Impact of the Capital Requirements Regulation (CRR) on the access to finance for business and long-term investments

Executive Summary

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Executive Summary

Policy background

On 20 July 2011, the Commission adopted a new legislative package to strengthen the regulation of the banking sector. The proposal replaced the Banking Consolidation Directive and Capital Adequacy Directive with the Capital Requirements Directive IV (CRD IV) and the Capital Requirements Regulation (CRR). The new framework came into force on 1 January 2014, however various transitional arrangements apply until 2019.

The CRD IV/CRR framework considerably strengthens the quantity and quality of the minimum capital that banks are required to hold. Capital requirements must be met through financial resources consisting of equity or equity-like instruments (although some debt instruments are also included), retained earnings and certain reserves. Financial resources are split into two categories, Tier 1 and Tier 2 capital, depending on their characteristics and quality as capital. Tier 1, the higher quality capital, is further subdivided into Common Equity Tier 1 (CET 1) and Additional Tier 1 (AT1). The new framework tightened the eligibility requirements for items to be included as regulatory capital under both Tiers. Under the new legislation package, banks are required to maintain Tier 1 capital of at least 6% of RWA, and the proportion of the highest quality capital required, Core Equity Tier 1 (CET 1), has been increased to 4.5% of RWA.

In addition, the CRD IV/CRR framework supplements the three pillars with requirements for capital buffers that apply in addition to the capital requirements outlined above, thereby effectively increasing the proportion of overall capital required as a percentage of risk-weighted assets. These capital buffers have to consist of CET 1 capital. The CRD IV/CRR framework includes a capital conservation buffer[1] designed to ensure that banks build up capital buffers outside periods of stress which can be drawn down as losses are incurred, a discretionary countercyclical capital buffer, which may be imposed at a range between 0% and 2.5% when authorities judge credit growth is resulting in an unacceptable build-up of systematic risk, and a systemic risk buffer[2] at the option of Member States (and therefore not shown in the figure below) in order to prevent or mitigate long-term non-cyclical systemic or macro prudential risks. In addition, Member States will be able to impose a risk buffer on systemically important institutions of up to 3.5% of RWA for banks which are considered to be systemically important banks, either globally (known as G-SIIs) or domestically (known as O-SIIs in Europe)[3].

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[1] Article 129 CRR

[2] Article 133 CRR

[3] Article 131 CRR

Figure 1: Capital structure of a bank under CRD IV and CRR
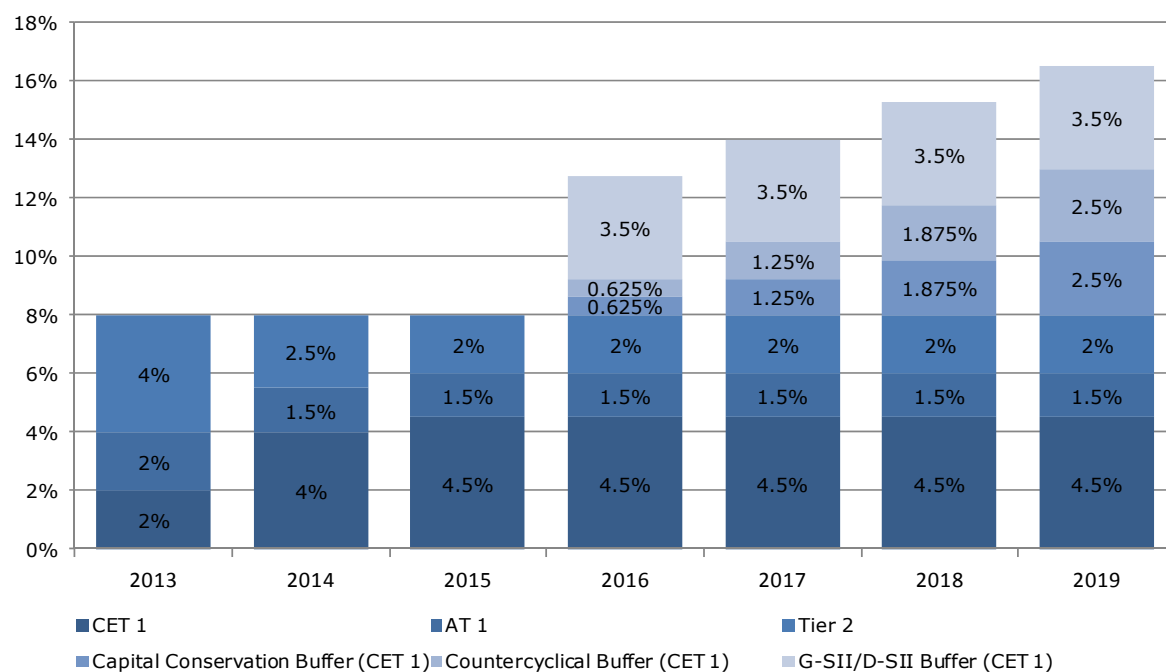
Note: the highest possible capital requirements are reported for the Countercyclical and G-SII/O-SII Buffers.

