Economic Letter

Using the Countercyclical Capital Buffer: Insights from a structural model

Matija Lozej & Martin O'Brien

Using the Countercyclical Capital Buffer: Insights from a Structural Model

Matija Lozej and *Martin O'Brien*[1]

This *Letter* looks at what happens after a demand-induced economic expansion with and without the activation of the Countercyclical Capital Buffer (CCyB). The main findings are that without the activation of the CCyB, bank resilience is diminished for an extended period. A timely activation of the CCyB alleviates the short-run decrease in bank resilience and enhances it in the medium-to-long term without substantially reducing economic expansion. If the activation is delayed, the reduced bank resilience persists longer. The cost of incorrectly timing the tightening of the CCyB is small. The macroeconomic impact of tightening is smaller the further above banks' actual capital ratios are from their regulatory minimum requirement.

Introduction

This *Letter* examines the relative effect of tightening minimum capital requirements (and their subsequent relaxation) for banks at different stages of the economic cycle. The tightening and relaxation of minimum capital requirements can be viewed as a proxy for tightening and release of the Countercyclical Capital Buffer (CCyB). The analysis is conducted by simulations using the Central Bank's DSGE model and provides insights to inform the timing of decisions to tighten the CCyB.[2]

The CCyB is a time-varying capital requirement which aims to promote resilience in the banking system through the economic and financial cycle. By changing the CCyB at various stages of the cycle, banks are required to build up buffers during expansionary phases where cyclical systemic risks begin to emerge. This build-up of buffers should be significant enough such that sufficient resilience is in place before the

[2]The analysis is based on simulations done using the financial version of the Central Bank of Ireland's DSGE model (Lozej, Onorante, Rannenberg, 2017).

contractionary phase of the cycle occurs and losses are realised. The release of the CCyB during a downturn is aimed at limiting the potential that the interaction between higher losses and minimum regulatory capital requirements act as an impediment to the supply of credit to the economy. Any such reduction in lending as a response to those losses could make the downturn worse.[3]

A number of different scenarios are considered, with the intention being to draw conclusions that are of most relevance given the current macro-financial environment and the conduct of CCyB policy. We focus on instances where the economy is subject to a broad-based positive demand shock which boosts economic expansion, and the relative impact of changing minimum capital requirements at different points in time relative to when that shock occurs. The results of the analysis can be summarised as follows:

- Without activation of the CCyB, bank resilience is diminished for an extended period after a demand-driven economic expansion, as the increase in real equity is proportionately smaller than the increase in real loans;

- An announcement, contemporaneous with the positive demand shock, of a tightening of the CCyB in four quarters' time (consistent with the actual lag involved in setting the policy), mitigates the reduction in bank resilience in the very near term, and enhances resilience in the medium-to-long term without substantially lessening the impact of the positive demand shock on the economy;

- Delaying announced activation of the CCyB further beyond the occurrence of the positive demand shock similarly does not weaken the impact of the demand shock on macroeconomic variables, but the diminution of bank resilience persists for a longer period.

- In instances where the policy-maker is unsure as to whether the economy is subject to a positive demand shock, the short-run "cost" of incorrectly tightening CCyB, measured by the lost output, consumption or investment, is minimal.

- The further above banks' actual capital ratios are from their regulatory minimum requirement, the smaller the adjustment of bank and macroeconomic variables are to the increase in minimum capital requirements.

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[3]Further details on the CCyB are available at https://www.centralbank.ie/financial-system/financial-stability/macro-prudential-policy/countercyclical-capital-buffer. Also note O'Brien *et al* (2018), O'Brien and Ryan (2017), Creedon and O'Brien (2016) and Lozej, Onorante, Rannenberg (2017) for discussions on the CCyB.

In addition, the *Letter* outlines the main scenarios considered and the results from some alternative specifications that highlight the relative role of acting on false signals and the means through which banks adjust to the higher requirements in more detail. As in any such exercise using a stylised model, the absolute size of the effects shown in the scenarios is not as informative as the relative size of the effects compared across the scenarios.[4]

Main scenarios

Scenario 1: Demand-driven expansion without the increase in minimum capital requirements

Scenario 1 is the benchmark scenario which does not include any policy response, and is shown in Figure 1 as the full black line.[5] The economic expansion is assumed to be driven by a widespread and persistent demand shock – an increase in preferences for consumption and for housing – that increases consumption, investment, output, and lending. Shocks have been set so that the house price increase is about three times as large as the GDP increase and the investment increase is about three times stronger than the consumption increase.[6] After the demand shock, households would like to borrow in order to fund consumption and housing, and therefore loans increase. While bank equity increases as a result of more lending and less defaults, the increase in bank equity just from a demand shock is not sufficient to increase the bank capital ratio, which falls marginally and does not recover fully for a number of years. This is due to the strong increase in bank assets in the form of loans, as households borrow more to finance consumption, investment and housing.

