

# Bank Credit Standards\*

BY MITCHELL BERLIN

**B**anks' lending standards at times seem too stringent and at other times too lax. The pattern seems to indicate that banks lend more easily in good times but tighten credit standards in lean times. But such a lending pattern may also be attributable to changes in borrowers' default risk over the business cycle or changes in the demand for loans, which rises and falls with GDP. Is there a systematic reason why banks might be too lax or too stringent in their lending? Economists have proposed a number of models to explain a bank lending cycle, including changes in bank capital, competition, or herding behavior. In this article, Mitchell Berlin discusses these models and the empirical evidence for each.

Bankers and the business press often speak of cycles in bank credit standards, periods in which banks' lending standards are too lax, followed by periods in which standards are too stringent. In this view, bank lending policies tend to amplify fluctuations in GDP; easy money during the upturn



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sows the seeds of tight money episodes in the downturn.<sup>1</sup>

But this pattern is also consistent with variations in bank lending driven by changes in borrowers' default risk

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<sup>1</sup>Most observers view the expansion of high-risk mortgage loans between 2004 and 2006 as a particularly dramatic example of a widespread decline in lending standards. While the research on this episode is expanding rapidly, the evidence is too recent to interpret with confidence or to incorporate into this article. Nonetheless, the theories I discuss in this article will certainly be part of a full explanation for the recent financial crisis.

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\*The views expressed here are those of the author and do not necessarily represent the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

over the business cycle or changes in the demand for loans, which rises and falls with GDP. To make sense of the idea of a lending cycle, we must uncover a *systematic* reason for banks to make unprofitable loans in an upturn and to forgo profitable loans in a downturn. I emphasize that the tendency must be systematic to distinguish the idea of a credit cycle from the truism that loans made near the peak of an expansion are more likely to go bad simply because bankers (just like economists and other businessmen) have difficulties predicting downturns.

What is the evidence for an independent effect for changing bank lending standards — that is, a systematic reason why banks might be too lax or too stringent? And what factors might explain this type of behavior? Economists have proposed a number of plausible models of a bank lending cycle, emphasizing changes in bank capital, competition, or herding behavior. To date, only the channel relating changes in bank capital to lending standards has firm empirical support. The available evidence is too weak to give us much confidence in assigning an important role for other theories of bank lending standards.

## WHAT ARE CREDIT STANDARDS?

It is helpful to be a little clearer about what we mean by a change in bank credit standards. Let's begin with a straightforward prescription from investment theory: A profit-maximizing bank should make any loan with a positive *net present value* (NPV). The NPV of a loan is just the

sum of discounted future repayments (principal plus interest) on the loan minus the loan amount. Future repayments must be discounted for two different reasons: First, \$10 in the bank now is worth more than \$10 paid a year from now. After all, the bank could receive a year's interest by purchasing Treasury bills on the \$10 paid back tomorrow. Second, the bank recognizes that the borrower may default in the future, so the bank may never receive some future payments. The firm may have a healthy balance sheet at the time the loan is made; a year from now, the borrowing firm may suffer financial setbacks and may be unable to pay back its loan.<sup>2</sup>

Using this framework, we can define a change in bank credit standards as a change in a bank's loan-granting decisions for some reason other than a change in the NPV of the loan. We can define a credit cycle as a systematic tendency to fund negative NPV loans during an expansion and a systematic tendency to reject positive NPV loans during a contraction. Since banks' lending decisions also involve the pricing and design of loan contracts, a credit cycle might also take the form of a systematic tendency to relax or tighten loan terms by more than would be justified by changes in borrower risk.

Conceptually, it is not too difficult to define a credit cycle. Empirically, it may be much harder to tell whether one has occurred. For example, think about some of the things that happen in an economic downturn. As economic conditions

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<sup>2</sup> To keep the discussion simple, I focus here on the loan-granting decision. Of course, the bank will set the loan rate in light of the probability of default. The bank will also design the loan contract to reduce the likelihood of default and to increase its payments in the event of default by including covenants or requiring the borrower to post collateral.

become more difficult, more firms experience economic difficulties and the probability that a firm will default increases. This reduces the NPV of a given stream of repayments and would probably induce the bank to raise the loan rate, impose new contractual restrictions, or refuse to make the loan at all. While these actions might be interpreted as a tightening of standards by an outside observer or by an aggrieved borrower, credit standards haven't changed according to our definition.

