} (XI_t - \bar{XI}_t) + e_t + c$$

Equation (3) states that observed output growth is driven by the speed at which the economy transits to its potential output, whereby better-functioning markets speed-up the transition, shorter-term behavioural feedbacks in response to changes in labour, product and financial market efficiency, and macro-economic conditions that may speed-up or delay the transition.

Table III.1 shows estimation results for parameters  $b$ ,  $g$ ,  $h$ ,  $k$  and  $l$  applying pooled instrumental variables regression analysis (instrumental variables include lagged variables). In variants 6 and 7, it is assumed that parameter  $l$  (in case of nominal interest rate and net public lending) is not constant but conditioned by developments in product, labour and financial market efficiency.

In the regression, macro-economic variables  $X$  are measured relative to their long-run equilibrium value, which is assumed to be constant over the sample period.

<sup>(1)</sup> Adding and subtracting lagged potential GDP,  $\ln(\bar{Y}_{t-1})$ , in the left-hand side of equation (1) one gets:  

$$(\ln(Y_t) - \ln(Y_{t-1})) = \alpha [(\ln(\bar{Y}_t) - \ln(\bar{Y}_{t-1})) + (\ln(\bar{Y}_{t-1}) - \ln(Y_{t-1}))],$$
  
 i.e., the desired change in output is equal to the change in potential output plus the output gap in t-1.





## II. Ease of doing business in the euro area

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*This section looks at how easy it is to do business in euro area countries. Like the EU as a whole, the euro area has made progress with business regulation and the quality of public administration over recent years. However, substantial differences remain across the area. In the context of the European Semester, the policy area business regulation and quality of public administration is still generating a high number of country-specific recommendations, whose implementation has been quite slow, especially compared to other areas. Countries with a better business environment have enjoyed a more resilient recovery. A better business environment can increase economic performance through its effect on investment, but there are other transmission mechanisms at work as well, i.e. firm dynamics (entry, upscaling and exit of firms) and allocative efficiency <sup>(47)</sup>.*

### II.1. Introduction

The ease of doing business is one of the main structural reform areas in which countries can improve their economic outcomes. It is a work priority for the European Commission, as reflected above all in the better regulation agenda and the third pillar of the Investment Plan for Europe <sup>(48)</sup>. It also features prominently in the multilateral surveillance that forms part of the European Semester <sup>(49)</sup>.

The business environment is considered a priority area in the second stage of moving towards deeper economic and monetary union <sup>(50)</sup>. It has also returned to the international fore recently, not least as part of the G20's Enhanced Structural Reform Agenda, which has made 'promoting competition and an enabling environment' a priority area. The recommendations from the 2017 European Semester on the euro area's economic policy explicitly refer to the issue and call on euro area Member States to 'prioritise reforms that increase productivity, improve the institutional and business environment, remove bottlenecks to investment, and support job creation'.

Importantly, making it easier to do business or cutting red tape is, to a large extent, possible through measures that incur limited or no budgetary costs but may provide significant economic and budgetary benefits. While this agenda is important for all EU Member States, it is particularly relevant for the euro area's ability to make progress on convergence and have a common monetary policy that works.

### II.2. Productivity growth and resilience in the euro area

Improving business regulation and the quality of public administration is an important part of policy strategies aimed at boosting growth and employment. The steep fall in investment and employment during the crisis led to lower capital growth. The crisis also casted a long shadow on the euro area in terms of a weak productivity performance, with adverse consequences for wages, living standards, competitiveness and the sustainability of public and private debt. In the period 2000-2015 total factor productivity (TFP) in the US increased by 9.5 %, while in the euro area it increased by only 3 % (see Graph II.1). This productivity gap increased considerably during the crisis, reflecting the significant investment gap with the US.

The administrative and regulatory burden is one of the main barriers to investment. Quantitative studies by the European Commission and others show that a supportive business environment is essential to boost investment <sup>(51)</sup>. A review of case

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<sup>(47)</sup> This section was prepared by Erik Canton and Marta Petrucci. The authors wish to thank Emmanuelle Maincent, Eric Ruscher, Anne Van Bruggen, Frank Siebern-Thomas and Nicola Gagliardi for their useful comments.

<sup>(48)</sup> The plan has three pillars: 1) mobilising finance for investment via the European Fund for Strategic Investments (EFSI); 2) getting finance into the real economy, through the European Investment Project Portal (EIPP) and the European Investment Advisory Hub (EIAH); and 3) improving the investment environment by creating better, more predictable regulation, removing non-financial regulatory barriers in key sectors in the EU's Single Market, and promoting structural reforms at national level.

<sup>(49)</sup> The European Semester provides the framework for economic policy coordination in the EU, covering budgetary and macroeconomic policies and structural reforms.

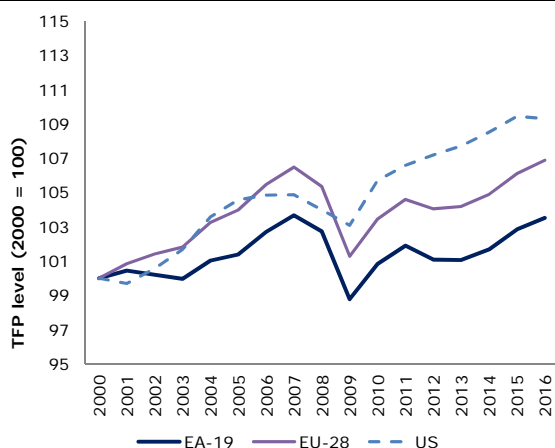
<sup>(50)</sup> J-C Juncker, in close cooperation with D. Tusk, J. Dijsselbloem, M. Draghi and M. Schulz, 'Completing Europe's Economic and Monetary Union', 22 June 2015.

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<sup>(51)</sup> B. Égert (2017), 'Regulation, Institutions and Aggregate Investment: New Evidence from OECD Countries', *CEPR Working Paper* No 6415. The impact of regulation and ease of doing business on intangible investments is studied in A. Thum-Thysen, P. Voigt, B. Bilbao-Osorio, C. Maier and D. Ognyanova (2017), 'Unlocking investment in intangible assets', *European Economy Discussion Paper* 047.

studies by the European Investment Bank finds that regulation can affect investment in terms of both higher costs and higher risks <sup>(52)</sup>. Indeed, administrative burdens and other regulatory costs (e.g. adapting business processes to meet requirements, paying licensing fees, etc.) can raise investment outlays. Similarly, the cost of investing is higher when regulation is fragmented across geographical or product markets. Unexpected or frequent changes over time in regulation, or in its enforcement, can generate uncertainty, increasing the risks of investing in a given economy. This is particularly relevant for intangible investment, which has the highest potential impact on growth, and is lagging significantly behind US levels <sup>(53)</sup>.

Graph II.1: Low productivity growth in the euro area



Source: European Commission

An enabling business climate can foster resilience. Resilient economic structures mean that Member States have a low vulnerability to economic shocks and/or are more capable of adjusting to them. This is of particular importance in a monetary union, given the absence of the nominal exchange rate as an adjustment tool. While a vibrant business environment can foster the reallocation of capital and labour in response to shocks, structural rigidities can significantly increase the impact of a shock and slow down the speed of adjustment as measured, for instance, by the change in the output gap. Differences in business environment may

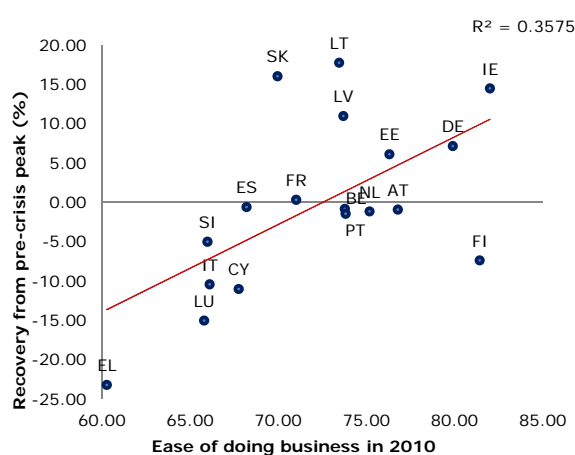
<sup>(52)</sup> EIB (2016), 'Breaking down investment barriers at ground level: Case studies and other evidence related to investment barriers under the third pillar of the Investment Plan for Europe', European Investment Bank.

<sup>(53)</sup> A. Thum-Thysen, P. Voigt, B. Bilbao-Osorio, C. Maier and D. Ognyanova (2017), 'Unlocking investment in intangible assets in Europe', *Quarterly Report of the Euro Area* 16(1), pp. 23-35.

result in different responses to symmetric shocks, which could make monetary policy less effective.

Euro area countries with a more enabling business environment have experienced a stronger post-crisis recovery (see Graph II.2). A range of empirical studies confirm the positive effect of the business environment on resilience <sup>(54)</sup>. Therefore, large variations in business regulation between euro area Member States hamper not only individual economies, but also the workings of the single market and the overall growth prospects for the euro area, because resilience to economic shocks will also improve the effectiveness of monetary policy.

Graph II.2: Business environment and resilience in the euro area



Note: Recovery from the pre-crisis peak equates to the percentage change from the maximum value in 2007-2008 to 2016 in real gross national income per capita. Malta is missing, as it does not have data on ease of doing business for 2010.

Source: European Commission, World Bank

The expected gains from an improved business environment are significant. Commission calculations have shown that making it easier to do business boosts GDP <sup>(55)</sup>. For example, if Member States were to reduce the costs of entry and close half of the gap with the three best EU performers,

<sup>(54)</sup> V. Ziemann (2013), 'Do structural policies affect macroeconomic stability?', *OECD Economics Department Working Paper* No. 1075.

<sup>(55)</sup> J. Varga, and J. In 't Veld (2014), 'The potential growth impact of structural reforms in the EU; A benchmarking exercise', *European Economy Economic Paper* 541. The authors investigate the potential growth impact of a wide variety of structural reforms. In particular, they investigate the impact of entry costs using Doing Business data and apply a distance-to-frontier approach by assuming that half of the gap vis-à-vis the average of the three best EU performers is closed. See also European Commission (2016), 'Single Market integration and competitiveness report' (see footnote 10).

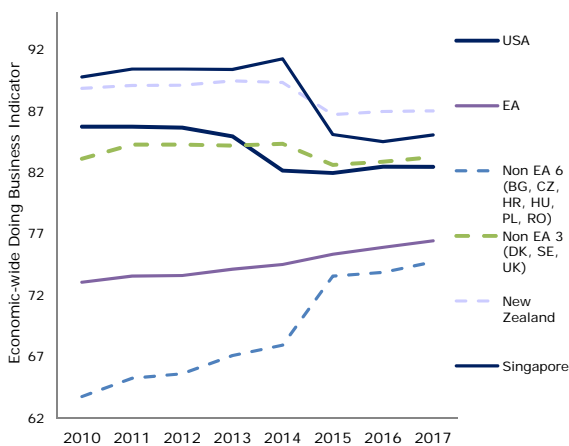


they could enjoy sizeable GDP gains. Moreover, the combined impact of product market reforms (higher competition in the services sector and lower entry costs) for the euro area countries would be about 1.5 % of euro area GDP within a 10-year horizon.

### II.3. How does the euro area perform?

The euro area has been steadily improving as a place in which to do business. The World Bank’s Doing Business indicator is showing a clear upward trend, with many countries improving over the period measured (see Graph II.3 and Box II.1). On average, the business environment remains less supportive in the euro area than in the US and other advanced economies (like Singapore and New Zealand).

Graph II.3: Performance of the euro area (EA) vis-à-vis best worldwide performers  
Doing Business indicator

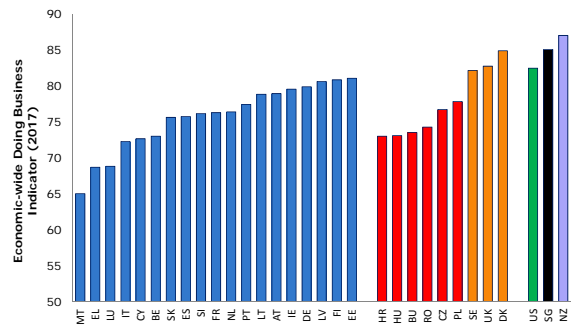


Note: A higher distance-to-frontier value means a better performance. Country group scores are simple, non-weighted averages.

Source: Doing Business, World Bank (2017)

There are significant differences between EU Member States, and the highest performance levels are attained in non-euro area countries – the group including Denmark, Sweden and the United Kingdom. (Denmark is the best EU performer – third on the worldwide list, behind New Zealand and Singapore – see Graph II.4.) The best performing euro area country is Estonia, in 12<sup>th</sup> place, closely followed in the euro area by Finland, Latvia, Germany and Ireland. Slovenia has made the biggest improvement.

Graph II.4: EA, non-EA and non-EU country comparisons (2017)  
Doing Business Indicator



Note: A higher distance-to-frontier value means a better performance. Latest available year is 2017.

Source: Doing Business, World Bank (2017)

In general, countries doing well in one area of business regulation and quality of public administration also tend to do well in others. However, there are exceptions to this and even high-performing countries could do better on specific issues. Moreover, while there has been progress in improving the business environment and removing certain restrictions to trade in services (notably in countries that needed it most), economies with relatively better business environments may have slowed down in their reform efforts and have not seen further improvements<sup>(56)</sup>.

The euro area economies have more work to do in areas such as obtaining credit, protecting minority investors and enforcing contracts. These areas have an impact on the opportunities for starting and expanding a business, providing security for investors and reducing market transaction costs.

<sup>(56)</sup> European Commission (2016), ‘Single Market integration and competitiveness report’, chapter 5, ‘Factors having an impact on the productivity of firms: evolution of the business environment and other internal factors’.

### **Box II.1: The World Bank's Doing Business indicators**

The World Bank's Doing Business indicators measure how easy it is to do business. To make it possible to compare countries and time periods, standardised data are collected using a questionnaire which presents the same business case to all respondents: the legal form of the business, its size, its location (typically the largest business city in each country analysed) and the nature of its operations. The questionnaires are not sent to firms but are distributed to local experts in the specific areas of analysis. Several exchanges with the Doing Business team are expected, to guarantee high-quality responses.

The Doing Business data are based on a detailed reading of domestic laws, regulations and administrative requirements. The methodology used is, therefore, transparent, is based on factual information and allows for several exchanges to clarify potential misinterpretations among those involved. It does not require collecting data from a representative sample, since it is not a statistical survey. The standardised assumptions used for data collection guarantee that comparisons can be made across countries and over time. Nevertheless, using a standardised scenario means reducing the scope of the analysis. In particular, the data may not be representative of other regions within a country, or other forms of business. Also, the project covers many but not all relevant transactions that a business can encounter. For selected Doing Business indicators, the measure of the time (and partly the cost) relies on the judgment of expert respondents; this brings with it the risk of some subjectivity. Lastly, the methodology assumes that firms are fully aware of all procedural steps required. However, this is not always the case and can cause delays.

There are two aggregate Doing Business indicators: the distance-to-frontier score and the ease of doing business ranking. The former looks at regulatory best practice and reports the absolute distance of a given economy to the frontier (i.e. the economy with the best performance). The latter, calculated from the distance to frontier score, compares and ranks the national economies. The ten topics covered by the Doing Business data are: starting a business; dealing with construction permits; getting electricity; registering property; getting credit; protecting minority investors; paying taxes; trading across borders; enforcing contracts; and resolving insolvency. Each of these indicators covers a range of sub-indicators. As such, the Doing Business database is an extensive source of information and it may be difficult to detect the underlying structure in the data.

It is possible to summarise the original data through a Principal Components Analysis (PCA). Here, the original variables can be replaced with a reduced set of variables that can provide an appropriate synthesis while limiting as much as possible any loss in overall information. The results of the PCA on the Doing Business indicators show that Member States have worked especially hard in two key areas over recent years. The first relates to the ease of doing business across borders and, in particular, with sub-indicators such as 'trading across borders' and, more specifically, 'time to import' and 'time to export'. The second highlights the relevance of the 'starting a business' variables, with particular emphasis on the 'cost of starting a business' and on the 'number of procedures to start a business'.

