are currently constructing a national panel data set that will examine differences in bank behavior over business cycles and regulatory regimes. However, this initial work does support the contention that the transmission of monetary policy must be considered in the context of regulatory as well as monetary policy shocks.

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Discussion

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The interesting paper by Joe Peek and Eric S. Rosengren is a contribution to the debate over the so-called "lending view" of the monetary transmission mechanism. As I elaborate below, the lending view channel for monetary policy requires that some group of borrowers be "bank-dependent" and that the central bank be able to affect the supply of bank loans through monetary policy. The essential idea put forth by the authors is that comparing loan responses of "capital-constrained" and "capital-unconstrained" banks to changes in monetary policy offers a way to test the second requirement of the lending view.[1]

Following the Peek and Rosengren paper, my remarks are organized around five questions: Is an effect of monetary policy on bank loan supply necessary or sufficient to corroborate the importance of capital-market imperfections in spending decisions? Second, does the authors' model of bank behavior illustrate the lending view? Third, why study lending in the New England region? Fourth, are the empirical tests convincing? Finally, where do we go from here?

Putting the Lending View in Context

Let me begin by characterizing the traditional "money view" of the monetary transmission mechanism.[2] In this view, financial intermedi-

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[1] The other requirement is not addressed in the paper (but see the paper by Himmelberg and Morgan in this volume).

[2] More detailed descriptions of alternative monetary transmission mechanisms can be found in Bernanke and Gertler (1995) and Hubbard (1995b).

aries ("banks") offer no special services on the asset side of their balance sheet. On the liability side of their balance sheet, banks perform a special role; the banking system creates money by issuing demand deposits. Underlying assumptions about borrowers is the idea that capital structures do not influence real decisions. To keep the story simple, suppose that there are two assets—"money" and "bonds." In a monetary contraction, the central bank reduces reserves, limiting the banking system's ability to sell deposits. Depositors must then hold more bonds and less money in their portfolios. If prices do not instantaneously adjust to changes in the money supply, the fall in household money holdings represents a decline in real money balances. To restore equilibrium, the real interest rate on bonds increases, raising the user cost of capital for a range of planned investment activities, and interest-sensitive spending falls.

The search for a richer transmission mechanism reflects two concerns. The "macro" concern is that cyclical movements in aggregate demand appear too large to be explained by monetary policy actions, which have not generally led to large, prolonged changes in real interest rates. This has pushed some macroeconomists to identify financial factors in propagating relatively small shocks, factors that correspond to "accelerator" models that explain investment data relatively well.

The "micro" concern relates to the growing literature studying information imperfections in insurance and credit markets. In this line of inquiry, problems of asymmetric information between borrowers and lenders lead to a gap between the costs of external finance and internal finance. The notion of costly external finance stands in contrast to the more complete markets approach underlying the conventional interest-rate channel, which does not consider links between real and financial decisions.

While a review of this literature is beyond the scope of these remarks, let me mention three common empirical implications. The first is that uncollateralized external finance is more expensive than internal finance. Second, the spread between the costs of external and internal finance varies inversely with the borrower's net worth—internal funds and collateralizable resources—relative to the amount of funds required. Third, an adverse shock to a borrower's net worth increases the cost of external finance and decreases the ability of the borrower to implement investment, employment, and production plans. This channel provides a "financial accelerator" magnifying an initial shock to net worth.

One can extend this argument to include a channel for monetary policy. In the money view, policy actions affect the overall level of interest rates and interest-sensitive spending. The crux of models of information-related financial frictions is a gap between the costs of external and internal finance for many borrowers. It is possible for monetary policy (open market operations or regulatory actions) to affect

this gap. Two such channels have been identified: financial constraints on borrowers (a "balance sheet" channel), and the existence of "bank-dependent" borrowers (the "lending" channel). A significant body of empirical research supports the former channel (see the review in Hubbard 1995a). The latter channel is the one related to the Peek-Rosengren analysis. Specifically, Peek and Rosengren focus on a necessary precondition for the lending channel, namely, that the central bank can affect the supply of bank loans.