Figures 1a and 1b illustrate the distinction between the effects of a

## **We can define a change in bank credit standards as a change in a bank's loan-granting decisions for some reason other than a change in the NPV of the loan.**

tightening of credit standards and the effects of an increase in credit risk. Figure 1a shows a probability distribution of loan applicants' NPVs. The profit-maximizing rule for a bank is to make a loan as long as its NPV is positive (the sum of the shaded regions). If the bank tightens its credit standards, for example, making only loans with an NPV greater than \$A, the bank will make a smaller number of loans (just the darker region). Figure 1b illustrates the effects of a downturn: Loans become riskier and the distribution of NPVs shifts to the left. But this figure shows a bank that retains the profit-maximizing rule. Note that the number of loans made falls in this case also (from the sum of the shaded regions to just the darker region).

Slightly more subtly, in a downturn many loans often go bad at once. Typically, a bank will charge a borrower a higher loan rate if the borrower is likely to default at the same

time as other borrowers in a bank's portfolio default. To see this, consider a Detroit bank that has a portfolio with a high concentration of loans to auto parts suppliers. This bank is evaluating two prospective loans with identical probabilities of default. One of the loans is to an auto parts supplier, and the other is to a department store. Even though the probability of default is identical for both projects, the bank will not charge the same default risk premium to both. Instead, the bank will charge a higher risk premium for the loan to the auto parts supplier because its performance is more highly

correlated with the rest of the bank's portfolio.

Taking this idea a step further, economists have found that firms' defaults tend to be correlated.<sup>3</sup> Thus, we should not be surprised that a bank would demand a higher premium for default risk in a downturn as compensation for the higher probability that many loans will go bad at the same time. Although the bank has charged borrowers a higher price for bearing risk, this should not be viewed as a change in credit standards.

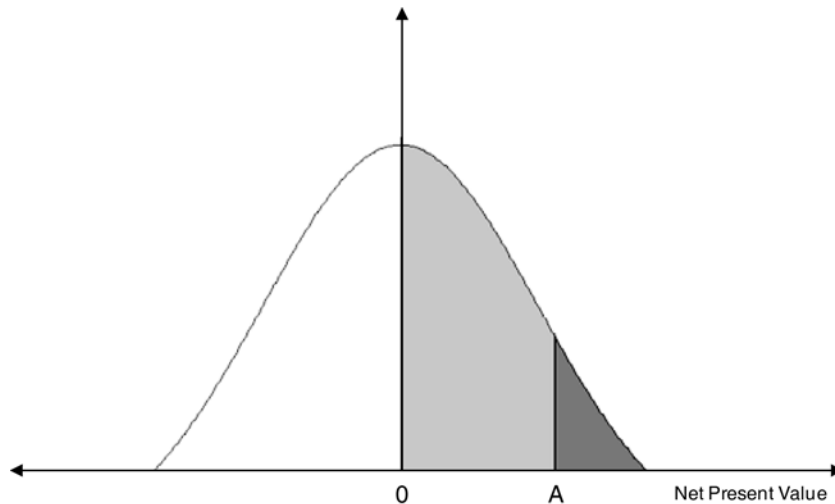
In an economic downturn, nonfinancial firms also cut back on investments in plant and equipment and inventories, and, in turn, they cut back on borrowing. A decline in the demand for loans should certainly not be viewed as a change in bank credit standards.