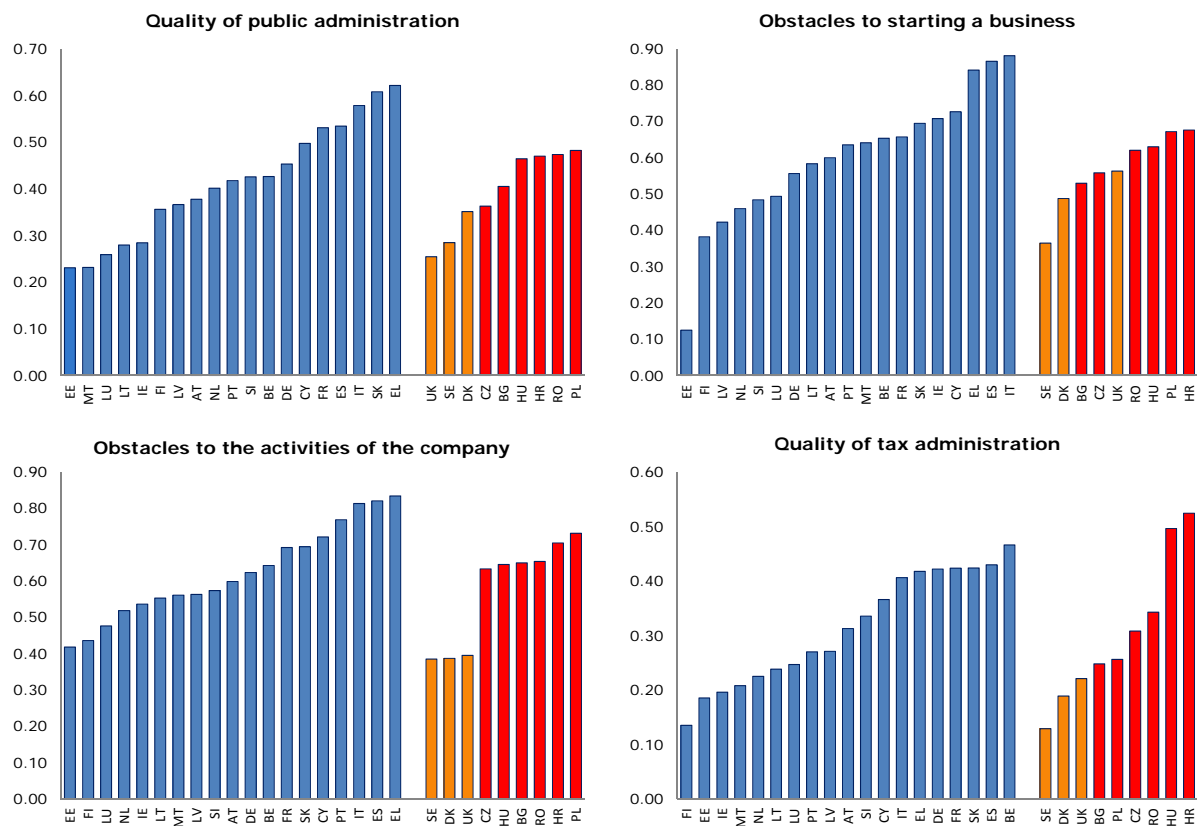
#### **II.4. How firms perceive business regulation and quality of public administration**

Further insights into the business environment can be gathered by directly asking firms about their experiences <sup>(57)</sup>. In 2015, the European Commission carried out a large-scale survey that asked firms a wide range of questions on the

obstacles they saw to the business environment in their country of operation. Four subject areas were covered: (1) quality of public administration, (2) starting a business, (3) obstacles to the activities of the company, and (4) quality of the tax administration. Firms were asked for their views on many different aspects of the business environment. Questions on the quality of public administration covered issues such as the efficiency of public administration in dealing with requests, the reliability of information from public authorities and the availability of online public administration services. On the ease of starting a business, firms were asked about the number of procedures, time, cost and capital required to start a business, and on the need for permits and licences. Questions on the main obstacles to the

<sup>(57)</sup> This section is based on the large-scale Flash Eurobarometer survey (number 417) on the business environment and quality of public administration among firms in the 28 EU Member States, conducted by TNS Political & Social. The field work was carried out in spring 2015. The survey covered 10 603 firms, varying in size (SMEs and large firms), age and sector.

Graph II.5: Firms' perceptions of the business environment



Note: A lower score indicates a better performance. The indicator is the proportion of respondents reporting an obstacle (for example, a value of 0.2 means that 20 % of respondents reported an obstacle).

Source: European Commission calculations based on Flash Eurobarometer 417.

activities of the company covered aspects such as customs controls and import-export formalities, inspections by competent authorities, the existence of an informal economy, health and safety at work requirements, and the predictability and stability of legislation. Lastly, on the quality of tax administration, firms were asked about dealing with the tax authorities, and how easy it was to file and pay various forms of taxes. Graph II.5 shows the proportion, per country, of respondents reporting obstacles in the four subject areas.

The differences across euro area countries are substantial. On the quality of public administration, about 20 % of respondents from Estonia, Malta and Luxembourg were dissatisfied, as against about 60 % of respondents from Greece, and more than 55 % from Slovakia and Italy. This suggests that exchanging good practices could bring substantial improvements. In Estonia, Finland and Latvia relatively few respondents report obstacles to starting a business, while obstacles are more frequently reported in Greece, Spain and Italy. Estonia and Finland are also among the best

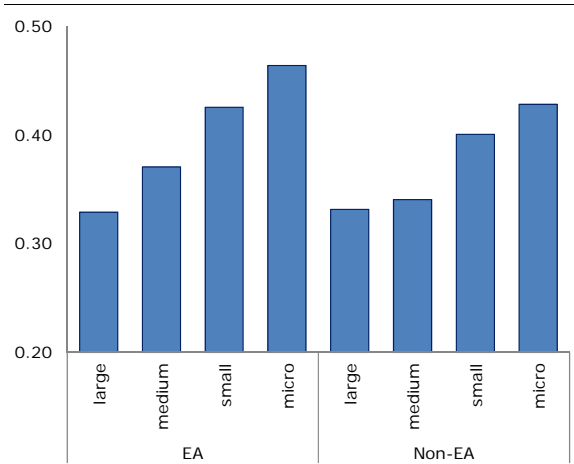
performers on obstacles to the activities of the company and quality of tax administration. Whereas countries doing well in one area also tend to do well in others there are exceptions to this, and even the high-performing countries could do better on specific issues <sup>(58)</sup>.

SMEs report barriers more often than large firms, as illustrated in Graph II.6, which shows reported obstacles, by company size, as regards the quality of public administration. This finding is not surprising, as larger companies often have more capacity to deal with red tape. Moreover, the cost (in terms of time and finances) of regulatory

<sup>(58)</sup> The survey data sometimes yields different results than the data from the World Bank's Doing Business project. This is the case, for example, with the time to start a business and with the performance of Luxembourg. There are several potential explanations for these diverging results, including the different focus and sampling strategies, and the failure of the Doing Business methodology to fully capture implementation lags. In addition, the survey does not include access to finance, which the Doing Business project covers. This further underlines the need to interpret the indicators with caution and conduct in-depth country-specific analyses before drawing policy conclusions.

compliance is, to a certain extent, fixed and thus represents a relatively heavier burden on smaller companies.

Graph II.6: **Firms' perceptions of the quality of public administration**  
by company size



Note: A lower score indicates a better performance. Micro-enterprises have up to 10 employees; small businesses have up to 50 employees; medium-sized enterprises have up to 250 employees; and large firms have more than 250 employees. The indicator is the proportion of respondents reporting an obstacle (for example, a value of 0.2 means that 20 % of respondents reported an obstacle).

Source: European Commission calculations based on Flash Eurobarometer 417.

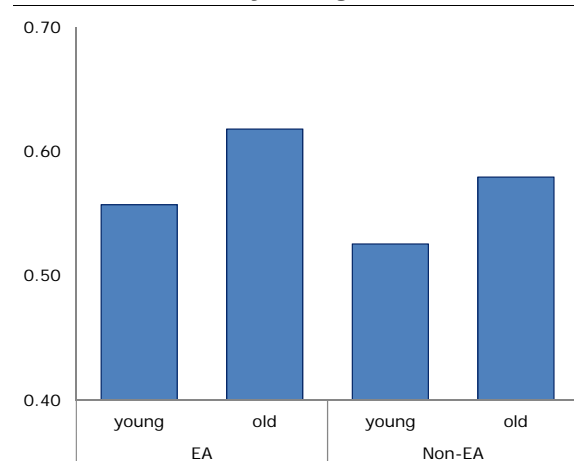
The survey data also allow for cross-tabulations with respect to the age of a firm. In particular, young firms turn out to be somewhat more positive on the business environment than older firms (see Graph II.7), except on the quality of tax administration. This could reflect a number of factors, including the fruits of recent reforms designed, for instance, to facilitate start-up activity and improve e-government services.

## II.5. Impact on economic performance

The business environment can impact economic performance through different channels, for example by making it easier and faster to start a new business and by providing framework conditions conducive to further business expansion (also across borders). Improvements in the business environment and good governance further impact on entrepreneurial behaviour and decision-making, notably by minimising risks associated with legislative uncertainty and by ensuring efficient interactions with public administration and tax authorities. A vibrant business environment can boost resilience through different channels. Some tend to be more

important at specific stages in a firm's life; others (for instance, the quality of public administration and tax authorities) have more impact throughout its lifetime.

Graph II.7: **Firms' perceptions of the obstacles related to starting a business**  
by firm age



Note: A lower value indicates a better performance. Old firms are firms established before 1 January 2009; young firms are firms established on or after 1 January 2009. The indicator is the proportion of respondents reporting an obstacle (for example, a value of 0.2 means that 20 % of respondents reported an obstacle).

Source: European Commission calculations based on Flash Eurobarometer 417.

This section briefly discusses the economic impact of a better business environment: directly on investment, and indirectly through a variety of other transmission channels.

### II.5.1. Impact of regulation on investment

Stringent business regulation has a negative impact on investment. By contrast, deregulation and entry liberalisation are potential drivers for investment and capital formation in the long run<sup>(59)</sup>. The effect of regulation on investments is particularly pronounced in the case of investments in intangible assets, which are affected by human capital, public investments in R&D, science-business linkages, regulatory frameworks (product and labour) and financial conditions. In the case of intangible investments, a positive and significant relationship is found with the 'ease of starting a business' indicator. The 'ease of trading across

<sup>(59)</sup> A. Alesina, S. Ardagna, G. Nicoletti and F. Schiantarelli (2003), 'Regulation and investment', *OECD Economics Department Working Paper* No. 352; A. Billmeier and T. Nannicini (2013), 'Assessing economic liberalization episodes: A synthetic control approach', *Review of Economics and Statistics*, July 2013, 95(3), pp. 983-1001.

borders' indicator, on the other hand, exhibits a positive and significant relationship with tangible investment <sup>(60)</sup>.

Stringent business regulation also makes countries less attractive to foreign investors. Protection of incumbents and other barriers to trade and investment (both taken from the OECD's PMR database) generate negative effects on greenfield foreign direct investment (FDI). Similarly, the costs of enforcing contracts and the ease of paying taxes (both taken from the World Bank's Doing Business) also matter. The empirical results point to sizeable negative impacts on FDI flows from business regulation and poor-quality public administration. A one-point increase in the PMR sub-indicator measuring the protection of incumbents is estimated as equating to a 13 % reduction in greenfield FDI inflows <sup>(61)</sup>.

### II.5.2. Other transmission channels

Empirical literature has explored a number of other transmission channels through which business regulation and quality of public administration can affect the economy and also potentially impact investment. These include firm dynamics and allocative efficiency.

#### *Firm dynamics*

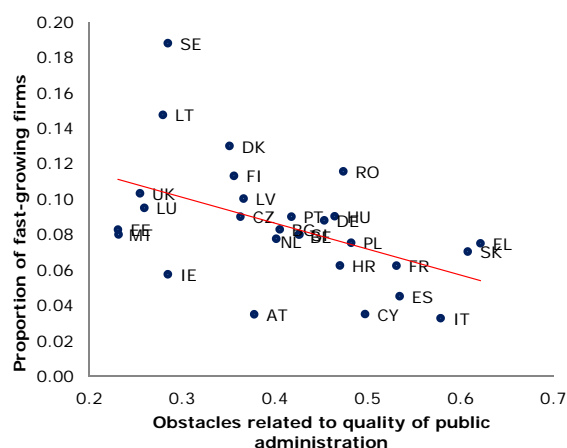
Business regulation and the quality of public administration also have an impact on businesses' entry, exit and growth, their productivity and their profitability. The rate of economic growth increases with the birth rate of new firms <sup>(62)</sup>. In competitive markets productive resources such as labour and capital are channelled to where they can be most efficient. Barriers to competition can prevent the efficient reallocation of these resources, allowing inefficient firms to survive while hampering the growth of efficient companies. They therefore undermine the 'Schumpeterian process of creative destruction', which is at the root of innovation and productivity gains in modern economies. Related to this, empirical evidence shows that US firms are more

likely to expand or contract, while European firms are more likely to stay the same size <sup>(63)</sup>.

Empirical literature shows that institutional and policy settings can play a major role in a firm's decision to enter, expand in or even exit from a given market. It has been found, for example, that red tape barriers have relevant negative effects on a firm's entry <sup>(64)</sup>.

The above-mentioned Eurobarometer survey on the business environment can also be used to explore the relationship with firm dynamics <sup>(65)</sup>. And indeed there appears to be a negative correlation between the proportion of fast-growing firms and reported obstacles. Graph II.8, for instance, shows the negative correlation between firms' capability to scale up and the quality of public administration.

Graph II.8: Business environment and business scale-ups



Note: Fast-growing firms are defined as firms reporting more than 25 % turnover growth since January 2012. Source: European Commission calculations based on Flash Eurobarometer 417.

#### *Allocative efficiency*

Allocative efficiency is another relevant transmission channel. As mentioned earlier, in competitive markets productive resources such as labour and capital are channelled to where they can

<sup>(60)</sup> A. Thum-Thysen, P. Voigt, B. Bilbao-Osorio, C. Maier and D. Ognyanova (2017), 'Unlocking investment in intangible assets in Europe', *Quarterly Report of the Euro Area* 16(1), pp. 23-35.

<sup>(61)</sup> E. Canton and I. Solera (2016), 'Greenfield foreign direct investment and structural reforms in Europe: What factors determine investments?', *European Economy Discussion Paper* No. 34.

<sup>(62)</sup> P. Aghion, U. Akcigit and P. Howitt (2013), 'What do we learn from Schumpeterian growth theory?', Mimeo, Harvard University.

<sup>(63)</sup> A. Bravo-Biosca, (2011), 'A look at business growth and contraction in Europe', Joint Research Centre, European Commission.

<sup>(64)</sup> D. Ciriaci (2014), 'Business dynamics and red tape barriers', *European Economy Economic Paper* No. 532.

<sup>(65)</sup> European Commission (2014), 'European Competitiveness Report 2014', Commission Staff Working Document SWD(2014) 277 final.



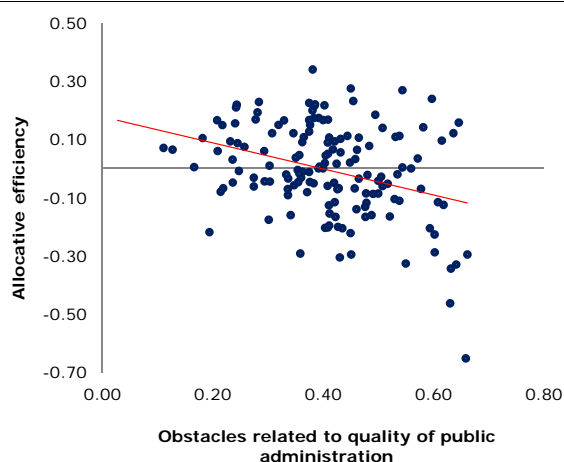
be most efficient. This can be summarised by the indicator on allocative efficiency (AE), defined in the 2013 Product Market Review <sup>(66)</sup>. This indicator measures the extent to which the most productive firms have the largest market share. Low AE scores point to forces in the economy preventing competition from working properly. These include excessive regulation, rent-seeking, ineffective procurement and clientelism.

Intuitively, it is very likely that allocative efficiency is closely related to the business environment. This productivity indicator will be affected by firms' market entry and exit, and also by ease of running a business. A simple pairwise correlation analysis reveals that AE is associated with all four subject areas covered in the survey (Graph II.9, for example, shows the negative correlation between AE and the obstacles perceived around the quality of public administration). The observed relationship is quite compelling. The quantitative effects are rather strong: the AE-indicator moves, broadly speaking, between +0.1 and -0.1, which equates to a difference in labour productivity of 14.6 %. Naturally, correlation does not mean causality, and other factors may distort the observed quantitative relationship. As with other relationships assessed in this chapter, further empirical work and multivariate or causal analysis would, of course, be needed to investigate this relationship in more detail.

## II.6. Policy implications

Differences in the business environment among euro area countries may have a substantial impact on growth and resilience to shocks. As such, they undermine cohesion in the common currency area and generate differences and imbalances which can make common monetary policy less effective and its transmission potentially asymmetric.

Graph II.9: **Business environment and Allocative efficiency**  
Flash Eurobarometer Survey results



Source: European Commission calculations based on Flash Eurobarometer 417 and Eurostat.

