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Bank Capitalization and Loan Growth

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A few academic papers have recently indicated that banks with a greater amount of capital tend to lend more as a result of lower funding costs. This evidence has been used to support further increases in capital requirements worldwide, including the proposed inclusion of the global systemically important banks (GSIB) capital surcharge in U.S. stress tests.¹ Two recent academic papers supporting the view that higher capital levels lead to an expansion of loan growth are Gambacorta and Shin (2016) and Michelange and Sette (2016).² For instance, Gambacorta and Shin (2016) find that a 1 percentage point increase in the equity-to-total assets ratio is associated with a 0.6 percentage point increase in annual loan growth. In this research note we show that the positive relationship between bank capitalization and the growth of lending is driven by the amount of capital in excess of capital requirements, an amount which we refer to as the “capital surplus.” That is, our results show that banks with a higher capital surplus tend to lend more. In contrast, we find that an increase in capital requirements leads to a decrease in loan growth. Specifically, we find that a 1 percentage point increase in capital requirements is associated with a 0.7 percentage point *reduction* in loan growth. These results have important implications for the calculation of the costs and benefits of higher capital requirements and other regulations for banks. An increase in capital requirements, such as the introduction of the GSIB surcharge in stress tests, would lower loan growth and reduce economic growth. Conversely, an increase in the surplus of capital either because capital requirements had been reduced or because banks earned and retained solid profits would lead to more lending and boost growth.³

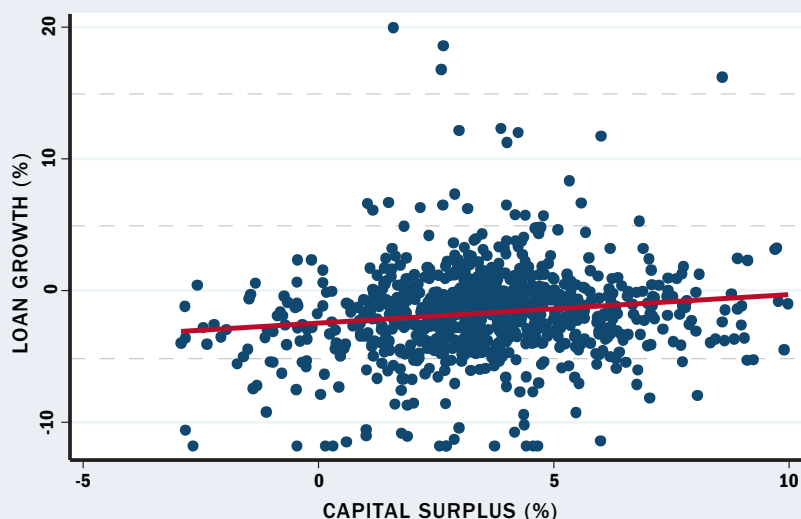
This note analyzes the impact of changes in capital requirements on bank lending using data covering only the period when Basel I requirements were still in place. This choice provides two advantages. First, our sample includes a period that includes two full business cycles, and second, it avoids having to make assumptions about the Basel III transition periods and the role of U.S. stress tests. Our identification procedure relies on the fact that in the U.S. banks are subject to prompt corrective action standards which require banks to meet capital thresholds based on two risk-based capital ratios – tier 1 and total risk-based capital ratios - and one non-risk based capital ratio – the tier 1 leverage ratio. Thus, over time there are going to be periods where it’s the risk-based capital ratio that is closest to be breached if a bank’s capital were to be reduced, while for other periods it is the leverage ratio that is the binding constraint. This heterogeneity in capital requirements across banks and over time allows the identification of the effect of changes in capital requirements on bank lending.

1 See, speech by Stefan Ingves on “Finalising Basel III: Coherence, calibration and complexity,” December 2, 2016 and a speech by Governor Daniel Tarullo on “Next Steps in the Evolution of Stress Testing,” September 26, 2016, respectively.

2 See, Gambacorta, Leonardo and Hyun Song Shin, “Why bank capital matters for monetary policy” BIS Working Papers No. 558, April 2016 and Michelangeli, Valentine and Enrico Sette, “How Does Bank Capital Affect the Supply of Mortgages? Evidence from a Randomized Experiment,” BIS Working Papers No.557, April 2016.

3 For a discussion of the importance of bank profitability for bank safety and soundness, see “Why Have Banks’ Market-to-Book Ratios Declined?,” The Clearing House, November 1, 2016. https://www.theclearinghouse.org/research/articles/2016/11/20161101_tch_research_note_market-to_book_ratios

EXHIBIT 1: CAPITAL SURPLUS AND LOAN GROWTH



Note: The panel includes only data for the first quarter of 2011, for expositional purposes.

Under Basel I, a U.S. bank was considered to be well-capitalized if its total risk-based capital ratio was above 10 percent and its tier 1 risk-based capital ratio was above 6 percent and its tier 1 leverage ratio was above 5 percent. The analysis uses the well-capitalized capital threshold – hereafter denoted as the capital requirement – to construct the capital surplus, which is defined as the amount of capital above the capital requirement. Moreover, the

capital surplus can also be decomposed into two subcomponents: (i) the regulatory capital ratio that is more likely to breach the capital requirement; and (ii) the corresponding capital requirement. We construct our set of capitalization measures in two steps:

STEP 1: Find the regulatory capital ratio that is more likely to violate the capital requirement if a bank's capital were to be reduced using the following definition:

$$\text{Capital surplus} = \min \left\{ \frac{\text{Total Capital}}{\text{Risk Weighted Assets}} - 10\%, \frac{\text{Tier 1 Capital}}{\text{Risk Weighted Assets}} - 6\%, \frac{\text{Tier 1 Capital}}{\text{Total Assets}} - 5\% \right\}$$

STEP 2: Define the following two measures of bank capitalization: (1) the regulatory capital ratio that is more likely to breach the capital requirement in any given quarter for each bank in our sample; and (ii) the capital requirement associated with the regulatory capital ratio that is the closest to be breached.