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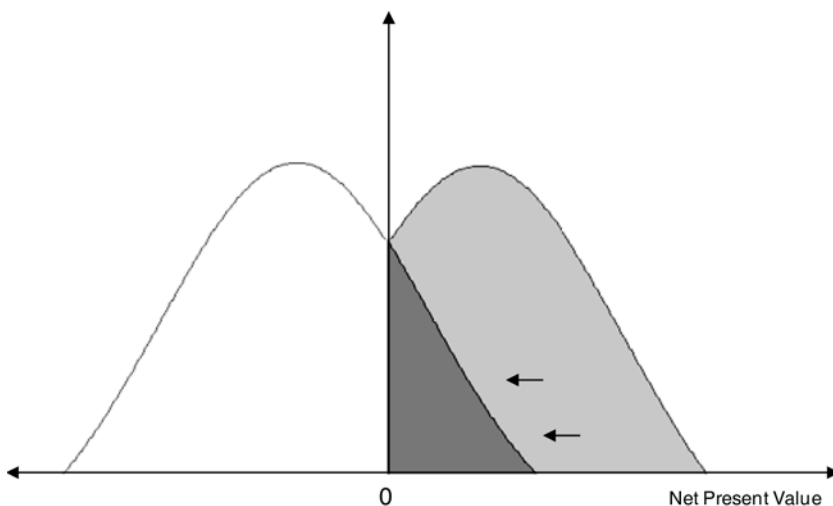
<sup>3</sup> See the article by Sanjiv Das, Darrell Duffie, Nikunj Kapadia, and Leandro Saita.

## FIGURES 1a and 1b

### A Tightening of Credit Standards



### An Increase in Credit Risk



We can see the empirical challenge in identifying an independent effect for lending standards on the quantity of loans. Consider an economic downturn. In a downturn, default risk increases, risks become more correlated, and the demand for loans declines. None of these factors reflects a change in lending standards, but all lead to a decline in the quantity of loans made. To uncover a lending cycle, the researcher must find some way to disentangle the effects of changing lending standards from these other effects.

### THE BROAD FACTS

Economists have documented a number of empirical observations that are broadly consistent with the existence of a lending cycle.<sup>4</sup> The first empirical observation is that declines in bank capital are associated with declines in bank lending. Ben Bernanke and Cara Lown (among many others) have found evidence that large negative shocks to bank capital — such as those experienced by banks in New England at the end of the 1980s — are associated with declines in bank lending. The relationship between capital and lending is a robust empirical finding, but since the weak economic conditions associated with a decline in bank capital are also associated with higher default risk, more correlated risks, and a decline in loan demand, economists have had to be ingenious in providing compelling evidence for the capital channel (as I discuss in the next section).

A second observation is the well-documented *flight to quality*

<sup>4</sup> Note that not all the researchers who made these observations were concerned with lending cycles or with identifying an independent role for bank credit standards.

during economic downturns. For example, William Lang and Leonard Nakamura show that bank portfolios shift from high- to low-risk loans during a downturn; specifically, they show that bank portfolios shift away from loans made above the prime rate.<sup>5</sup> Their finding is consistent with evidence that during a downturn, banks systematically shift their portfolios toward larger borrowers and toward borrowers with pre-existing loan commitments.<sup>6</sup> While these studies shed light on the ways that bank lending may amplify negative economic shocks, the observed portfolio shifts may simply reflect a rise in default risk during an economic downturn, rather than an independent role for lending standards, according to our definition. With a rise in default risk, some borrowers are shut out of public debt markets and shift toward bank borrowing, while bank portfolios shift toward lower risk borrowers.

A third observation is that loan terms vary systematically over the business cycle in a way that may amplify economic fluctuations. Patrick Asea and Asa Blomberg find that commercial loan markups (the spread between the loan rate and the rate on a riskless Treasury security) fall continuously right up to the beginning of a recession. Their interpretation of this finding is that credit standards are excessively easy at the end of an expansion, sowing the seeds of future portfolio problems.

Jianping Mei and Anthony Saunders provide evidence of *trend-*

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<sup>5</sup> Traditionally, the prime rate is defined as the rate offered to a bank's best customers. Loans made above the prime rate are typically made to smaller borrowers and borrowers who do not have access to money market financing.

<sup>6</sup> See the article by Ben Bernanke, Mark Gertler, and Simon Gilchrist for a review of the empirical literature on the flight to quality.

*chasing* behavior by banks. They find that banks increase real estate lending when *past* real estate returns are high, but that bank real estate investments are unprofitable, on average. These results are consistent with a systematic tendency for excessively lax credit standards during an expansion, and they may also be evidence of a tendency for banks to invest in a herd-like manner. However, the evidence from commercial lending and real estate lending markets

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may simply mean that banks have difficulty predicting a downturn (just like everyone else). Thus, banks may continue lending strongly even as the downturn begins.