Source: Allen & Overy (2014a)

Economic justification and impacts of increased capital requirements

In general, higher bank capital is expected to reduce the frequency and cost of bank failure (Dewatripont and Tirole, 1994).

From a microeconomic perspective, increased capital requirements are intended to limit banks' risk taking incentives ex-ante and increase their ability to absorb losses ex-post, thereby increasing their financial stability.

From a macroeconomic perspective, the additional capital requirements on systemically important institutions (G-SII/O-SII Buffer) recognise the contribution of such banks to financial stability (or potentially financial fragility).

Further, the additional countercyclical capital requirements are intended to increase financial stability by allowing for the build-up of capital under favourable funding conditions that can be drawn down, if needed, when funding conditions deteriorate.

Typically broader economic analyses of the benefits of higher capital requirements focus on a) the reduction in probability of a financial crisis and b) the reduction the cost of financial crises (for example, European Commission, 2011; Basel Committee on Banking Supervision, 2010; and Brooke et al., 2015).

Increasing regulatory capital may also lead to costs. For instance, raising regulatory capital, particularly, by equity, may be subject to adverse selection costs, as it may signal to investors that banks are presently over-valued (Myers and Majluf, 1984).

Further, a bank adjusting its regulatory capital to meet increased regulatory capital requirements may also reduce the volume of lending, that is, it chooses to reduce

assets in order to avoid the costs of increased regulatory capital in total liabilities. This particular concern is the subject of the present study.

However, before proceeding, it should be noted that reductions in lending may be beneficial if that lending was excessively risky (for example, excessive lending to the real estate sector or within the financial sector).

After considering the bank-level data used in the analysis, and the relationship between the *requirements* for regulatory capital ratios of interest and the *actual* regulatory capital ratios studied, an overview is provided of the analysis of the impacts of increased capital requirements on bank lending flows, in terms of their:

- transitional effects;

- structural effects; and

- infrastructure financing effects.

The bank-level database

The main source of the bank-level microdata used is Bankscope. A second source of bank-level microdata used is Bloomberg, which supplemented the data drawn from Bankscope. The resultant bank-level database sampled, on average, 38.1% of EU banking sector assets for the transitional effects analysis; and 36.9% for the structural effects analysis; and form a basis for generalising the conclusions to the EU as a whole.

## On the relationship between *requirements* for and *actual* regulatory capital ratios

As the impact of increased capital requirements under the CRR cannot be observed directly, it is necessary, in making an assessment of their impacts on bank lending, to consider actual capital ratios.

Actual capital ratios are influenced by regulatory factors (including, increased capital requirements) and other, non-regulatory factors.

A concern with making an assessment of the impact of *requirements* for regulatory capital ratios on the basis of *actual* capital ratios is that actual capital ratios could be driven purely by non-regulatory factors. Indeed, one observes that banks maintain a capital ratio "cushion" above the regulatory minimum, giving rise to the possibility that they could simply decrease the size of this cushion in response to increased regulatory capital requirements and maintain lending levels.

However, one also observes that banks increased actual capital ratios at key capital regulation dates, indicating that actual capital ratios do respond to changes in capital regulation. The figure below shows, for instance, that since the application of the CRR in Europe since the 1st of January 2014, there is a statistically significant shift to the right in the distribution of banks' capital ratios in excess of the regulatory minimum.