Policies aimed at improving the business environment would support the convergence process, and thus foster EMU deepening. Moreover, as also emphasised by the ECB <sup>(67)</sup>, the current juncture of accommodative monetary policy creates ideal circumstances for the implementation of structural reforms, as it would help to cushion the potential short-term adjustment costs by supporting demand.

Despite continuous improvements in the euro area Member States, there remains substantial scope for further progress. Some non-euro area EU Member States, along with the United States, actually score better on comparative indicators than euro area countries. Policy measures to improve business regulation and the quality of public administration are part of the structural reform strategy needed to revitalise productivity growth and close the gap in TFP performance vis-à-vis the US. One avenue for fostering progress in the euro area lies in mutual learning and exchanging good practices, while taking into account the importance of country-specific conditions.

Efforts to improve the business environment should generally be comprehensive if they are to be effective. In general, Member States with a less supportive business environment tend to perform poorly in many of its areas. In addition to the

<sup>(66)</sup> European Commission (2013), 'Product Market Review: Financing the Real Economy', European Economy series 8 | 2013.

<sup>(67)</sup> Cf. ECB (2016), 'The euro area economy, monetary policy and structural reforms', remarks by Peter Praet at the Observatory Group roundtable in New York, 18 November 2016.

obstacles to starting and scaling up a business, the business environment is shaped by the quality of public administration and tax authorities. Furthermore, benefits from reforming the business environment also depend on whether labour and financial markets can effectively support the gains in activity resulting from a better business environment.

According to the Doing Business indicators, in euro area economies there is room for improvement in policy areas like obtaining credit, protecting minority investors and enforcing contracts. These areas are relevant, as they have an impact on the opportunities for starting and expanding a business; they provide security for investors; and they make market transactions less costly. Improving these areas would contribute to a working financial system and a predictable and accessible judicial system.

Special attention to specific groups of firms (e.g. young firms, fast-growing firms and SMEs) in reform design can be effective, as long as negative side effects (such as growth traps, i.e. negative incentives to expand) are avoided. A survey carried out among firms, summarised in section III.4, has shown that the reporting of obstacles at least partly correlates with a firm's features (i.e. age and size).

These weaknesses are addressed through actions at both Member State and EU level. Examples include the work on the completion of the Single Market (including the Digital Single Market), and the start-up and scale-up initiative. The European Semester and country-specific recommendations can do much to guide Member States in their reform activities, so that they further strengthen their business environments and reap the full benefits of product market reforms.

Despite action taken in recent years by some euro area Member States, in particular those heavily hit by the crisis, the policy areas of business regulation and quality of public administration are generating a high number of country-specific recommendations in the European Semester. At the same time, however, they are among the areas with the lowest rate of policy responses.<sup>(68)</sup> This is all the more concerning because inefficiencies in public administration and an unfavourable business environment are also the most frequent barriers to investment. To address this implementation gap Member States should speed up structural reforms, adopt comprehensive packages of measures and adopt best practices from their peers when relevant. Through its Structural Reform Support Service, the European Commission is taking other steps to give Member States more technical assistance as they implement reforms.

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<sup>(68)</sup> European Commission (2017), 'Implementation of country-specific recommendations related to the business environment', Note for the Economic Policy Committee, Brussels, 27 February 2017 for further details on the implementation of country-specific recommendations.





### III. Determinants of trend TFP growth and key policies that influence it

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*The decline in productivity growth in the euro area, as well as in the EU overall, and the slow-down in catching-up with US productivity levels in the last decade has been spurring policy debates on how to re-launch total factor productivity (TFP) growth. The efficiency in the use of inputs in production and technological progress — as captured by TFP — is seen ultimately as the only source of long-term growth. To better understand the underlying causes of these dynamics, we empirically test for catching-up and spill-overs with the US and explore potential determinants of trend TFP growth using an error-correction model. While we do not find evidence for catching-up (or convergence in TFP levels) of euro area countries with the US, we find evidence for (upward or downward) convergence in TFP growth rates (a result that holds for other groupings of EU Member States too). Convergence in growth rates can be explained by spill-overs stemming, for instance, from technological adoption or imitation and also by the global impact of the economic crisis. Spill-over effects with the US are found to be strong. The quality of education, business investment in intangible capital, public R&D expenditure, trade openness and policies fostering job transitions and self-employment are found to be positively associated with trend TFP growth. On the contrary, an ageing workforce is found to be negatively associated with it. While this analysis does not provide the answer to the widely discussed 'productivity puzzle', it sheds some light on factors that could play a role in determining the long-run dynamics of TFP growth in the euro area and beyond <sup>(69)</sup>.*

#### III.1. Introduction

Alongside capital and labour components, total factor productivity (TFP) is a driver of potential growth. The efficiency in the use of inputs in production and technological progress, as captured by TFP, is seen as ultimately the only source of long-term growth, especially in the context of an ageing population as is the case in European societies.

The decline in productivity growth in the euro area, as well as the EU, and the slow-down in catching-up with the US in the last decade have been spurring policy debates on how to re-launch TFP growth. According to the ECB <sup>(70)</sup>, the contribution of TFP to potential growth has halved in the euro area in the period before the financial crisis, from around 1 % in 2000 to ½% in 2007.

In this section the focus will be specifically on structural determinants of TFP growth, i.e. on trend TFP growth (obtained by cleaning TFP growth of its cyclical component using a time series

filter) <sup>(71)</sup>. The work presented here builds on previous work done by the European Commission, Directorate General for Economic and Financial Affairs and the Output Gap Working Group, tackling some of the issues raised in that context:

Firstly, a model is investigated in which convergence in the long run to US TFP growth, rather than to the level, is tested.

Secondly, updated education indicators are used, including the PISA score <sup>(72)</sup>, which it could be argued is a more accurate measure of skills than the number of years spent at school -that can vary largely in quality.

Finally, the issue of non-homogeneity of the convergence terms is addressed by using a Pooled Mean Group (PMG) estimator, which allows for heterogeneity in the speed of convergence. Results do not point to convergence in TFP levels in the euro area, but provide some evidence of convergence in TFP growth rates. The same is true for other groupings of EU Member States and convergence seems to be strongest in the EU's new Member States (NMS).

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<sup>(69)</sup> This section was prepared by Anna Thum-Thysen and Rafal Raciborski. The authors wish to thank Werner Roeger, Eric Ruscher, Emmanuelle Maincent, Josefina Monteagudo, Phillip Mohl, Erik Canton, Gaetano d'Adamo and Karel Havik for their very useful comments.

<sup>(70)</sup> ECB (2011), 'Trends in potential output', ECB Monthly Bulletin January 2011.

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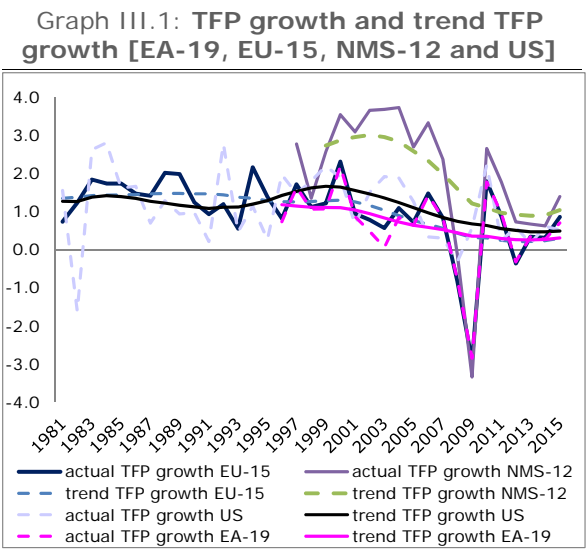
<sup>(71)</sup> A multivariate Kalman filter is used to obtain parameter estimates of an unobserved components model. Capacity utilisation is used to model the cyclical component of TFP.

<sup>(72)</sup> PISA refers to the OECD's Programme for International Student Assessment (<http://www.oecd.org/pisa/>).

The remainder of this section is structured as follows. Sub-section IV.2 discusses developments in trend TFP in the EU and across euro area countries. Sub-section IV.3 provides an overview of the literature on structural determinants of TFP. Sub-section IV.4 presents the empirical analysis and sub-section IV.5 concludes.

**III.2. Trend TFP in the EU and across euro area countries**

The differences between actual and trend TFP growth in the euro area, the EU-15, the EU’s new Member States (NMS-12) and the US respectively are shown in Graph IV.1. While actual TFP growth declined dramatically with the economic and financial crisis, trend TFP growth, by construction, declines smoothly with a tendency to start picking up again around the most recent years, as cyclical spikes are smoothed out.



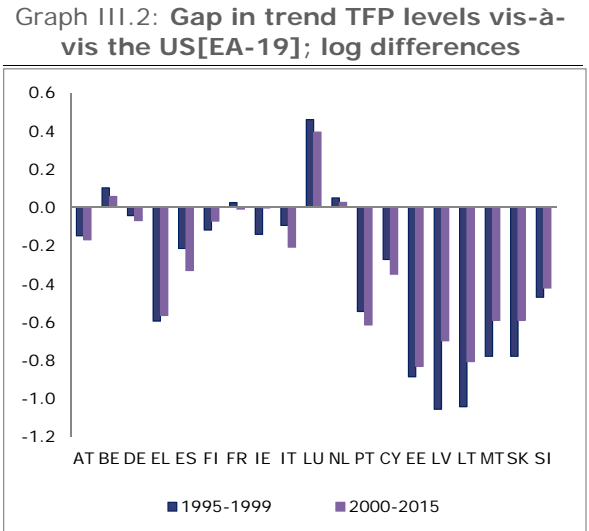
In the 1980s trend TFP growth rates for the EU-15 had stabilised around 1.5 % (after a period of high TFP growth in the 1960s and 1970s related to catching-up with the US). While a growth rate of 1.5 % would be considered healthy in the current environment, it implied that the catching-up process with the US had stalled. In the 1990s the US TFP trend growth rate temporarily rebounded, following the IT revolution, while in the EU-15 it continued to decline, falling for the first time to a level below US productivity growth.

In the 2000s trend TFP growth rates in the euro area, the EU-15 and the US kept falling dramatically, while the gap relative to the US

persisted. In the NMS we observed high growth rates of around 3 % up to 2003 when trend TFP growth also started declining dramatically. Recently, however, we have been observing a recovery in terms of trend TFP growth in the euro area and the EU, as well as in the US.

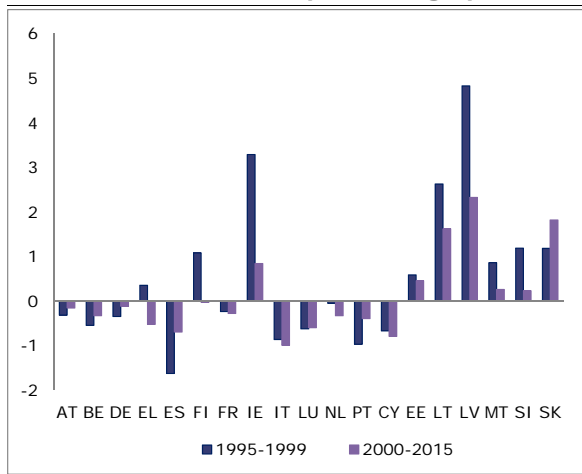
Looking more closely at developments in euro area countries vis-à-vis the US, Graphs IV.2 and IV.3 depict the gaps in terms of trend TFP levels and growth rates for the period 1995-2015 <sup>(73)</sup>. The time interval is split around 2000 as the approximate starting point for the dramatic decline in trend TFP growth rates.

In terms of trend TFP levels <sup>(74)</sup> (see Graph IV.2), most euro area countries lie below the US with the exception of Belgium, Luxembourg and the Netherlands, but the gap has shrunk for all these countries since 2000. In terms of growth rates (see Graph IV.3), most euro area countries (among those not belonging to the NMS) display trend TFP growth rates that are lower than the US rate (except for Ireland and also before 2000 Greece and Finland). On the other hand most NMS among the euro area countries display a positive gap in trend TFP growth compared to the US (with the exception of Cyprus).



<sup>(73)</sup> For the NMS data is only available since 1995.  
<sup>(74)</sup> The TFP trend is computed on the basis of data in national currencies. To be able to compare the data in levels in Graphs 2 and 3 we computed actual TFP in euros and corrected for the TFP gap (which is equal in euros and national currencies).

Graph III.3: Gap in trend TFP growth vis-à-vis the US [EA-19]; percentage points



Source: Commission services

### III.3. Review of the determinants of TFP

The reasons for the disappointing performance in (trend) TFP growth are unclear. Various possible explanations have been proposed in the literature. They include:

- a reduced ability of some advanced economies to benefit from technological advances, i.e. problems in technological diffusion <sup>(75)</sup>;
- the fact that technological innovation may have become marginally less important because innovation (in particular ICT-related) is characterised by diminishing returns <sup>(76)</sup>;
- a declining efficiency in combining factors of production <sup>(77)</sup>;
- the misallocation of resources (especially capital) which are somehow not being allocated to the most productive sectors, thus impeding productivity growth;
- the fact that developed economies are returning back to ‘normal’ and that the recent subdued pace of productivity growth might be merely

the return to more normal rates of growth, following extraordinary gains from the information technology revolution <sup>(78)</sup>;

- measurement errors or data problems and conceptual issues, e.g. with regard to capturing intangible assets (especially in light of the emerging knowledge-economy).

This contribution concentrates on the *structural* developments in TFP growth and explores its potential long-run determinants with a view to understanding which key policies may influence it. As summarised by the EIB <sup>(79)</sup>, there appears to be an extensive list of potential structural determinants, which include: (i) educational attainments (quality and quantity); (ii) lifelong learning and ICT skills; (iii) ageing; (iv) product market reforms (particularly in the services sector) and reforms of employment protection legislation; (v) public and private R&D (coupled with liberalising elements of the patent system); (vi) ICT and broadband investment; and (vii) competitiveness and trade openness.

Many papers test the macro-empirical link between TFP (growth) and these determinants using panel data on a range of OECD or EU countries <sup>(80)</sup>. In the remainder of this section we discuss studies looking at a range of different factors, then focus on findings related to the key areas and briefly discuss some additional potential factors of interest.

<sup>(75)</sup> OECD (2016), ‘Technological slowdown, technological divergence and public policy: A firm level perspective’, ECO/CPE/WP1(2016)26.

<sup>(76)</sup> Gordon, R. J. (2015), ‘Secular Stagnation on the Supply Side: US Productivity Growth in the Long Run’, *Communications & Strategies*, 1(100), 19-45.

<sup>(77)</sup> Cardarelli, M. R., and L. Lusinyan (2015), ‘US Total Factor Productivity Slowdown: Evidence from the US States’, International Monetary Fund Working Paper No 15-116.

<sup>(78)</sup> Fernald, J. G. (2015), ‘Productivity and Potential Output before, during, and after the Great Recession’, *NBER Macroeconomics Annual*, 29(1), 1-51.

<sup>(79)</sup> European Investment Bank (2011), ‘Productivity and growth in Europe: Long-term trends, current challenges and the role of economic dynamism’, *EIB Papers* 16(1).

<sup>(80)</sup> There is also a number of studies focusing: (1) on particular countries (Calligaris, S., Del Gatto, M., Hassan, F., Ottaviano, G., and F. Schivardi (2016), ‘Italy’s productivity conundrum’, *European Economy Economic Discussion Paper* No. 030.; Hsieh, C., and P. Klenow (2009), ‘Misallocation and manufacturing TFP in China and India’, *Quarterly Journal of Economics*, No. 124 (4), 1403-1448) or (2) firm data (Hall, B. (2011), ‘Innovation and productivity’, *Nordic Economic Policy Review* No. 2, p. 168-195; Mohnen, P., and B. Hall (2013), ‘Innovation and productivity: an update’, *European Business Review* No. 3(1), p. 47-65; Bartelsman, E., and Z. Wolf (2014), ‘Forecasting aggregate productivity using information from firm-level data’, *The Review of Economics and Statistics* No. 96(4), 745-755).

### III.3.1. Studies examining a range of different factors simultaneously

Systematic attempts to find the main determinants of TFP growth are rare <sup>(81)</sup>. Some studies however test a range of different factors simultaneously.

McMorrow et al. <sup>(82)</sup> estimate a simple error-correction model with EUKLEMS sectoral panel data over 1980-2004 and find that ICT-intensive industries are more likely to catch-up. On the other hand human capital seems to be important for explaining differences across countries, and regulations seem to matter most for network sectors. Balta and Mohl <sup>(83)</sup> extend and update the analysis by McMorrow et al. using new EUKLEMS data up to 2007 and confirm that fostering R&D activities can promote TFP growth. Furthermore, they show that reforms to restrictive employment protection legislation, lowering corporate taxes as well as improving government effectiveness can foster productivity growth.