The most direct evidence for a direct role for bank credit standards comes from survey results. Cara Lown and Donald Morgan analyze the Federal Reserve Board's Senior Loan Officer Opinion Survey, in which bankers are asked periodically whether they changed their credit standards in the previous three months. They are also asked to explain how their standards changed, e.g., changes in collateral requirements, covenants, and loan markups, as well as the underlying reasons for any change. Using a statistical analysis called a vector autoregression (VAR), Lown and Morgan find that changes in credit standards (as measured by survey responses) have a significant effect on both the quantity of bank loans and GDP.<sup>7</sup> Interestingly, changes in GDP do *not* have a significant effect

on lending standards, suggesting an independent role for credit standards. While this is perhaps the most convincing evidence that changes in bank credit standards have an independent effect, Lown and Morgan do not provide evidence that banks systematically choose excessively lax or risky lending standards.

To sum up, there is survey evidence of an independent role for bank credit standards, and a number of empirical observations are broadly

consistent with the existence of a lending cycle. Making further progress requires a theoretical framework that would permit us to disentangle the various effects on banks' lending behavior.

#### **CAPITAL CONSTRAINTS LEAD BANKS TO TIGHTEN STANDARDS**

**Bank Lending Is Limited by Bank Capital.** A wide range of models show that a firm's investments in plant, equipment, and inventories are limited by the firm's capital, i.e., the funds committed by the firm's owners. A bank is just a particular type of firm, but instead of investment in goods and machines, its main investments are loans. While the precise link between capital and investment differs

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<sup>7</sup> In a VAR model, each variable (e.g., change in credit standards, change in GDP, change in loans) is regressed on past values of itself and the other variables. Thus, each variable is permitted to affect the others.

from model to model, the element common to all of them is that *agency problems* limit firms' access to outside funding. In our context, the term "agency problem" refers to a conflict of interest between a firm's insiders — owners and top managers, who are influential in a firm's decision-making — and outside investors — depositors, bondholders, and perhaps small stockholders, who control only their willingness to provide funds.

For example, in Bengt Holmstrom and Jean Tirole's model, the bank's insiders have a choice between carefully monitoring borrowers and avoiding the costs of monitoring.<sup>8</sup> A carefully monitored loan has low risk and positive NPV; a loan that is not monitored has a high risk of default and a negative NPV. The underlying agency problem is that a firm's insiders will forgo monitoring and make high-risk loans unless they receive a sufficiently large share of the total profits.<sup>9</sup> But providing insiders with incentives to monitor limits the share of the returns left over for outside investors, who will refuse to provide funds unless their own expected rate of return is adequate.

The role of bank capital in all this is that a firm's insiders have a stronger incentive to engage in costly monitoring of loans when more of their own funds are at risk, i.e., when bank capital is higher. Outside investors will refuse to provide funds to banks

<sup>8</sup> I am interpreting Holmstrom and Tirole's model in a banking context. Their model is actually cast in more general terms. Bernanke, Gertler, and Gilchrist's article describes some other agency-based models that yield results similar to Holmstrom and Tirole's.

<sup>9</sup> In the Holmstrom and Tirole model, insiders can't promise to monitor carefully or to fund only positive NPV loans because outsiders have too little information about the details of lending decisions to ensure that the promise is kept.

that are not well-capitalized.<sup>10</sup> In Holmstrom and Tirole's model, a bank with insufficient capital may be unable to convince outside investors to fund loans that would have positive NPV if the bank could make a credible guarantee to monitor.

#### When Bank Capital Falls, Banks Tighten Lending Standards.

Loan losses are countercyclical; in particular, in an economic downturn, more borrowers default and loan losses increase (Figure 2). Higher loan losses reduce bank capital, and the availability of outside financing also decreases. In turn, banks may be forced to forgo loans with positive NPV (if properly monitored); that

<sup>10</sup> The concept of capital used in Holmstrom and Tirole's study is often called *net worth* or *economic capital*. This is not exactly the same thing as *regulatory capital*, although net worth corresponds fairly closely to tier 1 capital, which mainly includes equity.