The model responses are what one would typically expect from the economic expansion: An increase in all spending components (consumption, investment, imports), a drop in exports due to the increase in prices and

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[4]It should be noted that if spending is financed predominantly by retained income or retained earnings, then the effects of bank lending may be less strong. In addition, there may be stronger non-linearities if banks are closer tot he constraint.

[5]At the start, banks keep a 2 percentage point buffer above the minimum capital requirement, which in the model is equivalent to the total capital ratio (Tier 1 plus Tier 2 capital) of 8 per cent.

[6]Note that the consumption preference shock on its own pushes consumption up and investment down (including housing investment and house prices). This arises since after such a shock households want consumption only and try to reduce all other types of expenditure. Because investment is more volatile than consumption, this can result in the short run decrease in GDP in the model. This is the reason why a housing demand shock is needed in addition to the consumption preference shock in order to push up both house prices and investment.

Figure 1 | Scenarios 1 and 2 - demand-driven expansion with and without the increase in minimum capital requirements
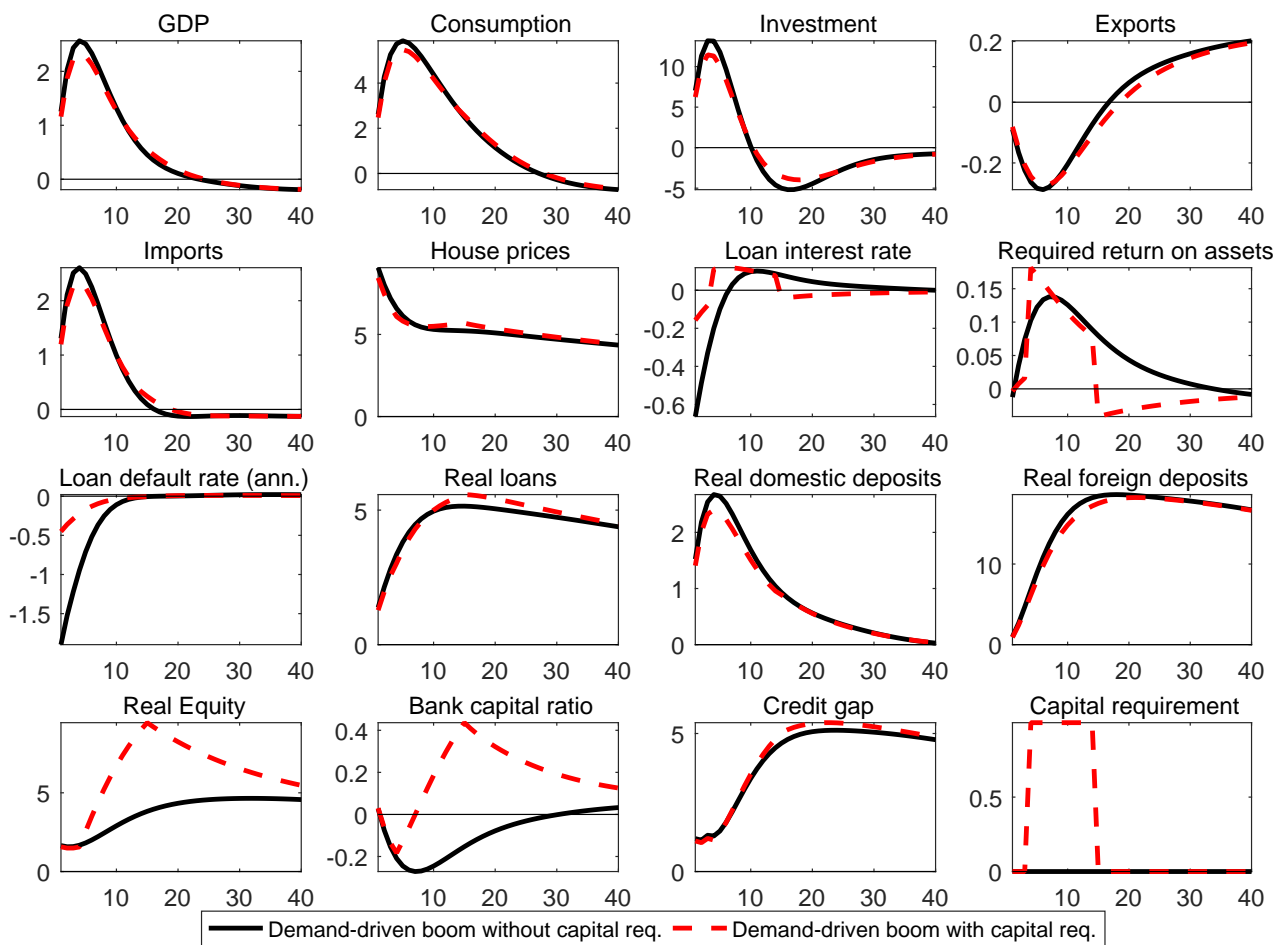
Source: Variables are reported in percent deviations from initial values. Interest rates and the default rate are in percentage point deviations (annualised). Bank capital ratio and capital requirements are in percentage point deviations from initial values. Units on the x-axes are quarters.