Two significant concerns have been raised about the precondition that central bank actions can affect loan supply. The first is the difficulty in identifying exogenous changes in banks' ability to lend. The second is the need to explain why it is costly to substitute nontransactions deposits or new equity for transaction deposits in order to fund loans. I discuss these concerns below in the context of the authors' model.

Model of Bank Behavior

The model of bank decisions presented extends earlier work by the authors. The basic idea is to use balance sheet relationships at a point in time to examine comparative statics (the response of bank loans to changes in the target federal funds rate or to changes in equity capital). Peek and Rosengren stress three predictions. First, capital shocks generate (directionally) different effects on CD borrowing for "constrained" and "unconstrained" banks. Second, policy shocks (changes in the funds rate target) generate (directionally) different effects on loan supply for constrained and unconstrained banks. Third, total deposits in constrained banks do not change in response to a change in the funds rate target, while total deposits in unconstrained banks fall in response to an increase in the funds rate target. The authors argue that capital constraints are a more useful way to group banks than bank size, because the values of model parameters that govern the response of loans to changes in the funds rate target and changes in equity capital likely vary across bank size groups.

The authors need the model really only to establish that an effect of monetary contraction on loan supply is greater for banks with no binding capital constraint than for banks facing a binding capital constraint. This point can be illustrated somewhat more simply and in a way that avoids counterintuitive implications—for example, that loans by constrained banks rise in response to a monetary tightening.[3]

[3] It is the difference in the effects that is important for the subsequent empirical work. The prediction of the model that loans by capital-constrained banks will rise in response to a monetary tightening is an artifact of the assumed form of the securities demand relationship.

To see this, let me reformulate the model articulated by Peek and Rosengren; variable definitions match those in their paper. In the example below, I make two assumptions different from those in the Peek and Rosengren paper: The interest rate on demand deposits is zero, and the loan market is competitive. Banks maximize profits subject to a reserve requirement, liquidity constraint, balance sheet identity, and capital adequacy constraint:[4]

$$\max\ [(r_L L - \theta)L + r_s S - r_D CD] \qquad \text{(Profit maximization)}$$

subject to:

$$R \geq \alpha\, DD \qquad \text{(Reserve requirement)}$$

$$R + S \geq h_0 + h_1\, DD \qquad \text{(Liquidity constraint)}$$

$$R + L + S = CD + DD + K \qquad \text{(Balance sheet identity)}$$

$$K \geq \mu L \qquad \text{(Capital adequacy constraint)}[5]$$

If all constraints bind except the capital constraint, $r_L = \theta + r_D + (r'_D)CD$, where $r'_D = (1/f_1)$ in their model. If $r'_D = 0$ ($f_1 \to \infty$), then the loan rate equals the CD rate; absent increasing marginal costs of CD financing, no scope remains for the lending view. When $r'_D > 0$, banks face a rising marginal cost of CD finance. In the short run, if $(r_L - r_D)$ does not change, the volume of CD borrowing is pinned down; a decrease in reserves of \$1 reduces deposits by $(1/\alpha)$, loans by $(1 - h_1)/\alpha$, and securities by $(h_1/\alpha - 1)$. In equilibrium, the loan-CD spread may change, depending in part on the size of r'_D (or f_1). The bottom line is that when loans and CDs are imperfect substitutes, both $(r_L - r_D)$ and loan supply will be affected by shocks to reserves.

The capital constraint may bind if raising additional equity is costly under asymmetric information. In this case, the liquidity constraint will not bind, because banks hold more securities than required for liquidity (capital constrains the volume of loans). With loans tied down by the capital constraint, changes in the bank's portfolio in response to a change in reserves occur through changes in securities holdings.

While some caution in interpretation is in order (for example, because these exercises ignore dynamics and the possibility of expected future constraints), such simple models illustrate the potential usefulness of capital constraints for tests of whether monetary policy affects bank loan supply.