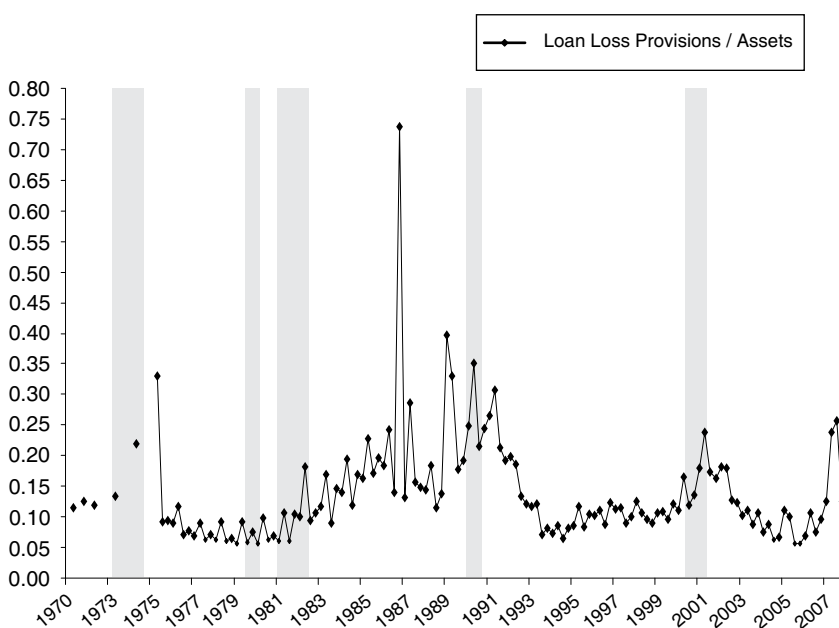
is, banks will have excessively tight lending standards. Most models that focus on the link between capital and the availability of outside funds focus on economic capital, but similar limits on lending arise if regulators limit bank lending when loan losses press banks against regulatory capital requirements.

Note that this model predicts that capital shortages will restrict lending but it doesn't predict that banks would ever have excessively lax credit standards. That is, according to Holmstrom and Tirole, banks will forgo positive NPV loans when access to outside funds is restricted because their capital is low, but high bank capital doesn't increase the likelihood that a bank will make a negative NPV loan.

**Empirical Evidence for the Capital Channel.** A large empirical literature documents the effect of negative shocks to banks' capital

**FIGURE 2**

### Loan Losses Rise in Downturns



Source: Report of Condition



on bank lending. In particular, a number of studies of the 1990-92 credit crunch in the U.S. show that declines in bank capital were systematically associated with declines in bank lending, consistent with the statements of bankers, borrowers, and bank regulators at the time.<sup>11</sup> While consistent with an independent effect for bank capital on lending standards, these studies are not fully convincing because the same factors that led to declines in bank capital also led to a decline in the demand for loans and to a decline in loans' NPV. Specifically, the credit crunch occurred following an economic downturn triggered, in part, by serious downturns in the commercial real estate markets in New England, California, and the Southwest. At a minimum, these studies don't fully disentangle the relative importance of demand effects, changes in credit risk, and declines in bank capital.

Joe Peek and Eric Rosengren's studies of Japanese banks' lending in the U.S., following the collapse in Japanese equity prices in 1989-92 and the precipitous decline in the Japanese real estate market beginning in 1991, provide the most convincing evidence for a significant, independent channel relating capital to lending standards. In these studies, which cover the 1989-96 period, Peek and Rosengren find that U.S. branches of Japanese banks reduced commercial and industrial loans and real estate loans when their parent bank's capital fell.<sup>12</sup> So, for example, the U.S. branch of a Japanese bank operating in New York would

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<sup>11</sup> Joe Peek and Eric Rosengren's articles provide the main references.

<sup>12</sup> They also find a strong negative effect for nonperforming loans. Peek and Rosengren argue that Japanese banks postponed recognizing loan losses, so nonperforming loans may be a proxy for unrecognized loan losses.

reduce its commercial real estate loans in the state when its parent suffered a decline in capital, even though U.S. commercial banks operating in the same state were increasing their commercial real estate loans. Peek and Rosengren's studies provide convincing evidence that the decline in capital was a major cause of the decline in

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lending, because the U.S. banks and U.S. branches of Japanese banks both faced essentially the same local business conditions (default risk and loan demand) in the U.S.

