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

*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 ([131]).*

## 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

([131]) 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) ([132]). 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 ([133]). 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 ([134]).

Stylised scenarios yielding the maximum achievable loan growth rates for each euro area Member State over the 2016-19 period ([135]) 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) ([136]) 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:

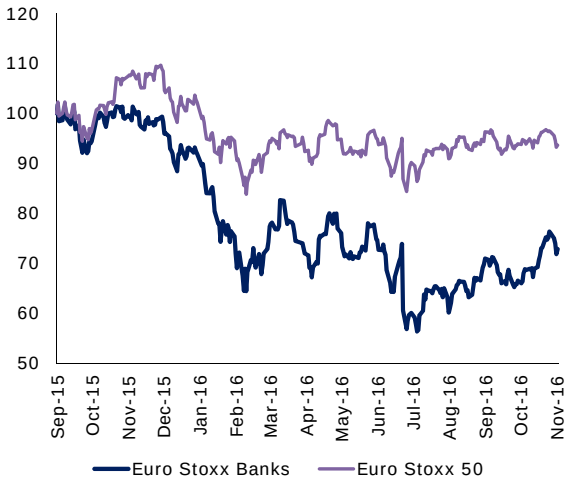
$$\Delta CR_t = CR_t - CR_{t-1} = \frac{CET1_t}{RWA_t} - \frac{CET1_{t-1}}{RWA_{t-1}} =$$

$$= \frac{CET1_{t-1} \times (1 + RoE \times (1 - PO) + issuance)}{RWA_{t-1} \times (1 + g_t^{RWA})} - \frac{CET1_{t-1}}{RWA_{t-1}}$$

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:

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

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

([132]) 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.

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

([134]) 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 sub-section VI.5.

([135]) The present analysis takes the viewpoint of November 2016 and is based on the information known on that date.

([136]) 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 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.

(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) ([137]) could, on the contrary, mean that banks may try to protect this asset class while seeking to contain RWA growth.

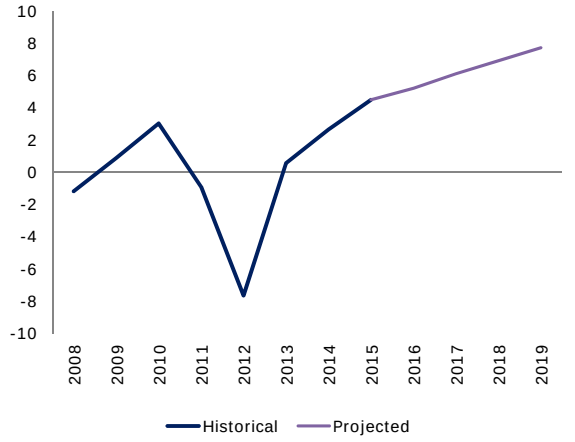
The $g^{RWA}$ for the euro area for the 2016-19 period is based on the aggregation of country-specific projections. To derive these country-specific figures, the following assumptions are made:

- 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 ([138]). 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 % ([139]).

- 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, ΔCR, requires particular consideration and forms the basis for the two scenarios analysed in this article. ΔCR 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 ([140]) due to their size and degree of

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

([138]) 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.

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

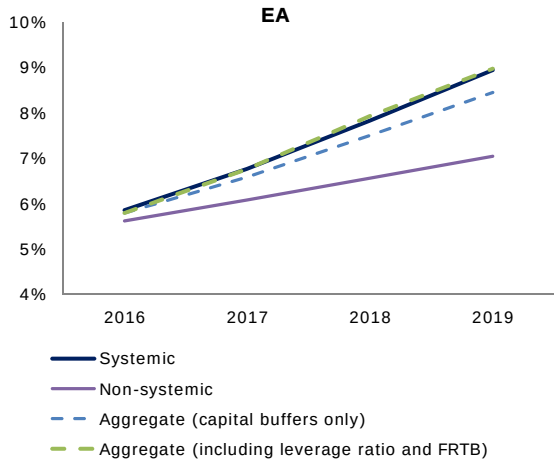
([140]) The list of institutions deemed globally systemically important is published annually by the Financial Stability Board while other

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.