Figure 2: Distribution by banks of capital cushion, year-ends 2012, 2013 and 2014
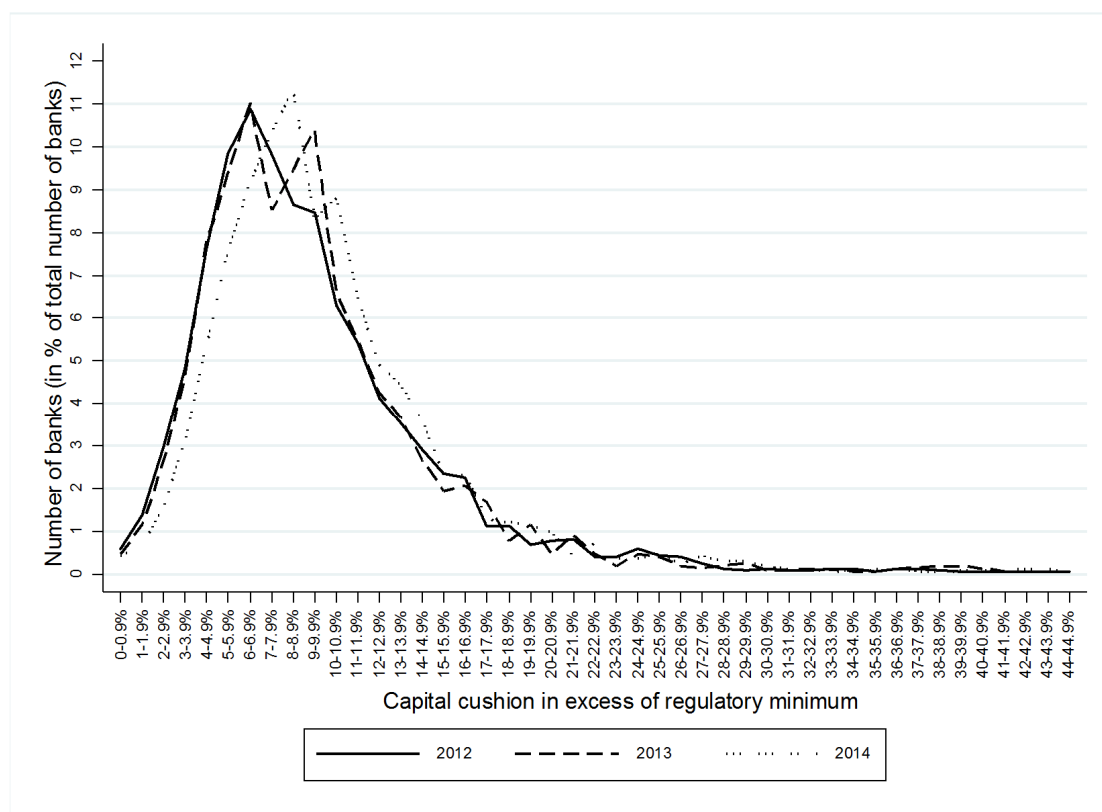
Notes: Percentage of banks in Europe maintaining a Total Capital Ratio in excess of the minimum requirement for Total Capital Ratio of 8% ("capital cushion") at year-end 2012, 2013 and 2014. *Sample of banks reporting their Total Capital Ratio (2012, 2013 or 2014)
Source: Bankscope and LE Europe calculations

Further, the empirical analysis discussed below shows that lending impacts are larger for banks with smaller capital cushions, which is further evidence that actual regulatory capital ratios are likely affected by requirements for regulatory capital ratios.

In conclusion, although one cannot observe the impact on bank lending of increased capital *requirements* under the CRR per se, the impact of actual capital ratios provide a guide to their likely effects. With this background in mind, the results of the quantitative analysis undertaken are discussed.

Transitional effects

Since the application of the Capital Requirements Regulation in 2014, banks in Europe have had to meet increased capital requirements, including requirements to maintain a *greater quantity* of *higher quality* capital as a proportion of risk-weighted assets than previously.