### COMPETITION MAY AFFECT LENDING STANDARDS

Every episode in which lending expands rapidly and loan terms become more lenient is accompanied by statements from bankers and other market players that competition drives them to relax lending standards. For example, a manager at Standard and Poor's, a credit rating agency, explained the growth of "covenant-lite" loans during a fiercely competitive loan market in 2006 as follows: "When you have a lot of money chasing deals, lenders may lose their appetite for

enforcing covenants and are more willing to waive them."<sup>13</sup>

**Competition and the Winner's Curse.** Economic theorists have explored the possibility that aggressive competition might lead to a decline in lending standards. In particular, they have argued that economic booms generate competitive pressures that may induce banks to screen borrowers less carefully. An element common to a number of the theoretical models is a phenomenon that will be familiar to anyone who has purchased a home in a bidding war or won an online auction and worried, "I must have paid too much. If I had offered less, I still would have won." When a bank knows that a successful loan applicant has approached multiple banks, it worries that it has won the firm's business only because other banks have decided that the borrower was not creditworthy. Economists call this effect the *winner's curse*. In these models, banks compete more aggressively when the winner's curse is less serious, as may be true in an economic expansion. Notably, aggressive competition may lead banks to lend without screening some borrowers.<sup>14</sup>

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<sup>13</sup> Quoted in Serena Ng's article.

<sup>14</sup> Not all models of competition and lending standards build on the idea of the winner's curse. For example, Gary Gorton and Ping He's interesting model views a credit crunch as a breakdown in oligopolistic cooperation among banks. In their model, banks shift between periods when they cooperate and perform a normal level of monitoring, and periods in which cooperation breaks down and banks engage in excessive monitoring. Robert Hauswald and Robert Marquez argue that competition reduces market power over repeat customers, thus reducing incentives to monitor. I focus on theories of lending cycles, rather than on theories of the effects of secular changes in competitive conditions — for example, due to regulatory reforms — on banks' incentives to take risks. There is a large, and largely inconclusive, literature on the effects of competitive conditions on risk-taking. For an account of this literature, see Elena Carletti's article.

Martin Ruckes proposes a model of lending booms, in which underlying economic conditions affect bank screening decisions. In his model, borrowers approach multiple banks that can respond in one of three ways: (i) screen the applicant (and make loans only to applicants who appear creditworthy); (ii) reject the applicant out-of-hand; or (iii) make a loan offer without screening.<sup>15</sup>

In a recession, when default risk is high, banks believe that customers are not likely to be creditworthy. Consider a lender's thought process when a borrower applies for a loan and average credit risk is high. Since average credit risk is high, the bank worries that the loan applicant has failed competitors' credit screens. Thus, the bank would never lend without carefully screening loan applicants. Even if the customer passes the lender's screen, the bank still charges a high loan rate because it worries that it has missed something other lenders have noticed. When economic conditions are very poor, the winner's curse can become so severe that banks will simply turn away some borrowers without screening.

During an economic boom, borrowers' creditworthiness improves. Of course, not all borrowers are good risks, but the likelihood that any particular borrower will prove to be creditworthy increases in good economic times. Thus, the winner's curse is less severe, and banks will tend to compete more aggressively for customers. This competition takes an interesting form. In addition to charging a low loan rate to those customers they find to be creditworthy, banks make some loans without screening at all.

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<sup>15</sup> To be precise, lenders may also play *mixed strategies*; for example, a loan applicant may be screened with some probability and given a loan without screening with some probability.

Ruckes's model yields outcomes that look like a credit cycle. In particular, the fierce competition in the upturn yields high loan default rates (because of lax screening) and low expected bank profits. Credit standards are much more stringent in a downturn, and borrowers may be turned away altogether, a model prediction that resembles a flight to quality.

