

The Role of Bank Capital in the Propagation of Shocks

Césaire Meh (Bank of Canada) and Kevin Moran (Université Laval)

The balance sheets of banks worldwide have recently come under stress, as significant asset writedowns led to sizable reductions in bank capital. This appears to have generated a “credit crunch” in countries (such as the United States) where banks cut back on lending and firms found it harder to obtain external financing. This situation raised concerns that economic activity would be undermined. This has boosted interest in a quantitative model of the business cycle that can be used to analyze the interactions between bank capital, bank lending, economic activity, and monetary policy. Most macroeconomic models do not take into account the financial health of financial intermediaries. Meh and Moran (2008) take an important first step in this direction by developing a dynamic general-equilibrium model in which the link between bank capital and macroeconomic performance is significant. The simple model features an endogenous capital-adequacy ratio instead of an exogenous regulatory requirement, and is used to shed light on the ongoing debate on the regulation of bank capital.

MODEL AND METHODOLOGY

In our working paper, we develop a monetary macroeconomic model in which the condition of bank balance sheets has important effects on economic outcomes. The model includes several nominal and real frictions, in the spirit of state-of-the-art monetary models, but departs from those in the literature by accounting for the role of bank capital in the amplification and propagation of shocks.

The optimal financial contracting arrangement builds on the theoretical work of Holmstrom and Tirole (1997). Banks intermediate funds between investors/depositors, who are the ultimate lenders, and firms, who are the ultimate borrowers. A key function of banks is to monitor firms on behalf of investors/depositors. The intermediation process is complicated by two sources of moral hazard (owing to asymmetric information): the first affects the relationship between banks and firms, and arises because firms may not exert an optimal level

of effort, since effort is costly and not publicly observable. To mitigate this problem, banks can monitor the behaviour of firms and require that they invest their own funds in the projects.

The second source of moral hazard influences the link between banks and investors and stems from the fact that banks, to which investors delegate the monitoring of firms, may not provide the optimal intensity of monitoring, since monitoring is costly and not publicly observable. In response, investors will provide loanable funds only to banks that are well capitalized. All things being equal, higher bank capital lessens the moral hazard problem between banks and investors and increases the ability of banks to attract loanable funds. In addition, raising new bank capital is costly, and this implies that in the short run, bank capital is determined mainly by earnings. In the model, the overall effects of shocks depend on the relative amount of bank capital and on the net worth of firms.

The mechanism through which bank capital affects the propagation of shocks can be illustrated with the following example. A negative shock to aggregate productivity reduces the profitability of firms, making lending to them less attractive. Banks thus find it harder to attract loanable funds from investors. To compensate, they must finance a larger share of investment projects from their own capital, which increases their capital-adequacy ratio. Since bank capital cannot be quickly adjusted in the short run, bank lending decreases significantly, as does aggregate investment. This sets the stage for second-round effects in subsequent periods, in which lower investment leads to lower bank earnings and net worth, further decreasing the bank's ability to attract loanable funds and provide external financing to support economic activity.

MAIN FINDINGS

Our main findings can be summarized as follows. First, we show that in economies with well-capitalized banks, the economic downturn following a negative shock to productivity is

muted, and banks are better able to provide funding. This moderates the response in aggregate investment and output. In turn, inflationary pressures resulting from adverse shocks are subdued when banks are well capitalized, reducing the response required from monetary authorities. These results support the long-held view that an economy with a well-capitalized banking sector is more resilient to shocks.

Second, we find that sudden exogenous shortages in bank capital have a prolonged negative impact on the real economy. The source of this deterioration in the balance sheets of banks is unspecified but could arise from severe weakness in a specific sector or foreign market where banks are heavily involved.

Third, the model predicts that banks must satisfy market-determined capital-adequacy ratios. Interestingly, whether or not these capital-adequacy ratios are procyclical depends on the source of the shocks. Specifically, after an erosion of bank capital caused by unexpected loan losses, the capital-adequacy ratio decreases (i.e., is procyclical), suggesting a possible motivation for allowing banks to hold less capital in recessions. During such episodes, banks have a greater incentive to monitor because of the scarcity of bank capital. This lessens the moral hazard problem between banks and investors and is reflected in a decline in the capital-adequacy ratio.

After a negative shock to aggregate productivity, however, these capital ratios increase (i.e., are countercyclical), suggesting the need for tighter banking standards in economic downturns. A negative productivity shock decreases overall returns to lending and intensifies the moral hazard problem. Thus, to provide banks with the right incentives for monitoring, investors will lend funds only to banks with higher capital-adequacy ratios.

POLICY DISCUSSION

Our simple model does not provide a direct motivation for regulating capital-adequacy ratios. In this model, the market provides the proper level of discipline. If the regulator is viewed as a representative of investors/depositors, however, our results have some bearing on the ongoing debate about regulating capital-adequacy ratios.

A widespread concern about the new capital-adequacy regulation, known as Basel II, is that it might force banks to restrict their lending when the economy is facing a recession and thus worsen economic downturns. Our model sheds some light on this concern and argues that the desirable cyclical nature of capital-adequacy ratios depends on the source of economic fluctuations.

The model suggests that regulated capital-adequacy ratios should decrease if the downturn is driven by an unexpected shock to the banking sector, since the market-determined

capital-adequacy ratio falls in response to a shock hitting that sector. Imposing Basel II-type regulation would inhibit this response and thus exacerbate the negative effects of the credit crunch on the whole economy.

On the other hand, our analysis suggests that regulatory capital ratios should increase, following aggregate productivity shocks, in agreement with the spirit of Basel II, since the market-determined capital-adequacy ratio rises when an adverse productivity shock hits the economy. Under this interpretation, the regulatory authority may not need to decrease the capital-adequacy requirement even if the banking sector is experiencing difficulties.

CONCLUSIONS

Our work makes two key contributions: (i) a macroeconomic model that takes into account real-financial linkages by explicitly modelling the link between bank capital (the health of the banking sector), real activity, and monetary policy; and (ii) the model contributes to financial stability research by clarifying the ongoing debate about the regulation of capital-adequacy ratios.

More generally, this work points to the economic benefits of well-capitalized banks (high capital-adequacy ratios) and to the need for flexibility in capital-adequacy regulation.

REFERENCES

- Holmstrom, T. and J. Tirole. 1997. "Financial Intermediation, Loanable Funds, and the Real Sector." *Quarterly Journal of Economics* 112: 663-91.
- Meh, C. and K. Moran. 2008. "The Role of Bank Capital in the Propagation of Shocks." Bank of Canada Working Paper No. 2008-36. ■