A very recent paper by Gehringer et al. <sup>(84)</sup> looks at a panel of 17 EU countries and 13 industries over the period 1995-2007 and confirms the key role of ICT and human capital. Dabla-Norris et al. <sup>(85)</sup> also confirm, based on a sectoral analysis, the important role of knowledge capital and innovation, a favourable business environment and the right policy mix.

### III.3.2. Innovation and human capital

Schreyer <sup>(86)</sup> argues that ICT allows network externalities to come into play by offering a platform and thereby fostering productivity. Meanwhile O'Mahony and Van Ark and Van Ark

et al. <sup>(87)</sup> show empirically that ICT has a positive and significant effect on productivity and argue that the US versus EU productivity gap is mainly due to differences in ICT performance. Uppenberg and Strauss <sup>(88)</sup> discuss the link between innovation and productivity growth in the EU services sectors and identify three main determinants: (i) tangible fixed investment, (ii) intangible investment and (iii) exchange of technological know-how.

The role of R&D is not clear-cut and transmission channels are complex <sup>(89)</sup>. R&D can, for instance, lead to improved production processes, new goods or higher quality of output, with possibly little or no impact on traditional measures of productivity. Nevertheless, many empirical studies show that business R&D has a positive effect on TFP, with coefficients ranging from 10-30 per cent <sup>(90)</sup>. Meanwhile Adams <sup>(91)</sup> finds that public R&D has a positive effect on productivity. Intangible capital (as a broader measure of innovative assets, going beyond R&D and software products) is also found to have a positive link with multi-factor productivity growth <sup>(92)</sup>.

In line with theoretical considerations stemming from endogenous growth models <sup>(93)</sup>, human capital has been found to have a positive effect on TFP. <sup>(94)</sup> For instance, Prichett <sup>(95)</sup> finds a negative

<sup>(81)</sup> Danquah, M., Moral-Benito, E., and B. Ouattara (2014), 'TFP growth and its determinants: a model averaging approach', *Empirical Economics* No. 47, 227-251.

<sup>(82)</sup> McMorrow, K., Roeger, 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, 165-180.

<sup>(83)</sup> Balta, N., and P. Mohl (2015), 'The drivers of total factor productivity in catching-up economies', *Quarterly Report on the Euro Area*, Vol. 13, No 1, 7-19.

<sup>(84)</sup> Gehringer, A., Martinez-Zarzoso, I., and F. Nowak-Lehmann Danziger (2016), 'What are the drivers of total factor productivity in the European Union', *Economics of Innovation and New Technology* Vol. 25, No. 4, 406-434.

<sup>(85)</sup> Dabla-Norris, E., Guo, S., Haksar, V., Kim, M., Kochhar, K., Wiseman, K., and A. Zdzienicka (2015), 'The New Normal: A Sector-Level Perspective on Productivity Trends in Advanced Economies', *IMF Staff Discussion Note* 15/03.

<sup>(86)</sup> Schreyer, P. (2000), 'The contribution of information and communication technology to output growth', OECD Publishing.

<sup>(87)</sup> O'Mahony, M., and B. Van Ark (2003), 'EU Productivity and Competitiveness: An Industry Perspective. Can Europe Resume the Catching Up Process?', Luxembourg: European Commission/Enterprise Publication; Van Ark, B., O'Mahony, M., and M. P. Timmer (2008), 'The Productivity Gap between Europe and the United States: Trends and Causes', *Journal of Economic Perspectives* 22 (1), 25-44.

<sup>(88)</sup> Uppenberg, K., and H. Strauss (2010), 'Innovation and productivity growth in the EU services sector' Luxembourg: European Investment Bank.

<sup>(89)</sup> Gehringer et al. (2016); Guellec, D., and B. van Pottelsberghe de la Potterie (2001), 'R&D and Productivity Growth: Panel Data Analysis of 16 OECD Countries', *OECD Economic Studies* No. 33.

<sup>(90)</sup> Guellec et al. (2001).

<sup>(91)</sup> Adams, J. (1990), 'Fundamental stocks of knowledge and productivity growth', *Journal of Political Economy* No. 98(4), p. 673-702.

<sup>(92)</sup> Corrado, C., Haskel, J., and C. Iona-Lasinio (2013), 'Knowledge spillovers, ICT and productivity growth', available from [www.intan-invest.net](http://www.intan-invest.net); Van Ark, B., Hao, J.X., Corrado, C., and C. Hulten (2009), 'Measuring Intangible Capital and Its Contribution to Economic Growth in Europe', *EIB Papers* No. 14 (1), 63-93.

<sup>(93)</sup> Romer, P. (1990), 'Endogenous technological change', *Journal of Political Economy* Vol. 98, No5, S71-S102; Jones C. (2005), 'Growth and Ideas', in P. Aghion and S. Durlauf (eds.) *Handbook of Economic Growth* (Elsevier, 2005) Volume 1B, 1063-1111; Jones, C., and P. Romer (2010), 'The New Kaldor Facts: Ideas, Institutions, Population, and Human Capital', *American Economic Journal: Macroeconomics*. Vol. 2, No. 1.

<sup>(94)</sup> Barro, R., and J. Lee. (2001), 'International Data on Educational Attainment: Updates and Implications', *Oxford Economic Papers* 53, 541-563; Sianesi, B., and J. van Reenen. (2003), 'The Returns to



effect, which he explains by highlighting a possible decrease in returns to education unfavourable governance structures and decreasing quality in education.

The link between economic performance and human capital measures (going beyond years of schooling or educational attainments and taking into account the quality of education) has attracted a lot of attention. Earlier research, for instance, looked at the effect of test scores, which would reflect the quality of entrants into the work force, on productivity<sup>(96)</sup>. This research found that US workers would have been 2.9 per cent more productive if test scores had not declined after 1967. Hanushek and Kimko and Hanushek and Woessmann<sup>(97)</sup> confirm the importance of the quality of education for economic outcomes, implying also a considerable role for TFP. Balart, Oosterveen and Webbink<sup>(98)</sup> go a step further and argue that both cognitive and non-cognitive skills matter for economic growth.

McGowan and Andrews<sup>(99)</sup> examine the role of yet another measure of education, namely that of skill mismatch based on the OECD's adult cognitive skills database<sup>(100)</sup>, and examine the role on firm-level labour productivity. They find that skill mismatch is likely to affect productivity through resources being allocated less efficiently. The authors indicate that managerial quality, reforms to restrictive product and labour market

regulations and improving bankruptcy legislation can affect this link. Research is nonetheless still scarce on the effect of skill mismatch on productivity in developed countries<sup>(101)</sup>.

### III.3.3. Regulatory framework conditions and institutional quality

Theoretical work on the regulatory framework's role in driving productivity suggests an inverted U-shaped relationship, implying there is an intermediate optimum in the level of regulation<sup>(102)</sup>. One way in which regulation can impact productivity is through its effect on resource re-allocation. For example, as some authors argue<sup>(103)</sup>, the abundant credit in some euro area countries in the first 10 years of EMU, together with restrictive product and labour market regulations, might have fostered unfavourable resource allocation that may have reduced TFP levels.

Nicoletti and Scarpetta<sup>(104)</sup> examine this relationship empirically and indicate that competition-enhancing reforms, in particular privatisation and entry liberalisation, are likely to foster productivity. Based on sectoral OECD data, the authors estimate growth regressions to test the relationship between regulation and productivity, controlling for human capital. Indeed, entry liberalisation may have a big impact on productivity through increasing competition. Canton<sup>(105)</sup> empirically confirms this theoretical link, already established in Schumpeterian growth models. Based on macro data for 2002-12, the author shows that firm birth rates are positively and significantly linked with TFP growth. Extending his analysis to firm exit rates, he finds that

Education: Macroeconomics', *Journal of Economic Surveys* 17, 157-200; Benhabib J, and M Spiegel (1994), 'The role of human capital in economic development: evidence from aggregate cross-country data', *Journal of Monetary Economics* No. 34, 143-174; Vandenbussche J., Aghion P., and C. Meghir (2006), 'Growth, distance to frontier and composition of human capital', *Journal of Economic Growth* No. 11, 97-127.

<sup>(95)</sup> Prichett, L. (2001), 'Where Has All the Education Gone?', *World Bank Economic Review* 15, 367-391.

<sup>(96)</sup> Bishop, J. (1989), 'Is the test score decline responsible for the productivity growth decline?', *American Economic Review* 79 No. (1), 178-197.

<sup>(97)</sup> Hanushek, E. A., and D. D. Kimko (2000), 'Schooling, labor-force quality, and the growth of nations', *American Economic Review* 90(5), 1184-1208; Hanushek, E. A., and L. Woessmann (2008), 'The role of cognitive skills in economic development', *Journal of Economic Literature*, 607-668; Hanushek, E., Link S., and L. Woessmann (2012), 'Does school autonomy make sense everywhere? Panel estimates from PISA', *Journal of Development Economics* No. 104, 212-232.

<sup>(98)</sup> Balart, P., Oosterveen, M., and H. Webbink (2015), 'Test Scores, Noncognitive Skills and Economic Growth', *IZA Discussion Paper* No. 9559.

<sup>(99)</sup> McGowan, M., and D. Andrews (2015), 'Labour Market Mismatch and Labour Productivity', *OECD Economics Department Working Paper* 1209.

<sup>(100)</sup> Programme for the International Assessment of Adult Competencies (PIAAC) (<http://www.oecd.org/skills/piaac>).

<sup>(101)</sup> Mahy, B., Rycx, F., and G. Vermeulen (2013), 'Educational Mismatch and Firm Productivity: Do Skills, Technology and Uncertainty Matter?', *IZA Discussion Paper* No. 8885; Kampelmann, S. and F. Rycx (2012), 'The impact of educational mismatch on firm productivity: Evidence from linked panel data', *Economics of Education Review* No. 31, 918-931.

<sup>(102)</sup> Aghion, P., and P. Howitt (2009), 'The Economics of Growth'. MIT Press.

<sup>(103)</sup> Cette, G., Fernald, J., and B. Mojon (2016), 'The pre-Great Recession slowdown in productivity', *European Economic Review* 88, 3-20; Diaz, A., and L. Franjo (2016), 'Capital goods, measured TFP and growth: The case of Spain', *European Economic Review* 83, 19-39; Reis, R. (2013), 'The Portuguese slump and crash and the Euro crisis', *Brookings Papers on Economic Activity*, 46, 143-193.

<sup>(104)</sup> Nicoletti, G., and S. Scarpetta (2003), 'Regulation, productivity and growth: OECD evidence', *OECD Economics Department Working Paper* No. 347.

<sup>(105)</sup> Canton, E. (2016), 'Drivers of TFP growth in the EU: The role of firm entry and exit', *Quarterly Report on the Euro Area* Vol. 14 (3).

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facilitating firms' exit from the market can be of importance in high-productivity countries.

Bouis and Duval<sup>(106)</sup> confirm the key role of the regulatory framework based on pooled mean group estimates of growth regressions. The authors find that regulatory barriers to entrepreneurship, barriers to trade as well as patent rights protection are robust determinants of the productivity level. After noting that there is a large range of estimated parameters concerning the effect regulations have on productivity, Egert and Gal<sup>(107)</sup> also examine the role of regulations for boosting productivity based on dynamic ordinary least squares estimation. They find there are positive effects from product markets deregulation. Bourles et al.<sup>(108)</sup> disaggregate the effect of regulations on productivity and find that strict regulations in upstream sectors have hampered TFP growth over the last 15 years.

Regulations are often linked to the degree of competition. Based on firm-level data for Belgium and the Netherlands, Dobbelaere and Vercauteren<sup>(109)</sup> find that different competition regimes on the product and labour markets (perfect or imperfect competition on the product market and different bargaining schemes on the labour market) affect TFP. The authors find that labour market regimes seem to be more decisive in shaping TFP distributions than product market regimes. They also find that TFP distributions vary with the type and level of product and labour market regulations. Literature<sup>(110)</sup> on the impact of employment protection legislation confirms that overly strict regulations can affect productivity for instance by reducing job flows, employment of outsiders and by encouraging labour market duality.

Fiscal policies also seem to play an important role for productivity, as shown by Everaert et al.<sup>(111)</sup>. Budget deficits are found to be detrimental to TFP, whereas productive expenditures and corporate tax reduction have a positive effect on productivity. Finally, in terms of government effectiveness, Challe et al.<sup>(112)</sup> argue that cheap external capital undermines incentives to maintain good institutions. This in turn results in a high share of inefficient projects and therefore lowers average productivity.

### III.3.4. Trade and globalisation

As underlined also by the OECD,<sup>(113)</sup> openness appears to be favourable to the adoption of new technologies, thereby fostering productivity growth<sup>(114)</sup>. Gerlinger et al.<sup>(115)</sup> summarise the potential transmission channels of trade openness and foreign direct investment (FDI) noted by Griffith et al.<sup>(116)</sup> Firm entry can increase the pressure to innovate and, on the other hand, FDI can go hand-in-hand with a technology transfer. The authors also add a novel dimension, which they term 'rationalisation'. This refers to pressures arising from globalisation and European integration to reduce factor costs. They measure this concept by factoring cost savings over time and find a significant relationship with TFP, based on dynamic OLS estimation on EUKLEMS data. Anyway this method does not allow the explicit measuring of catching-up and spill-overs.

### III.3.5. Ageing and other factors

There has been an increasing interest in the relationship between ageing and TFP, in particular

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<sup>(106)</sup> Bouis, R., Duval, R., and F. Murtin (2011), 'The Policy and Institutional Drivers of Economic Growth Across OECD and Non-OECD Economies: New Evidence from Growth Regressions', *OECD Economics Department Working Paper* No. 843.

<sup>(107)</sup> Egert, B., and P. Gal (2017): The Quantification of Structural Reforms in OECD Countries: A New Framework. *CE/Sjfo Working Paper No. 6420*, March 2017.

<sup>(108)</sup> Bourlès, R., Cette, G., Lopez, J., Mairesse J., and G. Nicoletti (2013), 'Do Product Market Regulations in Upstream Sectors Curb Productivity Growth? Panel Data Evidence for OECD Countries', *The Review of Economics and Statistics* 95(5), 1750-1768.

<sup>(109)</sup> Dobbelaere, S., and M. Vandercauteren (2014), 'Market imperfections, skills and total factor productivity: firm-level evidence on Belgium and the Netherlands', *National Bank of Belgium Working Paper* No. 267.

<sup>(110)</sup> Martin, J.P., and S. Scarpetta (2012), 'Setting it right: employment protection, labour reallocation and productivity', *De Economist*, Vol. 160, 89-116.

<sup>(111)</sup> Everaert, G., Heylen, F., and R. Schoonackers (2015), 'Fiscal policy and TFP in the OECD: measuring direct and indirect effects', *Empirical Economics*, No. 49(2), 605-640.

<sup>(112)</sup> Challe, E., Lopez, J., and E. Mengus (2015), 'Southern Europe's institutional decline' *HEC Paris Research Paper* ECO/SCD-2016-1148.

<sup>(113)</sup> OECD (2012), 'Long-term growth scenarios', Working Party No. 1 on Macroeconomic and Structural Policy Analysis, ECO/CPE/WP1(2012)5.

<sup>(114)</sup> See also Coe, D. T., and E. Helpman (1995), 'International R&D Spillovers', *European Economic Review* 39, 859-887; Coe, D., Helpman, E., and A. Hoffmaister (1997), 'North-South spillovers', *Economic Journal* No. 107, 134-149; Alcalá, F., and A. Ciccone (2004), 'Trade and Productivity', *Quarterly Journal of Economics* No. 119, 613-646; Buera, F., and E. Oberfeld (2016), 'The global diffusion of ideas and its impact on productivity and growth', VOX, CEPRs Policy Portal, 12 June.

<sup>(115)</sup> Gehring et al. (2016).

<sup>(116)</sup> Griffith, R., Redding, S., and H. Simpson (2003), 'Productivity Convergence and Foreign Ownership at the Establishment Level', *Discussion Paper* No. 57, London: Centre for Economic Performance.

as TFP is seen as the main source of growth in times of a decreasing working age population across Europe. This relationship can be affected by differences in health status and adaptability to new technologies across age-groups. Based on demographic projections, Aiyar et al.<sup>(117)</sup>, for instance, find that TFP growth in the euro area would decrease by 0.2 percentage points per year over the next 20 years. Policies found to mitigate this effect include (i) training through active labour market programs, (ii) increased access to health services, (iii) fiscal reforms to lower tax wedges and (iv) public R&D spending to foster innovation, which in turn can help the adaptation to change in the global environment.