**Empirical Evidence for the Competition Channel.** The evidence for an independent effect for competition is mainly anecdotal. One piece of evidence comes from the Senior Loan Officer Opinion Survey, which asks those bankers who tightened or loosened standards to provide a reason. Respondents typically emphasize competitive factors, even though they are also given the chance to ascribe the change in lending standards to a number of factors reflecting credit risk.<sup>16</sup>

Respondents code their responses, with 1 denoting "not important," 2 denoting "somewhat important," and 3 denoting "very important." So, for example, in the November 2004 survey, respondents ascribed their easing of loan terms primarily to more aggressive competition, with an average score of 2.54. (That is, most respondents said that competitive conditions were either somewhat important or very important.) At the same time, they noted that easier loan terms were also partially due to a more favorable economic outlook, with an average score of 1.87. These responses correspond

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<sup>16</sup> Respondents are given different (nonexclusive) choices to explain why they changed their lending standards, including (i) more (less) aggressive competition from other banks or nonbank lenders; (ii) more (less) favorable or uncertain business environment; (iii) improvement (worsening) of industry-specific problems; and (iv) increased (reduced) tolerance for risk. Choices (ii)-(iv) are all reasonably interpreted as factors related to default risk.

to press reports that competition was heating up in 2004.

While this type of survey evidence provides a fairly accurate indicator of bankers' own views of the forces underlying changes in credit standards, most economists remain skeptical. In particular, without convincing econometric evidence, economists worry that respondents haven't adequately distinguished the relative roles of default risk and competitive pressures that drive their lending decisions. Indeed, Ruckes's model, which emphasizes the close connection between the creditworthiness of borrowers and the aggressiveness of competition, suggests that these will be very difficult to disentangle, not only for econometricians but also for a banker who has made a loan.

## HERDING MAY AFFECT CREDIT STANDARDS

**Reputational Concerns Can Induce Banks to Herd.** Many commentators suggest that lenders' credit standards are interdependent even when they are not competitors; for example, banks often seem to postpone recognizing loan losses until they all jointly tighten standards in a herd-like movement. A famous example is Citicorp's May 20, 1987, announcement that it was increasing loan-loss reserves against its loans to less developed countries (LDC), following a long period in which banks had dealt with their troubled LDC debt either by providing borrowers new funds to pay off old loans or by rescheduling old loans. By the end of June 1987, 32 banks had increased their own loan-loss reserves against LDC debt.<sup>17</sup>

In Raghuram Rajan's model, banks may act this way because bank managers have reputational concerns

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<sup>17</sup> Theoharry Grammatikos and Anthony Saunders discuss this episode in detail.

that lead them to focus on short-term results. For example, top bank managers are more likely to be promoted or recruited by other banks if recent financial results have been strong. In his model, some lenders have superior ability in identifying profitable loans. Crucially for Rajan's analysis, differences in ability matter primarily when loan market conditions are favorable. When economic conditions are good, only the loans originated by high-ability lenders have a low probability of default. However, in a downturn, loans turn out poorly for both high- and low-ability lenders. Also important for Rajan's conclusions, bank managers' information — both about their own portfolio and about general loan market conditions — is superior to that of other market participants.<sup>18</sup>

Consider a lender's decision when he or she discovers that a number of the bank's loans are having serious problems. The lender can recognize losses immediately or relax credit standards — provide new funds or reschedule loan payments — in the hope that the borrower's situation will turn around. By assumption, the bank's profits are maximized by recognizing losses now, rather than by throwing good money after bad.

But the lender is concerned about his or her current reputation, as well as the profitability of the bank's loan portfolio. Concerns about reputation generate a systematic bias toward excessively lax credit standards. Note that unlike Holmstrom and Tirole's model, Rajan predicts that banks have a systematic tendency to make negative NPV loans.

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<sup>18</sup> The assumption that bankers have better information about general loan market conditions may seem unrealistic. However, it is enough that bank managers learn about loan market conditions *before* other market participants for Rajan's model to work.

To see why, think about how market players update their view of a lender's ability when the bank recognizes losses. Loan losses are bad news about the lender's ability when market conditions are good. Unless market participants are quite sure that loan market conditions are unfavorable, the lender's reputation will suffer; that is, market participants will downgrade their view of the lender's ability. To avoid taking a hit to his or her reputation, the lender will knowingly throw good money after bad, unless market conditions are widely viewed to be poor.

But how does this lead to herding behavior? The key is that the lender's reputation also depends on what *other* banks do. If other banks have written down loans, a lender can recognize losses and the market will not judge the lender harshly. Market participants will simply infer that loan market conditions are poor and that all banks are facing a difficult lending environment. But if one bank alone writes down its bad loans, its lender's reputation will take a hit.