Exhibit 1 depicts the relationship between the capital surplus and loan growth for all the banks in our sample during the first quarter of 2011, just to provide some perspective on the relationship between these two variables. The red line depicts the relationship between capital surplus and loan growth. The positive slope of the red line indicates that banks with a higher surplus tend to lend more. Below we conduct a regression analysis that explores in more depth the positive relationship between these two variables. Moreover, the regression analysis will also control for the importance of bank-specific effects as well as macroeconomic variables and time-effects in driving the relationship between the capital surplus and loan growth.

The first objective of the statistical analysis is to replicate the results reported by Gambacorta and Shin (2016) in our sample, which includes only U.S. commercial banks. Afterwards, we redo the analysis by replacing Gambacorta and Shin's capitalization measures with the capital surplus and the capital requirement. These changes are important to distinguish between the effects of changes in capital requirements versus changes in capital surpluses on loan growth. The model we estimate is as follows:

$$\Delta \ln(\text{loans})_{it} = \alpha_i + \delta_t + \rho \Delta \ln(\text{loans})_{it-1} + \beta \text{capital measure}_{it-1} + \theta X_{it-1} + \gamma Y_t + \varepsilon_{it}$$

where $\Delta \ln(\text{loans})_{it}$ represents annualized loan growth of bank i in period t , α_i denotes the bank i fixed effect, δ_t is a time fixed effect, $\text{capital measure}_{it-1}$ captures the various capital ratios and the

TABLE 1: HIGHER CAPITAL REQUIREMENTS REDUCE LENDING SUPPLY

Explanatory variables	Dependent variable: Growth rate of lending			
	(1)	(2)	(3)	(4)
100*(Equity/Total Assets) _{t-1}	0.7859*** (0.1245)			
100*(Tier 1 Capital/Risk-weighted assets) _{t-1}		0.6487*** (0.0500)		
Capital Surplus _{t-1}			0.9098*** (0.0849)	
Binding Capital Ratio _{t-1}				0.6253*** (0.0761)
Capital Requirement _{t-1}				-0.7403*** (0.1196)

*Note: Sample period: quarterly data from first quarter of 1996 to the fourth quarter of 2013. The dependent variable in each regression is the annualized growth rate of total loans. The notation '(t-1)' means that the explanatory variables enters in the regression lagged one quarter. The standard errors robust to autocorrelation and heteroskedasticity are reported in parenthesis. The regression specification also includes the lagged dependent variable, bank-specific effects, macroeconomic controls, and bank and time fixed effects. The macroeconomic variables included are the growth rate of real GDP, the effective federal funds rate and the growth rate of house prices. * p-value < 0.10; ** p-value < 0.05; and *** p-value < 0.01.*

capital surplus across our different specifications, X_{it-1} is a vector of bank-specific control variables, Y_t is a vector of macroeconomic variables and ε_{it} is the error term. We also allow for persistence in loan growth by including the lagged dependent variable as an explanatory variable.⁴

Table 1 reports the regression results. The first two columns replicate the results of Gambacorta and Shin (2016) by using as measures of bank capitalization the equity-to-assets ratio and the tier 1 risk-based capital ratio. Specifically, the results in the first column indicate that a 1 percentage point increase in the equity-to-assets ratio is associated with a 0.80 percentage point in the annual loan growth. This estimate is very similar to the results of Gambacorta and Shin (2016). Using a sample of 105 large banks across 15 countries, they report that a 1 percentage point increase in the equity-to-assets ratio leads to a 0.6 percentage point increase in annual loan growth. Thus, we are able to successfully replicate Gambacorta and Shin's main empirical result using a sample that includes only U.S. commercial banks.

The last two columns of Table 1 report the regression results using the capital surplus and its subcomponents as measures of the adequacy of bank capitalization. The results reported in the third column, indicate that a 1 percentage point increase in the capital surplus is associated with a 0.9 percentage point increase in annual loan growth. In contrast, a 1 percentage point increase in the capital requirement leads to a 0.7 percentage point decrease in bank lending. These results indicate that the positive relationship between bank capitalization and loan growth reported by Gambacorta and Shin hinges on the positive correlation between capital surplus and lending. In other words, banks with higher amounts of capital relative to regulatory requirements are likely to lend more, but an increase in capital requirements will cause banks to lend less.

These results have important implications for the current debate at the Basel Committee in terms of finalizing the changes to Basel IV and, more specifically in the U.S., on whether to include the GSIB capital surcharge into stress tests. The results of this note indicate that the inclusion of the GSIB surcharge in stress tests would increase capital requirements further for the largest bank holding companies and lead to a reduction in loan growth and lower economic growth. ■

⁴ However, we don't use GMM to estimate the model as Gambacorta and Shin because we have a long time-series for each bank in our sample, thus the dynamic panel bias becomes insignificant.