due to higher domestic demand relative to foreign demand, and an increase in house prices. The latter increases the value of housing collateral, which in turn reduces the default rate. Part of this gain is passed-on by banks to consumers through lower lending rates, and part is used by banks for replenishing capital in order to prevent the bank capital ratio falling too much due to the strong increase in lending.

Scenario 2: Demand-driven expansion with an announced increase in minimum capital requirements

This scenario is identical to Scenario 1 (the baseline), with one important difference. At the moment the expansionary demand shock hits the economy, the central bank announces that it will increase the CCyB by 1 percentage point in four quarters. To proxy for the time-varying nature of the CCyB, the buffer rate is kept at 1% for 10 quarters, before being lowered back to the initial level.[7] The results of this scenario are shown in Figure 1 as a dashed red line.

The announced increase in minimum capital requirements is relatively low and temporary, which is why it does not do much to the macroeconomic variables (there is small attenuation of the boom, with output increasing by 2.3% instead of 2.6% at the height of the expansion without the increase in minimum capital). There is a difference in the reaction of lending rates and the required return on assets. When the minimum capital requirement is increased, banks are faced with the situation where they are closer to the regulatory minimum. Even though the return on their equity has increased due to lower default rates, they still want to replenish their capital to move away from the regulatory constraint, so they increase the required return on capital during the period when the minimum capital requirement is elevated. This feeds into the lending rate of banks, which drops by less than in the case when there is no tightening of minimum capital requirements, and increases during the period when capital requirements are tightened. This higher lending rate dampens the economic activity somewhat, although the effect is not strong because the measure is temporary. Note that if minimum capital requirements were increased for a longer period, they would make somewhat more difference to macroeconomic variables, but not much.[8] Also, the adjustment would shift further into the future.

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[7]Banks and households know at the time of the announcement that the minimum capital requirement will be increased in four quarters' time and that this is the period within which they have to adjust. They also know that the minimum capital requirement will be lowered in ten quarters' time. The announcement by the central bank is fully credible.

[8]For instance, if minimum capital requirements were elevated for 20 periods, output would increase by 0.1 p.p. less.

Scenario 3: The role of the timing of the announcement of the higher minimum requirement

Here we analyse the demand-driven economic expansion as in Scenario 2, but in this instance the announcement of the minimum capital tightening is made with a lag relative to when the expansion begins. The lag can be considered as time needed to collect the data, identify the nature of the shock and take action. We consider two lengths of lags: that the announcement takes place four and eight quarters, respectively, after the initial demand shock.

The results are shown in Figure 2 below. When the implementation of the minimum capital requirement increase comes with a lag, the propagation mechanism of the demand shock in the economy is ongoing: House prices increase initially, which lowers the loan default rate, which in turn lowers lending rates because capital requirements have not increased yet. Low lending rates increase consumption, investment, and housing values, which further decreases the interest rate through lower default rates. The length of the delay does not matter very much for the levels of consumption, investment, house prices, etc. However it does affect the adjustment by shifting some of it further into the future. The result is robust to shorter implementation lags (e.g. 2 quarters). Note that in all cases the minimum capital requirement returns to the initial level in the long run so that there are no long-run effects.