Based on a panel VAR model for 21 OECD countries and a theoretical model, Aksoy et al. confirm that a decrease in the share of young workers leads to lower innovation and productivity in the long-run. For instance middle-aged workers between the ages of 40-49 appear to have the most positive affect on patent applications. Ariu and Vandenberghe<sup>(118)</sup> confirm these findings in the case of Belgium. They find that ageing may account for a loss of 4.5 percentage points in TFP growth from 1991-2013. They also predict this number to increase to 7 percentage points for the period up to 2020. These more recent findings confirm earlier findings by Feyrer<sup>(119)</sup>, who detected a robust relationship between demographics and productivity. Creativity (which is linked to innovation) can also be affected by age (see for instance Acemoglu, Akcigit, and Celik<sup>(120)</sup> who in particular studied the case of CEO's).

Other factors of potential interest to explain TFP developments include: (i) managerial practices (Bloom et al.<sup>(121)</sup> find that managerial practices account for half of the TFP gap between the US

and other countries); (ii) trust<sup>(122)</sup>; (iii) investment<sup>(123)</sup>; (iv) entrepreneurship<sup>(124)</sup>; and (v) state aid<sup>(125)</sup>.

### III.4. Empirical analysis

In this section we empirically analyse a set of potential determinants of trend TFP growth. We first assess a restricted specification consisting of fixed effects, a spill-over term and a variable measuring the TFP gap vis-à-vis the US. We then proceed to analysing the model including also a set of potential determinants (Box V.1 describes the methodology used in more detail).

#### III.4.1. Baseline model

In Table IV.1 we show results for the baseline specification described by equation (1) in Box IV.1 including only catching-up and spill-over effects concerning the US. Results show that TFP levels do not seem to converge in the euro area. The comparison with other groups of EU Member States shows that there is no evidence for convergence in TFP levels in the EU-28, nor in the EU-15. There is some evidence of convergence in TFP levels for the NMS-13 though. However, given the stark differences in trend TFP levels vis-à-vis the US across NMS-13 countries, we believe it is premature to draw strong conclusions on convergence for these countries. All groupings of EU countries, on the other hand, seem to be well placed to capture spill-over effects from the US.

<sup>(117)</sup> Aiyar, S., Ebeke, C., and X. Shiao (forthcoming), 'The impact of workforce ageing on Euro area productivity', Euro Area Policies, International Monetary Fund.

<sup>(118)</sup> Ariu, A., and V. Vandenberghe (2014), 'Assessing the role of ageing, feminising and better-educated workforces on TFP growth' *National Bank of Belgium Working Paper* No. 265.

<sup>(119)</sup> Feyrer, J. (2007), 'Demographics and Productivity', *The Review of Economics and Statistics* No. 89(1), 100-109; Feyrer, J. (2008), 'Aggregate Evidence on the Link between Age Structure and Productivity', *Population and Development Review* No. 34, 78-99.

<sup>(120)</sup> Acemoglu, D., Akcigit, U., and M. Celik (2014), 'Young, Restless and Creative: Openness to Disruption and Creative Innovations', *NBER Working Paper* No. 19894.

<sup>(121)</sup> Bloom, N., Sadun, R., and J. Van Reenen (2016), 'Management as a Technology', *NBER Working Paper* 22327.

<sup>(122)</sup> Bjornskov, C. and P.G. Meon (2010), 'The productivity of trust', Université Libre de Bruxelles, *CEB Working Paper* No. 10-042.

<sup>(123)</sup> Ollivaud, P., Guillemette, Y., and D. Turner (2016), 'Links between weak investment and the slowdown in productivity and potential output growth across the OECD', *OECD Economics Department Working Paper* No. 1304.

<sup>(124)</sup> Erken, H., Donselaar, P., and R. Thurik (2016), 'Total factor productivity and the role of entrepreneurship', *Journal of Technology Transfer*, forthcoming.

<sup>(125)</sup> Van Cayseele, P., Konings, J., and I. Sergant (2014), 'The effects of state aid on total factor productivity growth', *National Bank of Belgium Working Paper* No. 264.

### Box III.1: Empirical assessment of TFP drivers

#### The empirical model and its estimation

TFP growth and its evolution are modelled by an Error-Correction-Model (ECM). The ECM captures a set of assumptions about the dynamics of TFP growth. In the long-run we expect convergence in productivity across countries to what can be described as the technological frontier, typically represented by a country considered as a forerunner in terms of technological progress. Taking into account contributions from, for instance, Nicoletti and Scarpetta <sup>(1)</sup> and Domenech and de la Fuente <sup>(2)</sup> we consider this benchmark country to be the USA. Convergence can occur through different channels such as imitation (Aghion and Howitt<sup>(3)</sup>) or innovation. This long-run convergence in TFP is typically expected to be conditional in the sense that differences in structural factors with the frontier country can still persist. In the short-run TFP is driven by a catching-up process (making it converge faster if it is relatively far from the frontier (or best-performing) country) and potentially some additional short-term dynamics (for example due to direct spill-over effects from the frontier country).

The standard ECM typically takes the following form:

$$\Delta(TFP^{TR})_{it} = c + \alpha_i + \beta_0[TFP_{it-1}^{TR} - TFP_{L,t-1}^{TR} - \alpha_i] + \beta_1\Delta(TFP^{TR})_{L,t} + \varepsilon_{it} \quad (1)$$

where

- $\Delta(TFP^{TR})_{it}$  denotes trend TFP growth in country  $i$  in time  $t$ ;
- $\Delta(TFP^{TR})_{L,t}$  denotes trend TFP growth in the leader country  $L$  in time  $t$ ;
- $TFP_{it-1}^{TR}$  denotes the logarithm of TFP levels in country  $i$ ;
- $TFP_{L,t-1}^{TR}$  denotes the logarithm of TFP levels in the leader country  $L$ ;
- $c$  and  $\alpha_i$  denote respectively a constant term and a country fixed effect which captures time-invariant differences across countries;
- $\beta_0, \beta_1, \beta_2, \beta_3$  denote coefficients on the respective explanatory variables;
- the crucial term,  $[TFP_{it-1}^{TR} - TFP_{L,t-1}^{TR} - \alpha_i]$ , <sup>(4)</sup> indicates the difference between productivity in country  $i$  and at the frontier, conditional on the fixed effect  $\alpha_i$ ;
- $\Delta(TFP^{TR})_{L,t}$  indicates the impact of spill-overs from the leading economy.

For convergence and catching-up to be confirmed by the data (and for the crucial co-integration assumption to hold)  $\beta_0$  must be negative, indicating that if national TFP is below the US level, TFP must grow faster.

However, the data seems to suggest that the standard catching-up model in TFP levels may not hold and that instead there is some evidence of co-integration in terms of growth rates. Stationarity and co-integration pre-tests for the ECM model as well as visual inspection of the data strengthen this conclusion. An alternative to the model described by equation (1) is a model expressed in differences (see equation (2)), which would capture the assumption that TFP growth rates, not levels, are converging in the long-run. As we are interested in the relationship between structural indicators and TFP growth we add the former to the model denoted by  $SI_{it-1}$ . For the estimation of the model we choose the Pooled Mean Group estimator (PMG; see Pesaran, Shin, and Smith (1999) <sup>(5)</sup>), which — under the condition of co-integration — addresses

<sup>(1)</sup> Nicoletti, G. and S. Scarpetta (2003), 'Regulation, productivity and growth: OECD evidence', OECD Economics Department Working Papers, No. 347, OECD Publishing.

<sup>(2)</sup> Domenech, R. and A. De la Fuente, (2006), 'Human capital in growth regressions: how much difference does data quality make?', Journal of the European Economic Association, No. 4(1).

<sup>(3)</sup> Aghion, P. and P. Howitt (2009), The Economics of Growth, MIT Press.

<sup>(4)</sup> Note that this term denotes a lagged dependent variable (as the dependent variable can be written as a function of levels) and may entail the well-known econometric problem of endogeneity in form of the lagged dependent variable bias. It is challenging to find an econometric method that addresses both non-stationarity and endogeneity. However, in the presence of co-integration (for which some evidence is given if  $\beta_0$  is significantly negative), error terms are stationary and parameter estimates are super-consistent, which means that the parameter estimate converges to its theoretical value and even faster than if the series were stationary (see Sims 2013 'Graduate Macro II', [https://www.3.nd.edu/~esims1/time\\_series\\_notes\\_sp13.pdf](https://www.3.nd.edu/~esims1/time_series_notes_sp13.pdf)).

<sup>(5)</sup> Pesaran, M., Y. Shin and R. P. Smith (2004), 'Pooled mean group estimation of dynamic heterogeneous panels', ESE Discussion Papers 16, Edinburgh School of Economics, University of Edinburgh.

(Continued on the next page)



*Box (continued)*

non-stationarity and at the same time allows for heterogeneity in convergence speed. The model takes the following form <sup>(6)</sup>:

$$\Delta^2(TFP^{TR})_{it} = c + \beta_{0i}[\Delta(TFP^{TR}_{it-1}) - \Delta(TFP^{TR}_{it-2}) - \alpha_i - \beta_2(SI_{it-1} - SI_{it-2})] + \beta_{1i}\Delta^2(TFP^{TR})_{it} + \varepsilon_{it} \quad (2)$$

Note that the structural variables enter our model in terms of their gap vis-à-vis the US as we believe that dynamics in structural indicators in EU member states with respect to the US can explain dynamics in TFP growth in EU member states with respect to the US. A positive coefficient would indicate that — on average across EU member states — the structural indicator  $SI_{it}$  is positively correlated with TFP growth. It would also indicate that upward (downward) convergence or divergence with the US in terms of the structural indicator implies upward (downward) convergence or divergence with the US in terms of TFP growth. Note that due to the importance of parsimony in our model (i.e. relatively short series as well as the presence of multicollinearity) it is not possible to capture both, short- and long-run effects of the structural variables. Structural variables should have long-run effects while their short-run effects are more debatable. For this reason we only model the long-run effects of structural variables. Even if there are short-run effects, their omission decreases the efficiency of the estimates, but does not bias them (note that the omission of a valid long-run effect would generally lead to a biased estimate).

*The data*

Trend TFP data is computed as the trend Solow Residual based on the production function methodology (see Havik et al 2014) and on AMECO data combined with ECFIN's Spring 2016 Forecast. It is available for the 28 EU Member States. Data for the EU-15 Member States is available from 1965-2017 and for the new Member States from 1995-2017. To match TFP data availability with the availability of the structural variables we cut the TFP sample to the period 1980-2014. The size of the dataset used for the respective regression results reported below varies depending on the availability of the explanatory variables we include.

The explanatory variables stem from various sources including OECD databases, the Labour Force Survey (LFS), the INTAN-INVEST project, Eurostat etc. Note that some of the data was interpolated in some cases or in some rare cases flatly extrapolated. More specifically,

- our measure of human capital is based on the quality of skills (OECD PISA (maths) scores; available 2000-2012);
- our measures of regulations include the OECD's Product Market Regulation (PMR) index (taken from the OECD; sub-indicators cover barriers to entrepreneurship, state control and barriers to trade and investment; available 1998-2013 <sup>(7)</sup>) and the OECD's Employment Protection Legislation (EPL) index (it consists of 8 indicators based on sub-indicators; available 1985-2015 <sup>(8)</sup>);
- innovation is measured as business sector intangible capital (taken from the INTAN-invest database <sup>(9)</sup>) and measured as investment in intangibles over Gross Value Added (GVA); data available for the business sector excluding dwellings and for 15 countries 1995-2013);
- public R&D spending (taken from Eurostat and measured as a percentage of GDP; available 1995-2014).
- for measuring trade openness we regress per country the sum of exports and imports on GDP and use the predicted error term for our analysis (data is taken from AMECO and is available for 1960-2017);
- ageing is measured by the share of older workers, i.e. the percentage of employed aged 55+ in the labour force aged 15-64 (taken from AMECO and available for 1981-2014).

<sup>(6)</sup> See equation (8) in Blackburne and Frank (2007).

<sup>(7)</sup> The PMR index is not available for Bulgaria, Cyprus, Croatia, Lithuania, Latvia, Malta and Romania.

<sup>(8)</sup> The EPL index is not available for Bulgaria, Cyprus, Croatia, Estonia, Lithuania, Latvia, Luxembourg, Romania and Slovenia.

<sup>(9)</sup> <http://www.intan-invest.net/>

Turning to the results in growth rates (Table IV.2 based on equation (2) in Box IV.1) we can see that there is evidence of co-integration (i.e. convergence) in the euro area. This is also the case for the other groupings of EU countries

though this result seems to be stronger for the

NMS-13 countries <sup>(126)</sup>, in line with a priori expectations. This result may stem from the fact that growth rates in the NMS, which are typically higher than in the US, declined as a result of the economic crisis, leading to downward convergence (see section IV.2).

Table III.1: Pooled mean group estimation of error-correction equation (3); long-run relationship in levels

	EA-19	EU-28	EU-15	NMS-13
catching-up US	0.00945 (0.0226)	-0.0224 (0.0216)	-0.00743 (0.0204)	-0.0445** (0.0189)
spill-over US	0.974** (0.439)	1.299*** (0.343)	1.093** (0.496)	3.029*** (0.711)
Constant	-0.0655 (0.138)	0.161 (0.139)	0.0678 (0.200)	1.012** (0.425)
Countries	19	28	15	13
Years (maximum)	33	33	33	20
Observations	541	754	510	244

Source: Commission services

Table III.2: Pooled mean group estimation of error-correction equation (3); long-run relationship in growth rates

	EA-19	EU-28	EU-15	NMS-13
TFP growth gap US	-0.115*** (0.0398)	-0.103*** (0.0263)	-0.0336* (0.0194)	-0.137*** (0.0468)
spill-over US	1.041** (0.461)	0.781* (0.417)	0.836** (0.385)	0.874 (0.774)
Constant	-4.25e-05 (0.000525)	-0.000441 (0.000305)	-0.000132 (0.000234)	-0.00201** (0.000798)
Countries	19	28	15	13
Years (maximum)	33	33	33	20
Observations	522	726	495	231

Source: Commission services

### III.4.2. Adding explanatory variables

In Table IV.3 results are shown for the specifications including selected explanatory variables added to the baseline model of TFP convergence in growth rates. While a series of variables were tested in line with the literature review in Section IV.3, only the variables with the most robust results for each of the groups of determinants identified in Section IV.3 are presented, namely innovation, human capital, regulation, trade and globalisation, and ageing. The variables are added separately for reasons of multicollinearity. This may, however, create an omitted variable bias.

Column (1) is simply the baseline model for the full EU sample. Results in column (2) indicate that the

<sup>(126)</sup> Notice that when we harmonise the time range across EU-15 versus EU-NMS also in growth rates the convergence for the EU-15 vanishes, which reflects the fact that the growth rate in the US was on average higher in recent years.

quality of education — measured by PISA maths scores — is positively associated with TFP growth, i.e. catching-up in terms of PISA maths scores vis-à-vis the US is consistent with closing a negative gap in TFP growth relative to the US (or increasing a positive gap). Increasing PISA maths scores relative to the US by 1 % is associated with an increase in TFP growth relative to the US by about 0.05 %. This finding supports some previous results showing that education may matter in levels rather than in percentage change. For instance, based on a theoretical model by Nelson and Phelps <sup>(127)</sup>, Benhabib and Spiegel <sup>(128)</sup> show that human capital levels matter for TFP growth as they ensure a sufficient technology absorption capacity.

Results in column (3) show that increasing investment in innovative assets, measured by intangible assets <sup>(129)</sup> (as a share of GVA), relative to the US, by 1 % is associated with an increase in TFP growth, again relative to the US, by 0.05 %. Similarly, increasing public R&D spending relative to the US is associated with increased TFP growth (see column (4)).

Ageing seems to be negatively associated with TFP growth, as indicated by results in column (5). Results for regulation are mixed. For employment protection legislation (EPL) we find a negative relationship with TFP growth (see column (6)), while for product market regulation (PMR) the relationship is not significant. The latter finding is in contrast with theoretical literature on this issue and also with findings by the IMF. <sup>(130)</sup> The insignificance of the coefficient on the OECD's PMR indicator may be related to the fact that this data is only available every five years. Indeed, when testing the World Bank's Doing Business indicators — which are available annually, though only from 2004 onwards — some of them, notably the ease of dealing with construction permits, are

<sup>(127)</sup> Nelson, R. and E. Phelps (1966), 'Investment in humans, technological diffusion and economic growth', *American Economic Review* 56, p. 69-75.

<sup>(128)</sup> Benhabib, J., and M. Spiegel (2005), 'Human capital and technology diffusion' in Aghion, P., and S. Durlauf (eds) *Handbook of economic growth*, vol 4. North Holland, Elsevier, Amsterdam.

<sup>(129)</sup> Following a commonly used definition by Corrado, C., Hulten, C., and D. Sichel (2005), 'Measuring capital and technology: an expanded framework' in Corrado, C., Haltiwanger, J., and D. Sichel. (eds.), *Measuring capital in the new economy*, Studies in Income and Wealth, Vol. 64, Chicago: The University Press, intangible assets include investment in employer provided training, R&D, market development, and organisational and management efficiency.