[4] As do Peek and Rosengren, I abstract from the more complicated structure of capital and leverage requirements in practice.

[5] This assumes a zero capital requirement on securities.

Why New England?[6]

Peek and Rosengren note that Kashyap and Stein (1995) fail to find much of an effect from capital constraints on the lending channel in their analysis of data for the nation as a whole. While capital-asset ratios rose over the late 1980s and 1990s (and through the 1990–91 recession) for the nation as a whole, they fell in New England over the period from 1989 through mid 1991, increasing sharply thereafter. Hence, the New England region may offer a better laboratory for studying the interaction of capital constraints and the lending channel.

While the intuition behind this regional focus is clear, I have a concern: The period of falling bank capital-asset ratios corresponds to a period in which the net worth of many New England borrowers (especially in real estate) is falling, so that it is difficult to isolate a causal link between changes in bank capital and bank lending. I return to this point later.

Empirical Tests and Results

The authors' tests use quarterly Call Report data for New England banks. To measure "capital constraints," they use the presence or absence of a formal regulatory action, supplemented by information on supervisory CAMEL ratings (for example, for institutions about to be closed or merged with other banks). Before discussing the results, two pitfalls in using the data should be acknowledged (as they are by the authors): the shortness of the time period for the constrained bank sample (1989 to 1994), and the use as a control group of an unconstrained bank sample including data from an earlier period (1977 to 1994). With respect to the latter point, a better idea would be to use a control group drawn from other regions in the United States.

The paper's empirical results are presented in its Tables 1 and 2. The results reported in Table 1 examine the response of loans in the constrained and unconstrained subsamples to changes in the federal funds rate target and changes in equity. Loans by unconstrained banks respond more to changes in the federal funds rate target than those by constrained banks, though the differences are not statistically significant. Equity changes have a larger positive effect on loans for the constrained subgroup.

Peek and Rosengren suggest that findings in Table 1 do not support the lending view, but I have two concerns. First, the fact that "total sample" patterns follow "constrained sample" patterns might simply

[6] I am, of course, discounting the explanation that the research program is supported by the Federal Reserve Bank of Boston.

indicate that more loans were made by (large) capital-constrained banks. Second, the test is not really one of the "lending view" but of the relationship between changes in the funds rate and bank lending. More convincing differences between the two groups are observed for changes in equity capital. That capital shocks affect lending by constrained banks is certainly reasonable but, again, this is not a test of the lending view per se.

Table 2 reports results for the longer-period sample of unconstrained banks. In these tests, the change in the federal funds rate target has a negative and statistically significant effect on loans; changes in capital have an insignificant effect on loans. Even this evidence is somewhat difficult to interpret. Large standard errors make it difficult to use the results as a benchmark to compare against Table 1. Again, a comparison of results from different regions might be more fruitful.

The paper concludes noting "evidence that unconstrained banks behaved in a manner consistent with the lending channel." Perhaps. On a narrow level, the standard errors are really too large to make convincing the claim that an increase in the federal funds rate target reduces bank loan supply. On a broad level, neither for Table 1 nor for Table 2 can one be sure that the authors are estimating *loan supply* rather than *loan demand*. Nonetheless, the evidence suggests potentially promising future research with the national panel data set.

Where Do We Go From Here?

Because the "lending view" involves assumptions about capital-market imperfections for both banks and borrowers, more complete tests of the lending view require analysis of banks and borrowers jointly. In an ideal world, data matching borrower, loan, and lender characteristics could be used to sort out "lending view" and "balance sheet view" channels. Short of that, research could focus on two questions. First, are small or low-net-worth borrowers more likely to be the customers of constrained banks? Second, do low-net-worth firms have limited opportunities to substitute credit from unconstrained financial institutions when cut off by constrained financial institutions? Researchers have begun considering these questions,[7] and I suspect we will have much more micro evidence about the validity of the lending view in the near future.

[7] See, for example, Calomiris, Himmelberg, and Wachtel (1995) and Himmelberg and Morgan (1995).

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