The costs of acting on a false signal of a positive demand-led shock

In the previous section, we considered the impact of tightening minimum capital requirements in the presence of a positive demand shock. However in reality the policy-maker may face instances of a false signal, whereby certain early indicators of the expansion may not culminate in a broad based increase in demand. Indeed there may be general uncertainty on whether there is a significant expansion under way. Such uncertainty could lead to inaction bias on behalf of policy-makers.[9] In this instance it is useful to examine the relative "cost" of tightening and subsequently loosening minimum capital requirements in terms of the consumption or investment activity foregone if the demand-led expansion does not materialise. In the results below (Figure 3) such period without a demand shock is described as "normal times", and is represented by the dashed red line.

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[9] In practice certain aspects of the design of the CCyB framework in the EU, and in particular the requirement for policy-makers to review the buffer rate on a quarterly basis, also help mitigate inaction bias.

Figure 2 | **Demand-driven expansion with an announced increase in minimum capital requirement with different timing**
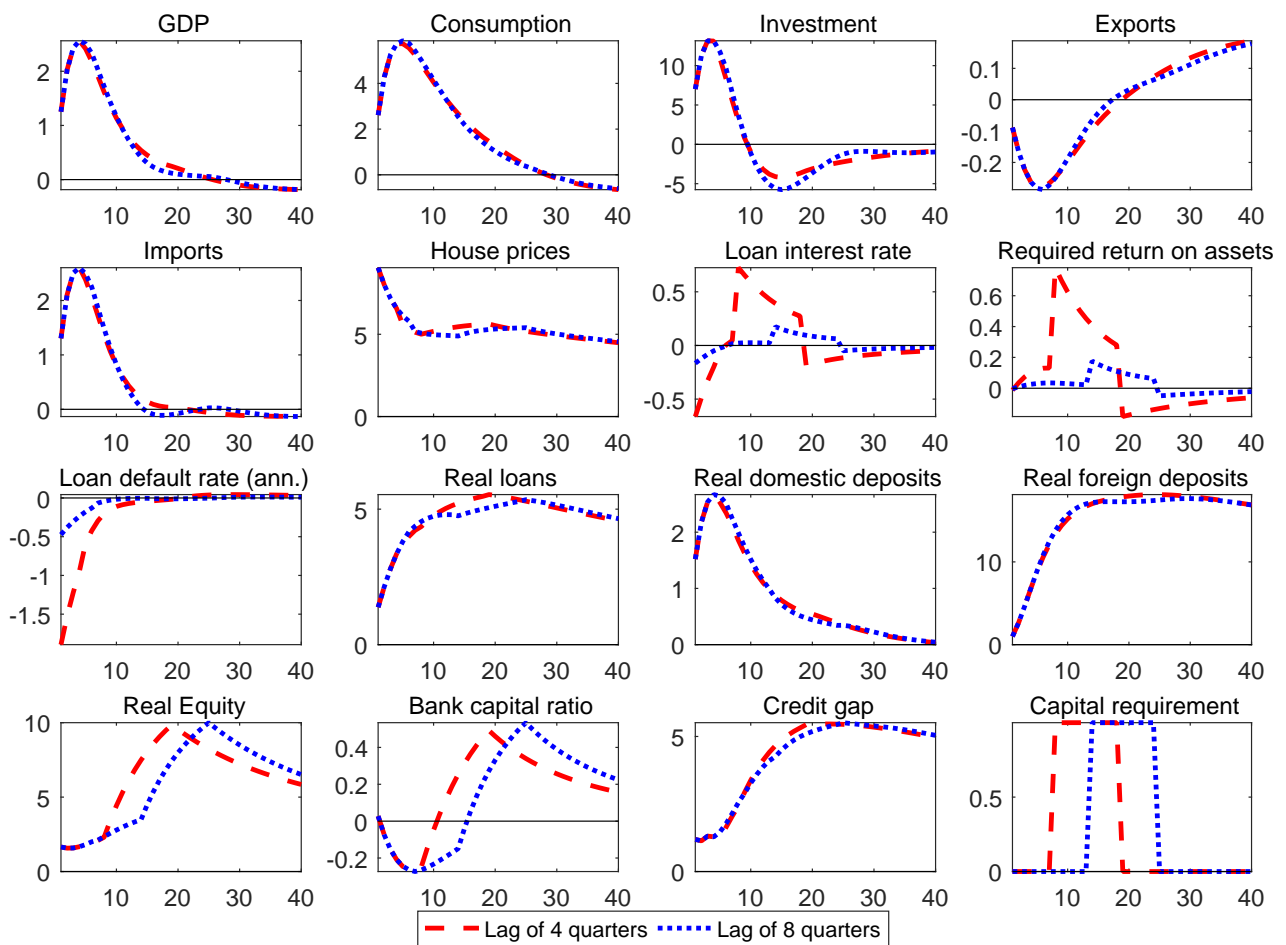
Source: Variables are reported in percent deviations from initial values. Interest rates and the default rate are in percentage point deviations (annualised). Bank capital ratio and capital requirements are in percentage point deviations from initial values. Units on the x-axes are quarters.