<sup>(130)</sup> IMF (2015), 'World Economic Outlook', April.

Table III.3: Pooled mean group estimation of error-correction equation (3), adding structural variables, EU-28

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
TFP growth (US gap) (log)	-0.103*** (0.0263)	-0.176** (0.0686)	-0.0935*** (0.0274)	-0.131*** (0.0320)	-0.106*** (0.0269)	-0.146** (0.0607)	-0.0782** (0.0316)
Spill-over US	0.781* (0.417)	2.056** (0.876)	1.137*** (0.427)	1.183** (0.518)	1.188 (0.758)	0.904 (0.662)	0.897** (0.416)
Long-run relationship							
PISA score maths (US gap) (log) <sup>(1)</sup>		0.0465*** (0.00168)					
Business sector intangible investment (US gap) (log)			0.0455*** (0.00512)				
Public R&D (US gap) (log)				0.0129*** (0.00120)			
Share of workers aged 55+ (US gap) (log)					-0.0450*** (0.00444)		
Employment protection legislation (US gap) (log) <sup>(2)</sup>						-0.00721*** (0.00119)	
Trade openness (US gap) (log)							0.0102** (0.00475)
Constant	-0.000441 (0.000305)	0.000395 (0.000776)	0.00146 (0.000933)	-0.00137*** (0.000468)	-0.00119 (0.000731)	0.00105* (0.000638)	-0.00596** (0.00251)
Countries	28	15	15	28	23	21	28
Maximum available years across countries	33	15	20	20	33	29	33
Observations	726	225	300	560	639	603	726

Notes: Standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 (1) for PISA scores also the science categories is significant (2) strictness of regulation on the use of fixed term and temporary work agency contracts; the indicator of strictness on dismissals on regular contracts is also significant

Source: Commission services

significantly correlated with TFP growth. Our findings somewhat confirm those of Dobbelaere and Vandercauteren (2015) that labour market regimes are more important than product market regimes for TFP growth (see Section V.3).

Finally, trade openness seems to be an important determinant of TFP growth as column (7) indicates.

### III.5. Conclusion

This section focused on the dynamics of trend TFP concerning the US and potential determinants of trend TFP growth, in particular human capital, innovation, regulation, openness and demographics. While this analysis does not provide the answer to the widely discussed productivity puzzle, it sheds some light on factors that could play a role in determining the long-run dynamics of TFP growth in the euro area and beyond.

Overall, we find evidence for convergence in growth rates while we do not find strong evidence for catching-up in levels with the US.

Convergence in growth rates can be explained by spill-overs stemming, for instance, from technology adoption or imitation and also by the global impact of the economic crisis. This finding is true for the euro area but also for other groupings of EU Member States. In particular, convergence seems to be strongest for the EU Member States that joined more recently. This result may stem from the fact that growth rates in the latter countries declined as a result of the economic crisis, leading to downward convergence. We also find that spill-over effects with the US are strong in the euro area as well as across other groupings of EU Member States.

Structural factors seem to play a role in determining trend TFP growth rates. Educational quality (measured by PISA scores), investment in intangible capital, public R&D expenditure, policies enhancing job transitions and self-employment, and trade openness are estimated to have a positive impact on TFP growth, while an older workforce could tend to have overall negative effects.



## IV. Bank lending constraints in the EA and their macroeconomic implications

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*This section presents stylised scenarios highlighting how low bank profitability, reluctance to issue bank equity and increases in target capital ratios can temporarily constrain bank lending in the current economic context. In connection with this, the article also reviews the main potential and actual sources of increases in minimum capital requirements at euro area level. An increase in bank capital ratios is expected to improve financial stability by lowering the probability and cost of a financial crisis. Beyond this important benefit, the combination of the three factors mentioned has the potential to significantly constrain bank lending during the period of transition to higher capital ratios. According to DSGE model simulations, this could reduce growth and investment levels in the short run. As such, restoring bank profitability, implementing conservative dividend payout policies and promoting equity issuance can have particularly positive macroeconomic implications in the current context <sup>(131)</sup>.*

### IV.1. Introduction

An increase in bank capital ratios can improve financial stability by lowering the probability and costs of a financial crisis. However, the period of transition to a higher bank capital base can imply a short-term drag on the economy if banks try to achieve the new target ratios by compressing loan growth rather than increasing their equity levels. Such a situation is made more likely if raising equity on capital markets is deemed unattractive for current shareholders due to depressed bank valuations, or if bank profitability is low, as this constrains the possibility of building up capital buffers through retained earnings.

The 2008 financial crisis saw the profitability of the banking sector of most EU Member States plunge to negative or very low levels. This was the result of several factors, including asset valuation losses springing both from a recognition of existing asset quality problems, as well as from an unfavourable macroeconomic environment. The latter also meant reduced banking activity and has progressively led to a low-yield environment, which has put pressure on interest rate margins. While the post-crisis period saw the need for more stringent regulatory requirements, including a larger capital base, in order to prevent and increase the resilience of the banking sector to future crises, this has also contributed to lower banks' return on equity, at least in the short-run. As both low valuations and low profitability continue to characterise the euro area banking sector, this section seeks to assess in a stylised manner the role of these two factors in

constraining current and prospective bank lending dynamics in a context of increasing target capital ratios. The broader macroeconomic implications of these bank lending constraints are subsequently simulated in a general equilibrium model, allowing for an assessment of their short-term impact on GDP and investment levels.

As a first step, sub-section V.2 provides stylised projections for bank profitability, dividend payouts and equity issuance. Based on these variables, on an equation for the evolution of risk-weighted assets over time and on some assumptions, a projection for the growth rate of bank lending can be run. As this projection is dependent on changes in capital ratios over time, sub-sections V.3 and V.4 discuss how both minimum and target capital ratios may evolve over the next few years. On the basis of this, three possible scenarios are defined, ranging from a scenario of no changes in target ratios to a scenario consistent with a sizeable increase. The implications of these scenarios for aggregate bank lending in the euro area are then shown in subsection V.5. Sub-section V.6 assesses the short-term macroeconomic effects of these bank lending constraints in a general equilibrium context and sub-section V.7 concludes.

### IV.2. Assessing bank lending constraints

Low bank profitability along with a reluctance to issue equity in capital markets can amplify the potential short-term negative effects on bank lending of an increase in bank capital ratios. The median return on equity (RoE) of EU banks dropped sharply after 2007 and has since remained below 8% (a benchmark for the cost of bank

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<sup>(131)</sup> This section was prepared by Daniel Monteiro. The author wishes to thank Romanos Priftis for his contributions to an earlier paper, which are republished in this article. Comments from Christian Engelen and Davide Lombardo are gratefully acknowledged.

capital)<sup>(132)</sup>. As a result of low profitability and a challenging outlook, both for the macroeconomy and for individual banks, the stock market valuations of EU banks have fallen to close to half of their book value, a significantly smaller ratio than that of US peers. In 2016 alone, from January until the results of the European Banking Authority's (EBA) stress tests were revealed in August, the market capitalisation of euro area banks declined by close to a quarter of their total value, markedly underperforming the wider economy (Graph IV.1) for an extended period. Low valuations mean that bank managers and current shareholders have little incentive to issue equity, as the timing is deemed adverse and the effects on shareholder dilution are heightened. Overall, this makes it particularly challenging to raise equity either internally (via RoE) or externally (via capital markets). As a result, where a regulatory increase in minimum capital requirements over the medium term leads banks to target a higher capital ratio (for instance, the common equity to risk weighted assets ratio), this is more likely to be met by constraining the denominator (risk-weighted assets) rather than by a swift increase in the numerator (common equity). In turn, a decrease in (risk-weighted) assets is likely to go hand in hand with a decrease in bank loans<sup>(133)</sup>. This effect accrues to and amplifies the standard effect on bank lending of a shift towards a more equity-intensive capital structure: as equity is deemed more expensive than debt, an increase in the capital ratio increases banks' funding costs, which can lead to the provision of less credit at higher interest rates<sup>(134)</sup>.

Stylised scenarios yielding the maximum achievable loan growth rates for each euro area Member State over the 2016-19 period<sup>(135)</sup> can be derived by, inter alia, projecting a path for return on equity and for target capital ratios. If  $\Delta CR$  denotes the change in the (target) Common Equity Tier 1 (CET1)<sup>(136)</sup>

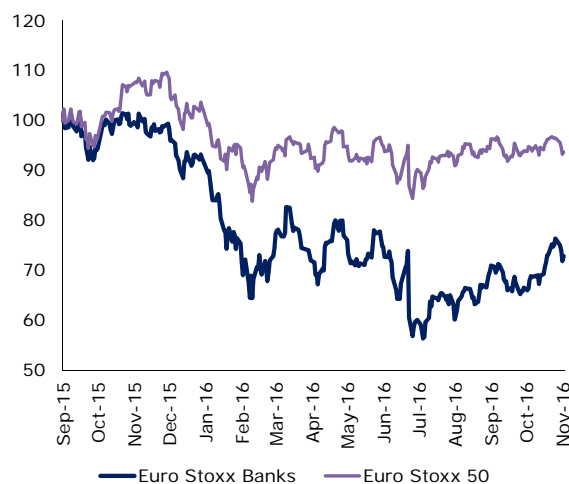
capital ratio expressed in pps., then the (maximum) growth in banks' assets can be derived by observing that a bank's CET1 ratio evolves according to the following difference equation:

$$\begin{aligned} \Delta CR_t = CR_t - CR_{t-1} &= \frac{CET1_t}{RWA_t} - \frac{CET1_{t-1}}{RWA_{t-1}} = \\ &= \frac{CET1_{t-1} \times (1 + RoE \times (1 - PO) + issuance)}{RWA_{t-1} \times (1 + g_t^{RWA})} - \frac{CET1_{t-1}}{RWA_{t-1}} \end{aligned}$$

where  $PO$  denotes the payout ratio (i.e., the percentage of earnings paid out as dividends),  $issuance$  denotes the percentage growth in CET1 due to new equity issuance, and  $g^{RWA}$  the growth rate of risk-weighted assets (RWA). Solving for  $g^{RWA}$  one obtains:

$$\begin{aligned} g_t^{RWA} &= \frac{CET1_{t-1} \times (1 + RoE \times (1 - PO) + issuance)}{RWA_{t-1} \times \Delta CR_t + CET1_{t-1}} \\ &- 1 \end{aligned}$$

Graph IV.1: Stock market performance of EU banks (September 2015 = 100)



Source: Euro Stoxx

In order to translate  $g^{RWA}$  into bank lending growth, a constant banking asset structure is assumed. This implies that  $g^{RWA}$  equates to the

corresponding to the notion of common equity. The analysis in this note is based on changes in the CET1 ratio, as most of the capital buffers considered here are to be met with CET1 capital, and RoE is a direct driver of CET1. The effects of other requirements not directly linked to CET1 can generally be translated into an impact on CET1 and are treated in this fashion in this section.

<sup>(132)</sup> A range between 8 % and 10 % was identified as a benchmark for the cost of bank equity in the European Banking Authority's June 2016 Risk Assessment Questionnaire.

<sup>(133)</sup> According to ECB data, loans constituted approximately two thirds of total aggregate EU banking assets by year-end 2015.

<sup>(134)</sup> The assumption that an increase in capital requirements results in higher bank funding costs is a common one across impact studies. However, the precise magnitude of this effect is not firmly established in the literature. This issue is further discussed in subsection VI.5.

<sup>(135)</sup> The present analysis takes the viewpoint of November 2016 and is based on the information known on that date.

<sup>(136)</sup> The CET 1 ratio is given by CET 1 bank capital divided by risk-weighted assets. CET1 capital is the form of capital with the highest quality and loss-absorbing capacity, essentially



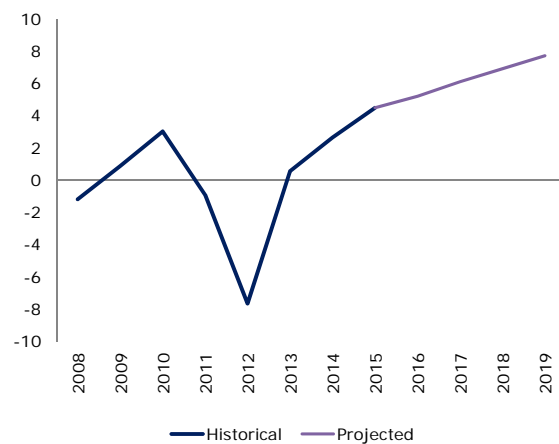
(maximum) growth in bank lending. It should be noted that when seeking to adjust RWA, banks may favour adjusting items with higher risk weights, such as corporate loans. However, the intent to maintain and extend the scope of the SME supporting factor in the context of the recent proposals for the revision of the Capital Requirements Regulation (CRR) and Directive (CRD) <sup>(137)</sup> could, on the contrary, mean that banks may try to protect this asset class while seeking to contain RWA growth.

The  $g^{RWA}$  for the euro area for the 2016-19 period is based on the aggregation of country-specific projections. To derive these country-specific figures, the following assumptions are made:

- **RoE:** the post-2007 historical maximum for RoE is determined for each country, and the 2015 returns are assumed to converge to this maximum by 2019. This approach assumes that the relevant profitability benchmark lies in the post-crisis period and is different from the (higher) pre-crisis figures. At the same time, the assumption can be seen as a favourable one by projecting increasing returns over the next 3 years <sup>(138)</sup>. The implication for the euro area is an increase in aggregate RoE from 5.5 % in 2015 to 7.7 % in 2019, a figure slightly below the estimated cost of bank capital (Graph IV.2). The euro area figure for 2018, which is the last figure considered in the calculations, is 6.9 % <sup>(139)</sup>.
- **Payout ratio:** the payout ratio is assumed to be 45 %. This figure is broadly in line with average payout ratios announced for banks for 2016-18. It should be noted, however, that an efficient payout ratio should respond to profitability expectations so that if, for instance, better investment and lending opportunities arise, banks may decide to lower their dividend payouts and increase their lending.

- **Issuance:** bank equity issuance is set at 1 % of existing equity in 2016, increasing to 1.4 % by 2018, in proportion to the assumed increase in RoE. These figures are in line with post-crisis issuance levels.

Graph IV.2: **Historical and projected paths for return on bank equity in the euro area (in %)**



Source: ECB (historical data)

The change in the target CET1 ratio,  $\Delta CR$ , requires particular consideration and forms the basis for the two scenarios analysed in this article.  $\Delta CR$  depends both on the changes in minimum capital requirements over the 2016-19 period and on banks' reaction to such change. The following two sections discuss these aspects in more detail.

### IV.3. Changes in minimum capital requirements over the 2016-19 horizon

Several capital buffers contemplated in the fourth Capital Requirements Regulation and Directive (CRR/CRD IV) are being phased in from 1 January 2016 to 1 January 2019 and affect both systemic and non-systemic bank institutions. All EU banking sectors are progressively being subject to the introduction of a capital conservation buffer (CCoB), while some supervisors are also discretionarily introducing countercyclical capital buffers (CCyB), which are determined on the basis of a reading of the estimated credit-to-GDP gap.

Additionally, bank institutions that are deemed systemic <sup>(140)</sup> due to their size and degree of

<sup>(137)</sup> For the recent proposals on the SME supporting factor see, e.g., [http://europa.eu/rapid/press-release\\_MEMO-16-3840\\_en.htm](http://europa.eu/rapid/press-release_MEMO-16-3840_en.htm).

<sup>(138)</sup> In the case of Germany, a somewhat different approach was followed due to the fact that Germany's post-crisis maximum is an outlier. Although Germany displays by no means the lowest average post-crisis RoE, its maximum RoE is significantly lower than that of any other EU-28 country. For this reason, Germany is assumed to converge to the second lowest EU-28 figure.

<sup>(139)</sup> The 2019 figure is not considered because the analysis stops on 1 January 2019, when the last batch of capital requirements enters into effect.

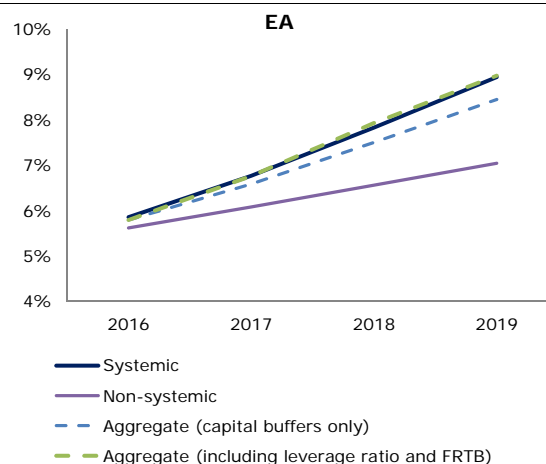
<sup>(140)</sup> The list of institutions deemed globally systemically important is published annually by the Financial Stability Board while other

interconnectedness are progressively having to comply with the maximum of three possible capital buffers: the global systemically important institutions (G-SII) buffer, the other systemically important institutions (O-SII) buffer and the systemic risk buffer (SRB). The table in Box IV.1 describes these buffers, their legal basis, possible magnitude in terms of the impact on the CET1 ratio and introduction profile, including the analytical assumptions used in the calculations shown in this section.

