PUBLISHABLE SUMMARY

Policy makers recognize the importance of developing quantitative models to assess both microprudential and macroprudential risks in the financial system. These tools aim to improve the identification and assessment of systemically important risks from high leverage, credit growth, or money market freezes. Moreover, quantitative structural models can be used in real time to perform counterfactual experiments and inform policy making.

Given the need for such applied, quantitative models, we construct a dynamic structural model of bank lending behavior and capital structure choices with the following features. Banks transform short-term liabilities into long-term loans (a maturity transformation function) and premature liquidation of loans is costly. Banks also operate in an incomplete markets setup and face uninsurable background risks in funding conditions and asset quality. In such an environment the limited liability option of bank shareholders may lead to incentives to shift risks to creditors and to the deposit insurance fund. Especially for banks whose charter value is low, excessive risk taking in good times could lead to high losses when the cycle turns. Bank capital regulation therefore exists to contain excessive risk-taking and limit potential losses to the deposit insurance fund. The main goal of our research is to understand the quantitative implications of changes in regulatory structures designed to make the banking system safer.

To perform the analysis, we first estimate the quantitative model using a Method of Simulated Moments. The model replicates the wide range of cross-sectional heterogeneity in bank financial ratios through the endogenous response to idiosyncratic risks emanating from deposit flows and loan write-offs, as well as the motive to hedge liquidity risk arising from maturity transformation. Consistent with the data, smaller banks are estimated to face a higher cost of accessing the wholesale funding market and therefore rely more heavily on deposit funding. Small banks also have a more concave objective function associated with more severe financial friction. Larger banks, on the other hand, are more highly levered due to the additional flexibility provided by easier access to wholesale funding.

We interpret these findings as consistent with quantitative features of the data. We therefore use the model to analyze the economic effects of changing capital requirements, a major issue of policy concern. We assume that regulatory intervention takes the form of a prudential limit on bank leverage (the leverage requirement), measured as the ratio of total assets to equity. In addition to the leverage constraint, banks face regulatory restrictions with respect to the ratio of risk-weighted assets to equity (the capital adequacy requirement), a proxy for Tier 1 capital ratio.

Tighter capital requirements could increase bank resilience to shocks and reduce the likelihood of bank failure. On the other hand, tighter capital requirements reduce financial flexibility. Lower flexibility might increase the likelihood of bank failure by either reducing bank charter value or increasing the likelihood of breaching a tighter limit, or both. Therefore, setting capital requirements at an appropriate level is a balancing act.

In the model banks respond to tighter capital adequacy requirements by accumulating more equity and lowering loan issuance. When capital adequacy requirements get too tight, bank charter value and equity buffers relative to the regulatory minimum fall, leading to an increase in bank failures. However, for a given capital adequacy requirement, a tighter leverage restriction induces banks to increase lending, while bank failures remain relatively unchanged.

What is the intuition behind the differential impact of tightening the two constraints? At the optimum, banks are indifferent between holding an extra unit of higher-yielding (yet high risk-weighted) loans

or low risk-weighted (yet lower-yielding) liquid assets. A tighter capital adequacy ratio induces a substitution of high risk-weighted loans with liquid assets, leading to an endogenous fall in the expected return on assets. Banks also respond to the tighter constraint by increasing equity. As a result of both effects, a tighter capital adequacy ratio lowers the expected return on equity, thereby weakening bank incentives to accumulate more equity. Therefore, banks increase equity by less than the increase in the capital requirement, making failure more likely.

On the other hand, by tightening the leverage constraint -- which does not discriminate between the two types of assets -- the capital adequacy constraint becomes less important. As a result, loans start dominating liquid assets, since lower risk weights matter less for bank asset choices, leading to an increase in loan supply. Tighter leverage requirements keep the expected return on equity relatively intact because the induced asset reallocation towards loans increases profitability, counteracting the increase in equity. Therefore, banks increase equity in proportion to the tighter constraint, leading to relatively unchanged failure rates, especially for large banks.

Our research can inform both the micro and macro prudential debate of the effects of regulatory changes on the economy. In current work we are expanding the model to study the effects of general equilibrium implications and the effects of other pre-emptive regulatory actions.