We compare the costs from tightening minimum capital requirements during times without the shock to the costs of tightening minimum capital requirements during a demand-led boom and releasing them after a number of quarters in a downturn relative to not taking any policy action during such an expansion and downturn. These are shown by the solid black line in Figure 3.

The results are presented as losses, meaning that positive numbers can be considered the "costs" of tightening capital requirements and negative numbers are gains.[10]

The top-left panel in Figure 3 shows that GDP is about 0.2% lower when minimum capital requirements are tightened during normal times (dashed red line is above zero until about period 10) and then increases when the minimum capital requirement is released (from period 10 onwards). The full black line in the top left panel shows losses of output for an identical path of minimum capital requirements during a demand-led expansion and subsequent downturn. As can be seen, the difference between the two series is marginal, and a similar result holds for most other variables considered.

Overall this would suggest that the relative cost of tightening capital requirements where there is uncertainty as to the presence or the strength of a demand-led expansion is not very significant.

Tightening when banks are already closer to their minimum capital requirement

The analysis presented up to now assumes that banks are a particular distance (2 percentage points) from, or have a particular risk of breaching, their minimum capital requirement. In this section we consider what the reaction would be if banks were at a higher risk of breaching their minimum requirement. This in essence forces the banks to raise sufficient additional equity over the four quarters from an announced increase in the CCyB rate to match the new 1 percentage point higher minimum capital requirement, and is indicative of a more binding policy change. It is useful to consider this extreme as a reference point given the actual capital position of the domestically relevant banking system, which at end-2017 had a CET1 ratio of circa 17%, well above minimum CET1 capital requirements.

The results are presented in Figure 4, and again the economy is subject to a broad-based demand shock. The banking system can react to

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[10]That is, the dashed red line shows the losses when the only shock is the (announced) tightening of the minimum capital requirements and the full black line shows the losses when there is an identical increase in minimal capital requirements, but this time accompanied by the demand shock.