The combined effect of these buffers derived from aggregating country estimates suggests that they could lead to an increase in the minimum euro area CET1 ratio of 2.6 pps by 2019 from the levels registered at the beginning of 2016 (Graph IV.3). These figures are based on the aggregation of projections for each euro area Member State, taking November 2016 as the viewpoint. The Member State figures are, in turn, based on the projected change in minimum capital requirements for systemic and non-systemic institutions, taking into account the relative sizes of these two subsectors for each Member State. While the calculations were produced at Member State level and aggregated to obtain the euro area figures, a more precise approach would require the calculation of minimum requirements at bank level, and subsequent aggregation.

Besides the buffers contemplated in the CRR/CRD, other regulatory developments could drive a further increase in capital requirements. In particular, the fundamental review of the trading book (FRTB) and the introduction of a leverage ratio can increase the minimum CET1 ratio by some 0.5 pps. The FRTB would impose constraints on banks' use of internal risk models, increasing risk weights and thus RWA<sup>(141)</sup>. The leverage ratio would impose a limit of 3% on the Tier 1-to-total exposure ratio.

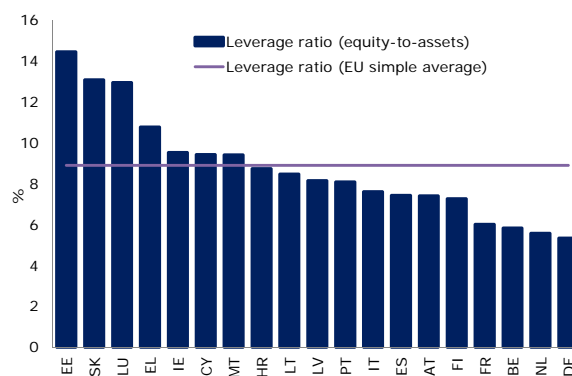
**Graph IV.3: Projected change in minimum capital requirements (CET1/RWA ratio) for the euro area (EA) aggregate**



(1) Assessment as of November 2016. Based on the aggregation of country-specific projections.

Source: Supervisory announcements, banking regulations and estimates.

**Graph IV.4: Equity-to-assets ratio per Member State (2015)**



Source: ECB

As mentioned in Box IV.1, the combined impact of the leverage ratio<sup>(142)</sup> and the FRTB can result in an increase of approximately 0.5 pps. in the aggregate CET1 ratio. It should be noted that the constraints imposed by the leverage ratio are more likely to be felt on the more leveraged banking sectors. Therefore, the approach in this section allocates the assumed aggregate effect to individual Member States on the basis of the (negative) gap

systemically important institutions are determined yearly by the EU supervisory authorities on the basis of criteria set by the EBA.

<sup>(141)</sup> For the purposes of our analysis, this increase in RWA is represented as an equivalent increase in CET1 and the CET1/RWA ratio.

<sup>(142)</sup> The leverage ratio is different from the CET1/RWA ratio considered throughout this section. The effects of the leverage ratio have therefore been translated into an effect on the CET1 ratio based on the estimates of the European Commission and the EBA.

between their actual equity-to-total-assets ratio and the EU average ratio <sup>(143)</sup> (see Graph IV.4).

#### IV.4. Will banks react to the introduction of new capital requirements?

Increases in minimum capital requirements may not generate a significant reaction if they have been anticipated and sufficient bank capital is already in place to meet them. Evidence suggests this is largely the case for some of the capital buffers and transitional arrangements contemplated in the CRR/CRD. Analysis by the EBA on the implementation of the CRR/CRD IV <sup>(144)</sup> concludes that *‘on average, European banks largely fulfil the future regulatory capital requirements, while only a very small number of banks exhibit potential capital shortfalls’*. This analysis was based on a sample covering 18 EU Member States, and excluding macro prudential discretions which are explicitly taken into account in this section (e.g., the systemic risk and countercyclical buffers) and other supervisory considerations (e.g., Pillar II capital add-ons).

In fact, EU banks have mostly anticipated the end of the transitional arrangements (which will result in the full phase-in of certain deductions and the full phase-out of some eligible capital elements), as shown in the narrowing of the difference between ‘full implementation’ capital ratios and current capital ratios <sup>(145)</sup>. Additionally, the full phase-in of target requirements revealed only a marginal shortfall as of year-end 2015, after a period of rapid narrowing of expected capital gaps <sup>(146)</sup>.

However, there are currently several regulatory initiatives, some of which not yet enshrined in regulation, with the potential to increase minimum capital requirements. This is the case of the non-buffer measures included in Box IV.1 and, in particular, of the leverage ratio and the FRTB.

Banks are likely to react to some of these measures both directly when their introduction is highly expected and due to market pressure and for precautionary reasons where their introduction and impact is less certain. Most banks possess significant excess capital buffers (defined as the difference between current capital levels and current regulatory minima). These are due to the anticipation of the phase-in of new buffers between 2016 and 2019 and to banks’ strategy of maintaining a safety margin over minimum requirements (which, in turn, is linked to the degree of market pressure experienced by banks and to the volatility in their RoE and RWA). As these CRR/CRD buffers are progressively introduced, excess capital levels are expected to decline. However, other measures may revive pressure for capital build-up. In particular, the leverage ratio was assessed by the EBA in its analysis as a stronger constraint than the Tier 1-to-RWA ratio for around one third of the 246 credit institutions, with approximately 9 % of them showing a leverage ratio below the required 3 % by mid-2015 <sup>(147)</sup>.

This section considers three scenarios:

1. The no-change scenario, where target CET1 ratios do not increase.
2. A 0.5 pps. CET1 increase scenario, whereby the aggregate euro area CET1 ratio increases by approximately 0.5 pps. by 2019. Under this section’s framework and assumptions, this would be consistent with banks reacting only to the new requirements arising from the introduction of the leverage ratio and the FRTB.
3. A 1.5 pps. CET1 increase scenario, equivalent to an increase in the euro area CET1 ratio of approximately 1.5 pps. by 2019. Under this section’s framework, this would be consistent with banks reacting both to the new requirements arising from the leverage ratio and the FRTB, as well as to approximately 37 % of the capital buffer phase-ins, including the CCyB and the SRB which are not considered in the EBA analysis mentioned earlier.

<sup>(143)</sup> The leverage ratios depicted in Graph VI.4 are calculated as equity divided by total assets. This definition differs somewhat from the regulatory definition of the leverage ratio, which is based on the broader concept of total exposure rather than that of total assets. The fact that all Member States depicted in Graph VI.4 display leverage ratios above 3 % is consistent with the existence of gaps at bank level as: i) these gaps are masked when looking at the aggregate country figure, and ii) the regulatory leverage ratio should be lower than the depicted equity-to-total-assets ratio.

<sup>(144)</sup> See, e.g., EBA — CRD IV — CRR / Basel III Monitoring Exercise — Results based on data as of 31 December 2015 (September 2016).

<sup>(145)</sup> Idem.

<sup>(146)</sup> See, e.g., EBA Quantitative Impact Study Data (December 2015).

<sup>(147)</sup> See the EBA report on the leverage ratio requirements under Article 511 of the CRR (August 2016).

Scenario number 2 can be considered a benchmark scenario for the minimum expected increase in the target CET1 ratio. In fact, it is unlikely that scenario 1 – a no-change scenario – materialises, given the aggregate capital shortfalls resulting from the introduction of the leverage ratio, the FRTB and other (potential) measures.

In scenario 3, the CET1 ratio is increased one extra pp. to a total of 1.5 pps. This is equivalent to institutions reacting to 37 % of the capital buffers phase-in, while letting the remaining 63 % eat into their excess capital reserves. The higher simulated increase in the CET1 ratio can also be understood as a scenario where institutions further strengthen their capital ratios to gear up for the uncertainty surrounding: i) the possible introduction of discretionary buffers (e.g., the CCyB and the SRB) and ii) the different measures described in the second half of the table in Box IV.1.

#### IV.5. The results: how constrained are bank lending dynamics?

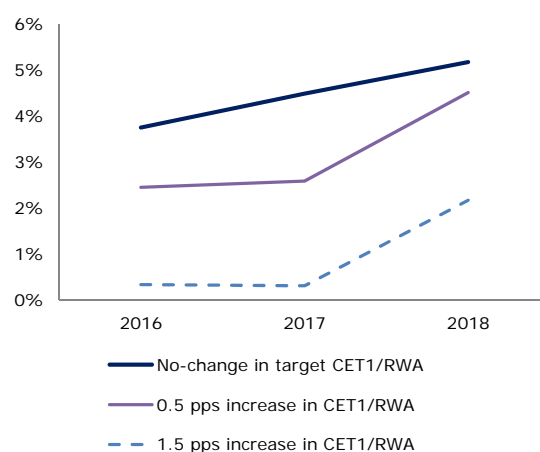
The two previous sub-sections have identified possible paths for changes in capital requirements and in target capital ratios, including a no-change scenario and two increasingly demanding scenarios. This sub-section explores the implications of such scenarios in terms of lending dynamics.

Even apparently moderate increases in target CET1 ratios can significantly constrain lending dynamics in a low-profitability, low issuance context. Under the stylised approach described in this section, euro area banks could increase loans on average by 4.4 % per year over the 2016-18 period, in the absence of increases in the target CET1 ratio. In this case, loan growth would mainly be constrained by the relatively low profitability profile of euro area banks. However, when a target increase of 0.5 pps. in the aggregate CET1 ratio is to be reached by 1 January 2019 (the second scenario), the average loan growth figure drops to 3.1 %. If this target increase is raised to 1.5 pps. (the third scenario), maximum loan growth rates drop quickly to an average of 0.6 % per year. These dynamics are shown in Graph IV.5<sup>(148)</sup>. The

observed acceleration in loan growth in 2018 is the result of the assumed increase in RoE over time and, more decisively, of the fact that the new leverage ratio requirements are assumed to be met over the 2016-17 period.

These results are consistent with the literature estimating the impact of transitioning to higher capital ratios, where a 1 pp. increase in capital requirements can be associated with a 5 to 8 pps. contraction in lending volumes over the short term<sup>(149)</sup>. Also, the literature review in ECB (2015)<sup>(150)</sup> provides estimated impacts of a 1 pp. increase in capital requirements ranging from a 1.4 % to a 8.4 % decrease in bank lending volumes over the first year. It should be noted that the low-profitability context embedded in this section's approach would be consistent with an impact in the higher range of the results distribution found in the literature.

Graph IV.5: Maximum achievable loan growth in the euro area under three stylised scenarios



Source: Own calculations

Cross-country dynamics underlying the aggregate euro area figure are diverse, ranging from cases of relatively strong loan growth under all scenarios to cases of negative growth in 2016 and 2017. The differences in these profiles arise from differences in profitability and in the path for changes in minimum capital requirements. The latter affects,

<sup>(148)</sup> While the projections in this section are made from the perspective of November 2016, the actual loan stock growth of euro area banks was in the order of 1.3 % in 2016, according to ECB data for loans granted to non-financial corporations and households. This would be consistent with a scenario that is midway between the 0.5 pps and 1.5 pps scenarios.

<sup>(149)</sup> For a review of studies estimating the cost of transitioning to higher capital ratios, see Dagher, J., Dell'Ariccia, G., Laeven, L., Ratnovski, L., and H. Tong (2016), 'Benefits and Costs of Bank Capital', *IMF Staff Discussion Note*, March.

<sup>(150)</sup> European Central Bank (2015), 'The impact of the CRR and CRD IV on bank financing', Eurosystem response to the DG FISMA consultation paper, December.

in particular, the 1.5 pps. CET1 increase scenario, where a reaction to time-varying requirements is considered. The countries with the most unfavourable loan dynamics under this scenario are those recovering from negative RoEs, such as Portugal and Cyprus, and also some larger Member States where banking sectors are more highly leveraged and therefore potentially more affected by the introduction of the leverage ratio. This is the case of France, the Netherlands and, particularly, Germany, where the challenges are compounded by low profitability levels<sup>(151)</sup>. Contrastingly, lending dynamics appear strong and resilient to different scenarios in countries benefiting from a combination of high profits, low leverage, frontloading of capital buffers already by the beginning of 2016 and relevant non-systemic banks (for instance, the Baltic countries and Luxembourg).

#### IV.6. The transmission to the wider economy: a QUEST model simulation

The literature assessing the impact of higher capital ratios generally finds net steady-state benefits and low long-run costs of improving capital ratios, in particular when compared with the low bank capital basis antedating the 2008 crisis. For instance, European Commission (2016)<sup>(152)</sup> discusses the benefits of higher capital ratios and finds net steady-state gains from selected regulatory reforms increasing capital ratios. This is a finding that is supported in Fender and Lewrick (2016)<sup>(153)</sup> and in the literature review and own estimates by the ECB<sup>(154)</sup>. Furthermore, LE Europe<sup>(155)</sup> finds that capital ratios have no statistically significant impact on bank lending stocks in the long run,

while Gambacorta and Shin (2016)<sup>(156)</sup> show evidence of a positive relationship.

Short-run transitioning costs can, however, materialise in the presence of frictions and be particularly relevant when bank equity cannot easily adjust through issuance or retained earnings.

The previous sub-section identified a possible short-term impact in terms of loan dynamics. A complementary analysis is the assessment of the economic effects that these loan dynamics may entail. This sub-section presents QUEST model<sup>(157)</sup> simulations of the effects on the wider macroeconomy of the two scenarios considered in the previous sub-sections.

It should be noted that higher bank capital ratios improve the resilience to adverse shocks of banks and the economy at large. Higher capital cushions reduce the probability of a financial crisis and also the size of economic losses in the event of such a crisis. The approach and the analysis presented in this section do not, however, consider such benefits. This is in part because it is not clear the extent to which these benefits can be expected in the short-run transitioning period considered here, where other potentially offsetting negative macroeconomic effects can be at play, as discussed below. In addition, the methodology employed here is geared towards the assessment of the potential adverse impact on lending and other macroeconomic variables and is not suited to assess financial stability benefits.

In the simulations shown below, two approaches are considered:

4. A standard simulation capturing only the shock to capital requirements. This is considered consistent with a scenario where capital ratios can adjust in a frictionless manner.

<sup>(151)</sup> It should be noted that these results do not imply that the Member States more affected by the 1.5 pps CET1 increase scenario are also those where there is stronger evidence of on-going credit rationing. In fact, the 1.5 pps scenario is both hypothetical and the most severe considered in this section. For comparison, data from the joint ECB/European Commission SAFE survey suggests that obstacles to receiving a bank loan for SMEs were on the high side of the cross-country distribution in the Netherlands, about average in France, and on the low side in Germany in the second half of 2016.

<sup>(152)</sup> European Commission (2016), Impact assessment accompanying the proposal amending Regulation (EU) No 575/2013, Directive 2013/36/EU, Directive 2014/59/EU and Regulation (EU) No 806/2014.

<sup>(153)</sup> Fender, I., and U. Lewrick, (2016), 'Adding it all up: the macroeconomic impact of Basel III and outstanding reform issues', *BIS Working Papers* No 591, November.

<sup>(154)</sup> ECB (2015).

<sup>(155)</sup> LE Europe (2016), 'Impact of the Capital Requirements Regulation (CRR) on the access to finance for business and long-term investments', April.

<sup>(156)</sup> Gambacorta, L., and H. S. Shin (2016), 'Why bank capital matters for monetary policy', *BIS Working Paper* No 558, April.

<sup>(157)</sup> The version of the QUEST model used for this exercise contains a consolidated banking sector. For a description of the model in the context of an exercise with a two-region setting, see Breuss, F., Roeger, W., and J. In 't Veld (2015), 'The stabilising properties of a European Banking Union in case of financial shocks in the Euro Area', *European Economy, Economic Paper* 550. Modelling of the banking sector largely follows the literature (see, for example, Kiyotaki, N., and J. Moore (1997), 'Credit Cycles', and Gerali, A., Neri, S., Sessa, L., and F. Signoretti (2008), 'Credit and banking in a DSGE model').



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5. A tailored simulation capturing both the shock to capital requirements and a simultaneous tightening of the collateral constraint that banks impose on prospective borrowers<sup>(158)</sup>. This is considered consistent with frictions in the adjustment of bank capital and with the results previously presented on the loan growth path (see Graph IV.5). Notably, the tightening of the collateral constraint is calibrated to produce a decline in loan growth rates that is broadly consistent with scenarios 2 and 3.