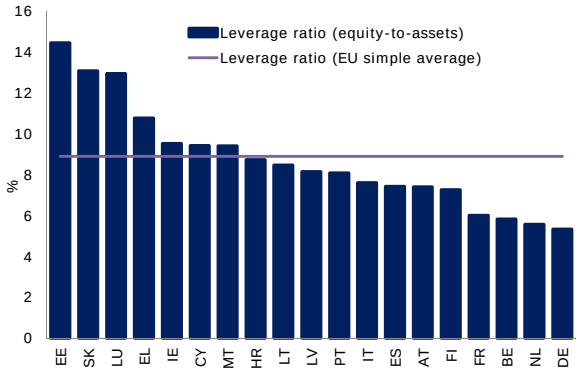
Besides the buffers contemplated in the CRR/CRD, other regulatory developments could drive a further increase in capital requirements. In particular, the fundamental review of the trading book (FRTB) and the introduction of a leverage ratio can increase the minimum CET1 ratio by some 0.5 pps. The FRTB would impose constraints on banks' use of internal risk models, increasing risk weights and thus RWA ([141]). 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 ([142]) 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.

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

([142]) 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 ([143]) (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 ([144]) 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 ([145]). 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 ([146]).

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 ([147]).

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.

([143]) 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.

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

([145]) Idem.

([146]) See, e.g., EBA Quantitative Impact Study Data (December 2015).

([147]) 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.

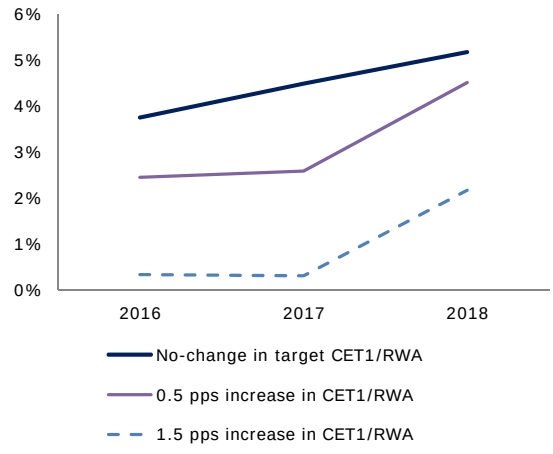
## IV.5. The results: how constrained are bank lending dynamics?

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 ([148]). 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 ([149]). Also, the literature review in ECB (2015) ([150]) 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,

([148]) 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.

([149]) 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.

([150]) 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 ([151]). 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) ([152]) 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) ([153]) and in the literature review and own estimates by the ECB ([154]). Furthermore, LE Europe ([155]) finds that capital ratios have no statistically significant impact on bank lending stocks in the long run, while Gambacorta and Shin (2016) ([156]) 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 ([157]) 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.

([151]) 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.

([152]) 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.

([153]) 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.

([154]) ECB (2015).

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

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

([157]) 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').

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 ([158]). 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 ([159]) 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 ([160]) and the entry into operation of the Single Resolution Mechanism. Assessments of bank regulations carried out by the Bank for International Settlement ([161]) 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. ([162]) 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

([158]) 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.

([159]) 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.

([160]) 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.

([161]) 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. .

([162]) 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.

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([163]) 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([164]).

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 ([165]).

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.

([163]) IFRS9 is an international financial reporting standard dealing, inter alia, with the accounting treatment of impaired financial assets.

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

([165]) 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 |
|---|---|---|---|---|
| **Capital conservation buffer (CCoB)** | 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. |
| **Countercyclical capital buffer (CCyB)** | 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. |
| **Additional buffers for systemic institutions** | 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. | |
| **Leverage ratio** | 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 fom 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. |
| **Fundamental Review of the Trading Book** | 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 |
|---|---|---|---|---|
| **Minimum requirement for own funds and eligible liabilities (MREL)** | 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 liabilites cover a set of equity and debt instruments. No specific impact on CET1 was assumed. |
| **Reform to reduce the variability in RWA** | 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. |
| **Supervisory review and evaluation process** | 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. |
| **IFRS 9** | 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. |