Figure 3 | Losses from tightening minimum capital requirements in the boom and releasing them in the downturn vs. tightening minimum capital requirements and releasing them in tranquil times
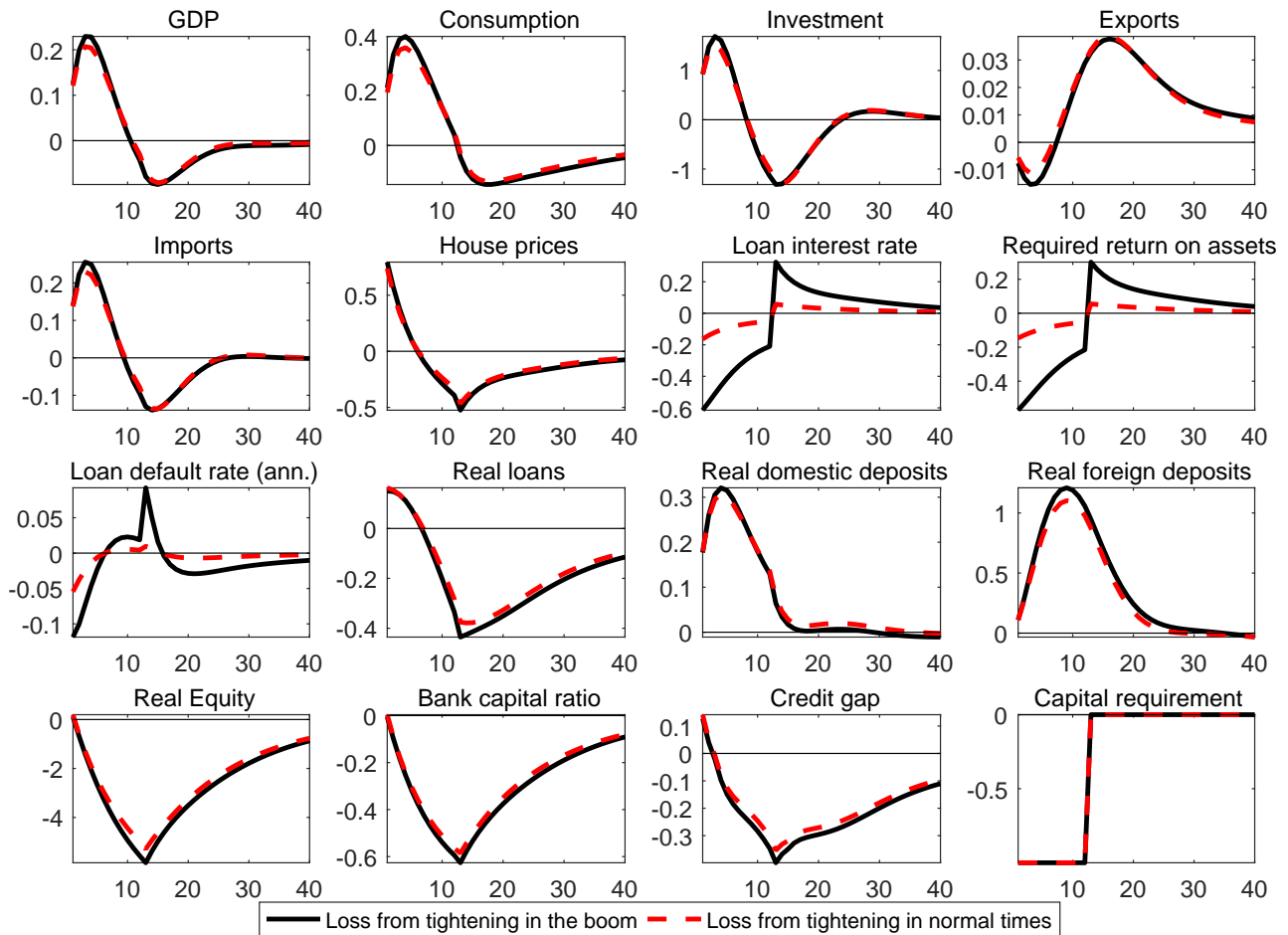
Source: All variables are reported as percentage-point differences between impulse-responses of two scenarios. In each scenario, impulse responses are deviations from initial values. Interest rates and the default rate are in percentage point differences (annualised) between two scenarios. Bank capital ratio and capital requirements are in percentage point differences from deviations w.r.t. initial values in each scenario. Units on the x-axes are quarters.

the more binding policy by not paying dividends (thus increasing retained earnings), by issuing new equity and/or by increasing interest rates (which increases margins but also dampens credit growth and the pace of increase in bank assets). The solid black line shows the response if banks raise the additional capital needed in part by issuing new equity and in part by not paying dividends. The blue dashed line considers only the instances where dividends are not paid out. As can be seen, the impact on macroeconomic variables in both instances is similar, and if compared to the previous scenarios is somewhat larger in magnitude (i.e., the increase in output, consumption, and investment following the demand expansion is somewhat smaller). The main difference between these instances with a more binding policy constraint and the previous scenarios considered is in the banking system itself, and the relative dynamics of bank capital. Also, in the case of where only retained earnings are used to reach the more binding minimum requirement, interest rates are relatively higher.

In the context of a banking system which is further away from minimum regulatory requirements, these results would suggest that a tightening of the CCyB to enhance resilience would not necessarily result in significant short-run "costs" in terms of economic activity foregone.

Conclusion

In this *Letter* we have presented various simulations from the Central Bank's DSGE model to provide insight to the timing of changes to the CCyB rate. As with all such exercises, the relative impacts across the various scenarios are most informative, as opposed the size of each individual impact. There are also a number of other relevant factors policy-makers would have to consider when determining the timing of the change in the CCyB stance, such as the interaction with other policy initiatives, etc. These factors are not considered in this *Letter*.

Overall the results of this analysis suggest that activating the CCyB sufficiently early in the economic cycle can be effective in promoting bank resilience. This is consistent with the primary objective of the CCyB. It is also the case that activating the CCyB early has less of an affect in dampening the pace of economic activity. Viewed from a different perspective, the relative cost in terms of economic activity foregone by tightening minimum capital requirements is relatively small, and especially so when the banking system is further above those minimum requirements.