Banks are presently in a period of change, as the capital requirements under the CRR that they are subject to are being phased in gradually up to 2019.

However, banks had the opportunity to anticipate the application of the new capital regulation regime because the Basel III Accord was adopted in 2011, at which point its transposition and implementation in Europe could be foreseen. Also, banks may have been pressed by markets to front-load to a large extent the future capital requirement increases.

In effect, banks may have been adjusting their capital structures to meet the new capital requirements at the full, 2019 level early on, and it is the objective presently to assess whether adjustments to regulatory capital in response to (anticipated and actual) increase in capital requirements under the CRR had an effect on lending.

"Transitional effects" are defined as the short-term effects of increased capital requirements on bank lending, that is, the effects that prevail contemporaneously or over a short number of periods after adjustments to higher capital requirements take place. In the main empirical exercises undertaken, transitional effects are measured over a period of three years.

Our main estimate of the transitional effect, derived in this study using data for the period 1985-2014, shows that for a one percentage point increase in the Total Capital Ratio[4] the impact on lending flows[5] of banks in the EU is -0.8% over one year with the implied impact over a three-year period being -1.5%.

Further, while the Total Capital Ratio has an economically significant impact on bank lending flows, the result should be read within the context of the fact that other bank-level and macroeconomic drivers matter to lending flow developments such as past lending flows and the output gap. Indeed, the estimation results of the baseline model indicate that a 1% increase in lending flows one year ago is related to a 0.34% increase in lending flows in the present year. In the case of the output gap, a one percentage point increase in the output gap results in a 0.95% reduction in bank lending flows.

Additional analysis shows that the impact of changes in the Total Capital Ratio on bank lending flows arises mainly through corporate and consumer loans, with mortgage loans being unaffected. These results are consistent with the notion that mortgages receive a relatively generous capital treatment under the CRR compared to the other loan categories and therefore do not show a negative relationship with the Total Capital Ratio. While the sizes of the samples of banks used in this more granular analysis of loan categories are relatively small due to lack of data, especially on consumer loans, the empirical results do suggest that the transitional effects arise mainly through corporate and consumer lending.

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[4] The Total Capital Ratio is the sum of the Tier One (T1) Ratio and the Tier Two (T2) Ratio

[5] Lending flows are measured by a net lending measure (that is, new lending minus repayments)

The size of the effect is within the same range as estimates from previous studies for single European Member States and the euro area. However, it is important to note that the present study includes sample data covering the period since the adoption of Basel III, whereas the majority of others do not.

A series of robustness tests have been undertaken to check the sensitivity of the effect sizes estimated. The models estimated indicate that a one percentage point change in the Total Capital Ratio has a statistically significant impact on bank lending flows in the same confidence interval as the main estimate.

Lastly, an analysis was carried out for subsamples of banks based on pre-crisis business models proxied by size, capitalisation, and funding. This showed that the impact of the Total Capital Ratio on bank lending flows was greater for banks that have historically been less capitalised and are funded to a greater extent through non-deposit liabilities.

Structural effects

"Structural effects" are defined here as the long-term effects of increased capital requirements on bank lending, that is, the effects that prevail once adjustments to higher capital requirements have taken place, and the economy is in a new long-term equilibrium.

The analysis of structural effects involved an assessment of simulation results and empirical results, which are each discussed in greater detail below.

Simulation results

Using a model of the credit market featuring banks of different size, potential long-term implications of increased capital requirements are discussed. Given that there is a lack of historical evidence on increases in bank capital requirements affecting all banks in an economy to such an extent, the potential long-term credit market implications are discussed in a theoretical framework.

Stricter bank capital requirements can affect bank lending not only through an increase in bank funding costs, but also through changes in the competitive structure of the credit market. This, in turn, can affect the market power of the incumbent banks and finally the lending rates for firms. Thus, in order to illustrate potential structural implications of tighter bank capital requirements, a model featuring imperfect bank competition and market structure in the credit market is used.