The major effect of an increase in capital requirements that is captured by the standard simulation is the impact on bank funding costs. These are then transmitted on to lending rates and increase capital costs for non-financial firms, with negative effects on their investment. The cost arises because an increase in capital requirements shifts funding from deposits to bank capital, and the cost of capital for banks is larger than the cost on deposits.

The size of this cost effect from changing the financing structure of banks is, however, not undisputed among economists. For example, Admati and Hellwig<sup>(159)</sup> argue that because the change in the composition of liabilities of the bank does not fundamentally change the riskiness of lending, a larger share of bank capital should reduce the risk premium, since the total risk of the bank is now borne by a larger equity base. This argument is based on the Modigliani-Miller (MM) theorem. However, it is also argued in the literature that MM does not apply for banks because of an implicit bail-out subsidy. Therefore, increasing the capital base implies shifting the risk from the public to shareholders. The applicability of this assumption is increasingly debatable given the new bank resolution tools offered by the Bank Recovery and Resolution Directive<sup>(160)</sup> and the entry into operation of the Single Resolution

Mechanism. Assessments of bank regulations carried out by the Bank for International Settlements<sup>(161)</sup> follow this argument, and they assume that there is no offsetting effect on risk premia. Micro-banking studies that look at this effect usually come to the result that there is at least a partial reduction of the risk premium on capital if capital requirements are increased. The relatively detailed study by Miles et al.<sup>(162)</sup> suggests that the risk premium effect is such that it offsets about 50 % of the increase in funding costs compared to a situation where the equity premium is kept unchanged. In the standard simulations we therefore consider both the situation of no-risk premium offset and a 50 % MM offset.

The tailored simulation considers a collateral constraint tightening which operates through two additional mechanisms. It leads to an increase in the loan rate, which induces firms to cut back on investment and consumption. At the same time, this fall in aggregate demand induces banks to reduce their loans and risk-weighted assets in order to meet the change in the capital requirements policy. In this simulation, no MM offset is considered.

#### **Standard simulation: increase in capital requirements**

The increase in target capital ratios induces banks to increase capital relative to deposits. This has two opposing effects on funding costs: i) shifting to bank capital and paying an equity premium increases funding costs, ii) lowering the aggregate demand for deposits reduces the deposit rate, which lowers funding costs. The latter effect is, however, extremely small. This applies especially at the current juncture with effectively zero deposit rates; thus, the first effect dominates.

Optimising banks shift the higher funding costs onto the non-financial private sector in the form of higher loan rates. This increases capital costs for firms which partly finance their investment with

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<sup>(158)</sup> In the QUEST model, banks impose a collateral constraint by restricting the loan supply to a fraction of the value of the capital stock of firms. This collateral constraint is the technical feature of the QUEST model through which a path for loan dynamics can be imposed that emulates the results presented in the previous sections, following the assumption of frictions in the adjustment of capital ratios.

<sup>(159)</sup> Admati, A., DeMarzo, P., Hellwig, M., and P. Pfleiderer (2010), 'Fallacies, irrelevant facts, and myths in capital regulation: why bank equity is not expensive', *Stanford University Working Paper* No 86.

<sup>(160)</sup> Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms.

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<sup>(161)</sup> BIS (2010a), 'An assessment of the long-term economic impact of stronger capital and liquidity requirements', Basel Committee on Banking Supervision, Bank for International Settlements.

BIS (2010b), 'Assessing the macroeconomic impact of the transition to stronger capital and liquidity requirements', Basel Committee on Banking Supervision, Bank for International Settlements.

BIS (2010c), 'Results of the comprehensive quantitative impact study', Basel Committee on Banking Supervision, Bank for International Settlements.

<sup>(162)</sup> Miles, D., Yang, L., and G. Marcheggiano (2013), 'Optimal bank capital', *The Economic Journal* 123, pp. 1-37.



loans. Consequently, the higher ratios affect the real economy via reduced investment. GDP falls less than investment since employment levels are hardly affected. This is due to the fact that in the QUEST model used in the simulations, real wages are adjusted downward (relative to the baseline) because of the decline in productivity associated with a fall in capital; this wage behaviour stabilises employment.

Table IV.1: **Standard simulation (no MM offset)**

	0.5 pps CET1 increase scenario			Summation of deviations (2016-18)
	2016	2017	2018	
GDP	-0.01	-0.01	-0.01	-0.03
Investment	-0.09	-0.13	-0.14	-0.36
Stock of loans	-0.02	-0.04	-0.05	-0.11
Employment	-0.01	-0.01	0.00	-0.02
	1.5 pps CET1 increase scenario			Summation of deviations (2016-18)
	2016	2017	2018	
GDP	-0.02	-0.02	-0.02	-0.06
Investment	-0.27	-0.39	-0.41	-1.07
Stock of loans	-0.06	-0.13	-0.14	-0.33
Employment	-0.03	-0.02	-0.01	-0.06

(1) All variables are % deviations from baseline levels

Source: QUEST model simulations

Table IV.2: **Standard simulation (50 % MM offset)**

	0.5 pps CET1 increase scenario			Summation of deviations (2016-18)
	2016	2017	2018	
GDP	0.00	0.00	0.00	-0.01
Investment	-0.04	-0.06	-0.07	-0.17
Stock of loans	-0.01	-0.02	-0.02	-0.05
Employment	0.00	0.00	0.00	-0.01
	1.5 pps CET1 increase scenario			Summation of deviations (2016-18)
	2016	2017	2018	
GDP	-0.02	-0.02	-0.02	-0.05
Investment	-0.21	-0.31	-0.34	-0.86
Stock of loans	-0.05	-0.10	-0.10	-0.25
Employment	-0.03	-0.02	-0.01	-0.05

(1) All variables are % deviations from baseline levels

Source: QUEST model simulations

### Tailored simulation: increase in capital requirements with collateral constraint tightening

The tailored simulation considers the constraints in bank equity adjustment described in the previous sections. It assumes that, in addition to the 1.5 pps. deviation in the CET1 ratio, the collateral constraint of entrepreneurs is tightened to the extent that loan growth is reduced by broadly the magnitude shown in Graph IV.5 (with respect to a scenario of no change in the CET1 ratio). This cumulated deviation results in a loan stock by year-end 2018 that is 4 % lower in the 0.5 pps. CET1

increase scenario, and 10 % lower in the 1.5 pps. increase scenario.

The effect from the tightening of the collateral constraint is that firms find it now more difficult to obtain loans, which reduces their investment and consumption. The decrease in investment induces a further tightening of the constraint, and acts as an amplification mechanism. As banks are forced to meet their capital requirements, loans drop.

The effects on GDP when changes in the target capital ratio are combined with a collateral constraint tightening are thus larger. In the case of an increase of 0.5 pps. in the capital ratio, the results suggest a cumulated GDP and investment loss of 0.5 % and 2 %, respectively, over three years. For a 1.5 pps. increase in the capital ratio, the cumulated losses rise to 1.5 % for GDP and 10 % for investment. In both scenarios, the impact is largest in 2016 and is seen to decrease over time. It should be noted that the relatively large impact for 2016 is a result of the fully anticipated nature of the collateral constraint tightening, which leads entrepreneurs to frontload their investment decisions. While this is not captured by the simulations, the impact of this shock would more realistically be distributed over time as expectations progressively adapt, implying that the effects of the tightening would likely be smoother over time.

Table IV.3: **Tailored simulation**

	0.5 pps CET1 increase scenario			Summation of deviations (2016-18)
	2016	2017	2018	
GDP	-0.37	-0.07	-0.02	-0.46
Investment	-1.10	-0.77	-0.15	-2.02
Stock of loans	-2.11	-2.97	-3.76	-8.84
Employment	-0.62	-0.07	0.02	-0.66
	1.5 pps CET1 increase scenario			Summation of deviations (2016-18)
	2016	2017	2018	
GDP	-0.95	-0.42	-0.17	-1.54
Investment	-4.26	-3.99	-1.77	-10.01
Stock of loans	-3.40	-6.90	-9.69	-19.99
Employment	-1.52	-0.51	-0.06	-2.09

(1) All variables are % deviations from baseline levels

Source: QUEST model simulations

## IV.7. Conclusions

The EU banking sector will be subject to several actual and potential increases in minimum capital requirements between 2016 and 2019.

EU banks have by now largely anticipated and adapted to most of the new requirements contemplated in the current version of the fourth Capital Requirements Directive and Regulation.

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This is true, in particular, of some of the new capital buffers being phased in over the 2016-19 period and of transitional arrangements currently being phased out.

While several changes are already legislated, others are still in the pipeline and their contours are therefore not yet fully defined. New measures such as the leverage ratio, the fundamental review of the trading book, the reform to reduce variability in risk weights and IFRS9<sup>(163)</sup> are expected to be enshrined in legislation and implemented over the next few years. These measures may have a non-negligible impact on capital requirements and EU banks are probably less prepared for them when compared with measures which have been anticipated for a longer period of time.

The literature assessing the impact of higher capital ratios generally finds net steady-state benefits and low long-run costs of higher capital ratios, in particular when starting from a low capital basis. Nevertheless, when looking at short-run transitioning periods, increases in target capital ratios can have a potentially negative effect on lending dynamics when banks face low returns on equity and do not find it attractive to raise capital on the market. In the current context of depressed bank profits and unfavourable equity valuations in a number of countries, the risk of weak lending dynamics may therefore be pronounced. The stylised scenarios considered in this section indeed show that stronger and more resilient lending dynamics can be expected in countries benefiting from higher profits, lower leverage, the frontloading of capital buffers and relevant non-systemic banks<sup>(164)</sup>.

Results based on the European Commission's QUEST model suggest that, under the presence of frictions in the adjustment of bank capital, the temporary reaction to an increase in target ratios can carry a significant, though temporary, cost.

In particular, two scenarios considered in this paper show that reductions in the loan stock reflecting increases in aggregated CET1 ratios of 0.5pps and 1.5pps imply a cumulated loss in

investment levels of approximately 2 % and 10 % respectively, over three years. The effects on GDP are, respectively, a 0.5 % and a 1.5 % cumulated loss. These losses should be understood as temporary and linked to the short-run transitioning period. In addition, they should be seen against broader benefits in terms of increased financial stability, which are not incorporated in the analysis presented here.

Overall, it should also be noted that there are different ways of achieving higher target capital ratios, and that different forms carry a different bearing on growth. The implementation of measures aimed at restoring bank profitability, fomenting a conservative dividend payout policy and promoting bolder levels of equity issuance can be particularly useful in the current context to reduce the risks of a compression in bank lending. In particular, banks can take concrete steps to improve their profitability, such as adapting bank business strategies for the post-crisis context, increasing operational efficiency and consolidating in the face of overbanked markets<sup>(165)</sup>.

Profitability can also potentially be improved by properly resolving non-performing loans. However, in case non-performing loans are sold at an accounting loss, this would dent capital levels, meaning that their effect on lending dynamics is not entirely clear. The net effect would be dependent, in particular, on the size of the accounting loss and on banks' strategy for replenishing capital levels. Finally, the impact of monetary policy on banks' profitability is, likewise, uncertain. For instance, while an increase in interest rates can alleviate pressure on interest margins over time, it can also impose valuation losses on bank's financial assets.

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<sup>(163)</sup> IFRS9 is an international financial reporting standard dealing, *inter alia*, with the accounting treatment of impaired financial assets.

<sup>(164)</sup> I.e., banks whose dimension and local nature render them exempt from the application of capital buffers reserved for systemic institutions.

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<sup>(165)</sup> See also the euro area recommendation calling for a euro area strategy to address these issues (Council Recommendation on the economic policy of the euro area, 10 March 2017).

**Box IV.1: Main regulatory sources of possible increases in capital requirements (November 2016)**

Measure	Basis	Magnitude	When	Analytical assumptions
<b>Capital conservation buffer (CCoB)</b>	CRD Art. 129, CRR Art. 458	Up to 2.5% of risk-weighted assets (RWA), to be met with common equity tier 1 (CET1) capital.	Phased in from 0.625% of RWA in 2016 to 2.5% by 2019.	Phased in as per current supervisory announcements and regulations.
<b>Countercyclical capital buffer (CCyB)</b>	CRD Art. 130 and Art. 135-140	Up to (normally) 2.5% of RWA to be met with CET1. Currently set at zero in all Member States (MS) except in SE where it is set at 1.5%.	May be increased in connection with the emergence of positive credit gaps.	Introduced as per current supervisory announcements and regulation. For BE, FI and FR introduction is assumed based on a comparison of announcements across the EU-28 along with a reading of the current credit gap.
<b>Additional buffers for systemic institutions</b>	CRD Art. 131, 133 and 134	Systemic institutions are subjected to the higher of the following buffers:		Introduced as per current supervisory announcements and regulation. Whenever different institutions within the same country are subject to different buffers, the aggregate country figure has been calculated as a weighted average of the minimum and maximum buffer, with a 2/3 weight placed on the maximum buffer to reflect the fact that higher buffers are associated with larger institutions.
		1. Global systemically important institutions (G-SII): 1-3.5% of RWA to be met with CET1.	1. G-SII: phased in in ¼ increments between 2016 and 2019.	
		2. Other systemically important institutions (O-SII): up to 2% of RWA to be met with CET1.	2. O-SII: buffers currently in place in some MS; they are expected to be in place in most MS by 2019	
		3. Systemic risk buffer (SRB): 1% to (normally) 5% of RWA to be met with CET1.	3. SRB: applied in AT, BG, DK, EE, HR, NL and RO; introduction announced for other MS by 2019.	
<b>Leverage ratio</b>	Basel III framework; CRR Art. 429, 430 and 511; CRD Art. 87 and 98. Expected to be implemented at EU level as a binding ratio through amendments to the CRD/CRR.	A ratio of Tier 1 capital to total exposures of 3%.	Introduction as a binding ratio recommended by the European Banking Authority from 2018 onwards. A binding leverage ratio of 3% was included in the European Commission's November 2016 proposal for amending the CRR/CRD IV.	Assumed to increase the CET1-to-RWA ratio by 0.25 pps on aggregate. This figure is within a range of estimates from the European Commission's impact assessment and the EBA. The aggregate figure is distributed among the Member States showing an equity-to-assets ratio below the euro area average, in proportion to their country-specific gap. Banks are assumed to respond to one third of the requirement in 2016 and to the remaining two thirds in 2017.
<b>Fundamental Review of the Trading Book</b>	Basel Committee on Banking Supervision (BCBS). Expected to be implemented at EU level through amendments to the CRD/CRR.	European Commission (2016a) points to an aggregate increase of 0.27 pps in EU bank capital ratios.	The FRTB was included in the European Commission's November 2016 proposal for amending the CRR/CRD IV and should come into effect two years after its entry into force.	A 0.27 pps increase is introduced for all Member States and banks are assumed to respond to the requirement in equal steps over 2016-2018.

*(Continued on the next page)*

Box (continued)

Measure	Basis	Magnitude	When	Analytical assumptions
<b>Minimum requirement for own funds and eligible liabilities (MREL)</b>	Bank Recovery and Resolution Directive (MREL) and Financial Stability Board and BCBS (TLAC). TLAC standards are expected to be implemented at EU level through amendments to the Bank Recovery and Resolution Directive.	MREL consists of own funds and debt that can be bailed in when institutions are at risk of failing.	A Commission proposal for introducing TLAC standards was presented in November 2016. National resolution authorities are working to introduce MREL as part of the resolution planning process.	MREL eligible liabilities cover a set of equity and debt instruments. No specific impact on CET1 was assumed.
<b>Reform to reduce the variability in RWA</b>	BCBS	The reform seeks to impose constraints on the use of internal models. According to the BCBS's mandate, the reform should not result in a significant increase in capital requirements at aggregate level. However, EU regulators and institutions have expressed concern that that may not be the case.	A date for implementation at EU level has not been set.	The possible impact of the reform is still uncertain and has not been included in the analysis.
<b>Supervisory review and evaluation process</b>	CRD Art. 102-106	Under Pillar 2 of the Basel framework, supervisors may impose higher requirements for capital, liquidity and disclosure obligations.	Pillar 2 measures were active in 7 MS in January 2016.	No further capital impact from Pillar 2 measures is assumed.
<b>IFRS 9</b>	International Accounting Standards Board	This new accounting standard introduces a forward-looking perspective for the calculation of loan-loss provisions which is expected to increase impairment ratios in some cases. Though uncertain, the impact on capital ratios is expected to be negative.	The IFRS9 has been endorsed in the EU for mandatory application from 1 January 2018 onwards, possibly subject to a 5-year phase-in period. A consultation has been launched by the BCBS on possible transitional arrangements, inter alia.	The impact of the new standard as well as its phase-in profile are still uncertain and have not been included in the analysis.



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