Figure 4 | A more binding increase in capital requirements - alternative strategies for raising equity
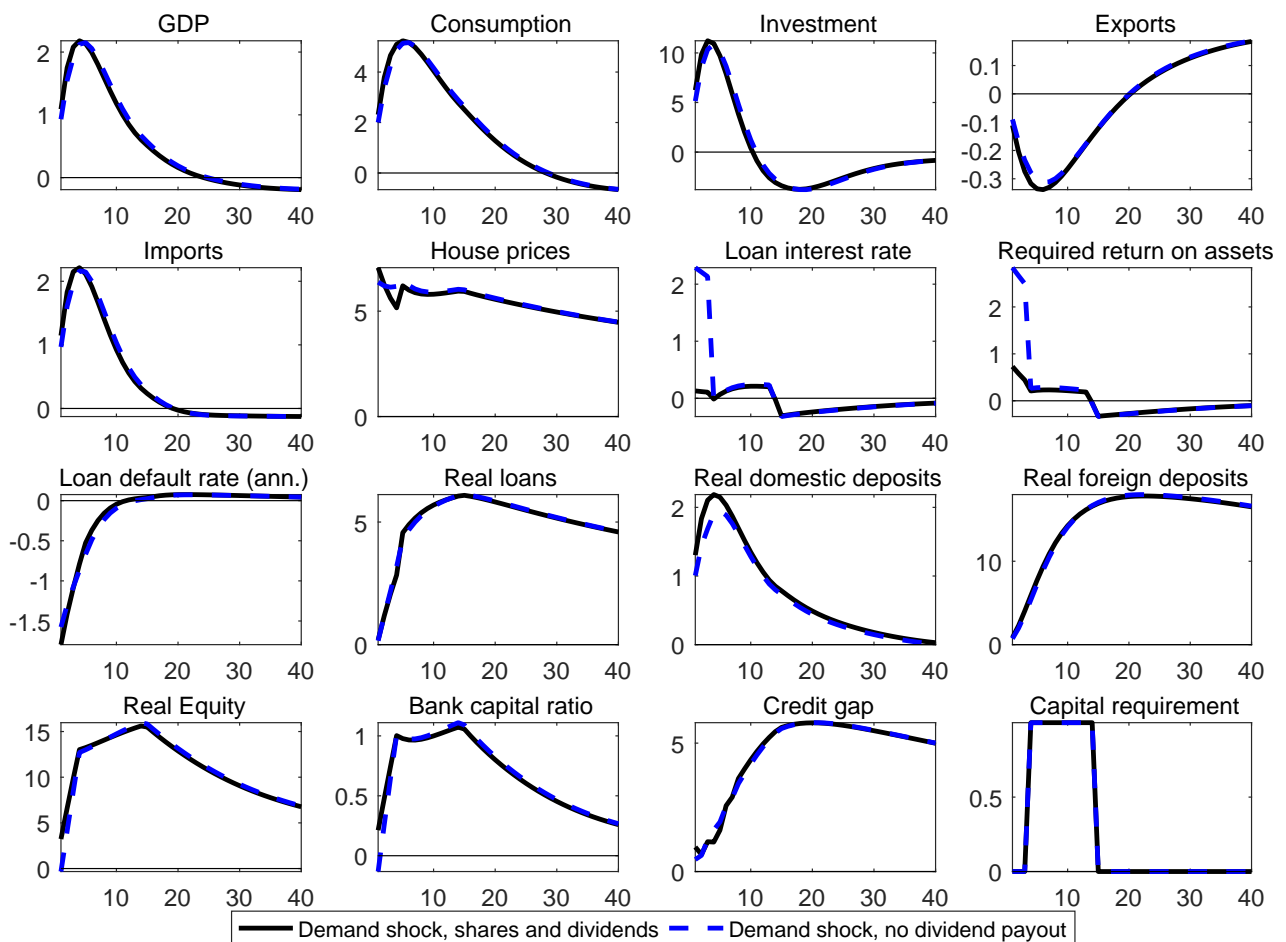
Source: Variables are reported in percent deviations from initial values. Interest rates and the default rate are in percentage point deviations (annualised). Bank capital ratio and capital requirements are in percentage point deviations from initial values. Units on the x-axes are quarters.

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