Similar to findings from other models, the simulation results show that higher capital requirements can lead to an increase in banks' funding costs. This, in turn, translates into higher bank lending rates, so that credit demand and credit to output ratios tend to fall. If all banks are affected by the capital requirement alike, credit market concentration remains unchanged in the model presented below. Yet, if the largest banks face higher capital requirements than the other ones, concentration may decline, as the funding costs and the lending rates of the large banks rise, so that their credit market share falls, all other things constant. The simulation exercises also illustrate that the implications of higher capital requirements depend on the prevailing market structures and, for example, on the response of the return on bank capital to higher bank capital ratios. Overall, the simulation results reveal that increased capital requirements can lead to higher bank lending rates due to the related funding cost increases.

Related studies which have assessed the economic importance of the effect of higher bank capital ratios on bank lending have come to the same qualitative conclusion. Regarding the long-run costs of higher capital ratios, the literature concludes that they are modest however. Moreover, the costs related to credit market outcomes, have to be weighed against the benefits of reduced macroeconomic volatility and a lower risk of crises. Depending on the specific frictions included in the theoretical models, some recent studies have also found positive long-term effects of increased capital requirements on bank lending, for example, in the case where bank capital requirements are increased from an initially rather low level.

Overall, the discussion of the diverse theoretical predictions on the long-term effects of increased capital requirements highlights that it ultimately remains an empirical question how credit markets react to changes in capital regulations in the long-run. It also suggests that identifying the socially optimal level of capital requirements is inherently difficult: the lending impact of capital requirement changes is just one side of the coin and neglects any potential offsetting benefits in terms of reduced risk-taking and increased loss-absorption.

Empirical results

The impact of regulatory capital ratios on bank lending stocks in the long run is estimated empirically in an error correction framework. Developments in bank lending stocks is the relevant measure for capturing lending developments in the long-run as it reflects the sum of flows over time.

Empirically, a long-run relationship between regulatory capital ratios and bank lending stocks estimated using data on *a panel of banks* is unlikely to be found because banks of different size maintain a given capital ratio, which supports a wide range of bank lending stocks. As such, it is important to control for the influence of size on the relationship between regulatory capital ratios and bank lending stocks in the long run. This observation motivates our consideration of a possible long-run relationship between regulatory capital ratios, bank lending stocks *and bank size*.

The sample of banks focuses on those more involved in traditional lending activities, that is, those with an average ratio of lending stocks to total assets greater or equal to 40%. The cut-off at 40% is justified by the tests for cointegration, which reject a cointegrating relationship between lending stocks, the Total Capital Ratio and bank size for those banks with a ratio of bank lending stocks to total assets less than 40%.

The choice of estimation method addresses key issues that may arise in the current setting. In particular, the model specification allows for heterogeneity in the equilibrium relationship between bank lending stocks, the Total Capital Ratio and bank size at the bank level and mitigates the impact of cross-sectional dependence across banks.

Model specification and sample changes are also made to the baseline model to test the robustness of the results. More specifically, the inclusion of additional bank characteristics and macroeconomic controls, the potential for a structural break in the long-run relationship between bank lending stocks, the Total Capital Ratio and bank size and the exclusion of Italian banks, which form a substantial proportion of banks in the estimation samples, are tested separately.

Overall, the following key findings emerge from the estimation of the various error correction models, derived using data for the period 1985-2014:

- The estimated impact of the Total Capital Ratio on bank lending stocks in long-run is negative (of -2.2%) in the baseline estimation; however the effect is not statistically different from zero once the assumption of strict exogeneity amongst the variables is relaxed.
- During the transition phase to a new equilibrium, an increase in the Total Capital Ratio has a statistically significant negative impact (of -1.1%) on the change in bank lending stocks, which is consistent with results obtained in the analysis of transitional effects.
- The baseline estimation is unaffected by the inclusion of other (statistically significant) bank characteristics and macroeconomic controls.
- A structural break in 2011 is introduced in the modelled long-run relationship between bank lending stocks, the Total Capital Ratio and bank size. This corresponds to the announcement of Basel III. However, the statistical significance of a break is rejected at conventional significance levels.
- Italian banks represent a large proportion of banks (63%) in the estimation samples used. The estimated short-run impact of the Total Capital Ratio in the estimation excluding Italian banks is statistically insignificant and smaller in magnitude when compared to the baseline estimation including Italian banks. However, the short-run impact excluding Italian banks is still economically significant despite being statistically insignificant, with a p-value of 20%.

The preferred estimation results are different to the simulation results discussed above and to previous studies, which find a negative relationship between lending stocks and regulatory capital ratios. For example, taking results for 38 models across 15 countries, the Macroeconomic Assessment Group (MAG) (2011) report a 1.4% decrease in lending volume given a one percentage point increase in the target capital ratio over 8 years.

Infrastructure financing effects

The value and quantity of EU infrastructure projects (funded wholly or in part by banks) grew rapidly from 2000 to 2006 when it reached its peak in terms of value to date. This was supported by economic growth in the EU, the willingness of banks to lend to infrastructure investors and the volume of PPPs in countries such as the UK and France.

However, from 2006, the value of EU infrastructure projects fell and crashed in 2009 as a result of the financial crisis and the reluctance of banks to offer infrastructure loans.

Since then and following the 2009 trough, both the number of deals and total deal value have recovered markedly with the number of deals in 2014 being well above and the value of deals only slightly below their respective 2006 peaks.

These developments occurred in a context of a growing role and funding contribution of institutional investors in the EU infrastructure sector. As a result, the proportion of the total value of infrastructure deals financed through bank debt in the EU has declined in recent years from 82.7% in 2007 to 65.9% in 2014. This development reflects the growing role of non-bank infrastructure investors.

However, while the overall volume of infrastructure funding provided by banks and non-banks has more or less recovered from the financial crisis, the current state of affairs is characterised by the paradoxical situation of a combination on one side of very large infrastructure needs (estimated by some observers to total about €1 trillion over the period 2016-2019) and large pools of potential infrastructure funding, and on the other side an actual level of infrastructure financing that remain well below potential needs. According to market commentators and infrastructure finance specialists, this paradoxical situation reflects at the present time mainly a lack of a strong pipeline of high quality, investable infrastructure projects.

Obviously, this state of affairs raises the issue of whether the increased capital requirements and the capital charging methodologies that can be used for infrastructure projects have had a negative impact on the level of infrastructure funding provided by banks. A small consultation and a small survey of 14 banks (of which nine were in the top 25 banks providing infrastructure finance) suggest that this is not generally the case.

Among the survey respondents, only two felt that the CRR had a negative impact while the others were of the opinion that it had no impact. However, the consultations also suggest that the CRR has led banks to focus on shorter tenor projects and often prefer less risky projects with capacity or availability payments. The consultation also highlights the view that the CRR as it stands does not take into account the particular risk specificities of the various infrastructure projects, especially of those projects involving either availability or capacity payments with no or little demand risks or special risk mitigation measures such as guarantees or insurance. In particular, the slotting approach was viewed as not being sensitive and granular enough to take account of particular risk characteristics of infrastructure projects. This situation is viewed by the consultation participants as having a negative impact on banks' appetite for longer tenor projects.

As a complement to the more qualitative assessment of the impact of the CRR on bank infrastructure finance, an econometric analysis of the potential impact of the CRR was also undertaken.

In the empirical analysis, infrastructure financing transactions data at the bank-level are used, covering both PPP and non-PPP projects and infrastructure projects funded

across the transport, telecommunications, power, renewables, environment and social sectors. An econometric model similar to the one used for estimating transitional effects of increased capital requirements was estimated. However, as transaction level data are available in the case of infrastructure, specific variables relating to particular infrastructure financing deals are included in the model.

The key result, derived in this study using data for the period 1985-2014, is that while a one percentage point increase in the Total Capital Ratio is estimated to have a negative impact on bank financing of infrastructure, the size of the impact is in a relatively wide range and the 95% confidence interval around the estimated impact is very close to zero or crosses zero at the upper end. Therefore, one can draw the conclusion that there is not clear evidence of a major negative impact of increased capital requirements under the CRR on bank financing of infrastructure, a result which is consistent with findings from the consultations and survey. The results highlight further that the impact of changes in the Total Capital Ratio on bank lending flows in general (as per the transitional effects analysis) are economically more significant than on bank financing of infrastructure in particular.