Thus, banks have a systematic bias toward lax credit standards because of reputational concerns. But when the economy moves into a downturn, banks ultimately shift toward a strict lending policy as all banks recognize losses in a herd. While a single bank in isolation would choose lax standards in a downturn to avoid taking a negative hit to its reputation, the existence of other banks permits all banks to *jointly* tighten lending standards. In effect, banks achieve a form of coordination; as long as they tighten jointly, market participants assign a high probability of a harsh lending environment.

**Herding Without Reputation.** Other models predict herding behavior in bank credit standards but without reputational effects. In the herding

models described in the article by Sushil Birkchandani, David Hirshleifer, and Ivo Welch, banks place excessive reliance on decisions made by other banks, sometimes overriding the decision they would make based on their own information. How does this work?

Each banker has some useful, but idiosyncratic information about the profitability of a loan. Note that it makes complete sense for one banker to take account of a previous banker's lending decision, since each banker knows that others also have useful information. If each lender could actually observe the information used by previous lenders, lending decisions would become progressively more informed. Each lender would be adding its own information to that of previous banks.

Things are different if bankers observe only the *decisions* made by previous lenders (as is realistic), rather than the *information* on which the decisions were based. In this case, sequential decision-making can lead to what economists call an *informational cascade*. That is, the decisions of previous banks ultimately lead subsequent banks to override their own information. So a bank will rationally follow the crowd even if its own credit analysis suggests that a lending decision is too risky.

Consider an example. First Bank might view an investment in a shopping mall as marginally profitable. The bank's risk managers are actually quite worried about a possible downturn in the real estate market. But a number of First Bank's past commercial real estate investments are maturing and the bank does not intend to replace them. So the lending officers argue that the risk is not so great after all, and First Bank decides to make the loan. Imagine that Second Bank views shopping malls as



a profitable investment and also makes the loan.

Now consider Third Bank's decision. Third Bank has evaluated the shopping mall and decided that it is too risky based on its own cash flow projections. Third Bank has also observed that both First Bank and Second Bank have decided to lend, but the bank is not privy to First Bank's future plans to limit its real estate exposure. On this basis, Third Bank might (rationally) decide to override its own cash flow projections and make the investment anyway.

What about Fourth Bank? Fourth Bank and all subsequent banks will never know that Third Bank's cash flow analysis was negative, only that the bank decided to invest. In this example, had banks shared their information collectively, they might have decided that shopping malls were a negative NPV investment.

#### **Empirical Evidence for Herding.**

While stories about informational cascades abound in the business press, there is, as of yet, no econometric evidence that permits us to distinguish informational cascades from reputational explanations (such as Rajan's), which also predict herding behavior. Also, it is very difficult to distinguish herd-like behavior from instances in which banks act in a correlated way because they share common information or even because of regulatory pressures.<sup>19</sup> That many

banks make similar investments that ultimately turn out badly is not necessarily evidence of herding.


#### **CONCLUSION**

Bankers, business analysts, and economists often speak of a credit cycle, in which bankers adopt excessively lax credit standards in an upturn and excessively stringent credit standards in a downturn. The expansion in mortgage loans,

cycle. In one explanation, banks' lending standards are driven by shocks to bank capital. This explanation has both well-founded theoretical foundations and convincing empirical support. Second, there are also many interesting and plausible models in which competitive conditions can be shown to affect lending standards, but there is little hard econometric evidence that competitive pressures have an empirically significant

### **To date, there is insufficient empirical evidence to support either competition or herding as explanations for lending cycles.**

particularly the growth in low- and no-doc loans in 2006-07, and the widespread cutback in mortgage loans during the financial crisis that followed, is the most recent episode. Broadly, three classes of explanations might generate this type of credit cycle or, at least, some aspects of a

effect. Finally, there are a number of plausible models in which lending standards are driven by herding behavior. In particular, reputational concerns or informational cascades can lead lenders to follow correlated lending strategies, even when loans have negative NPV. To date, there is insufficient empirical evidence to support either competition or herding as explanations for lending cycles. Learning more about the underlying sources of variation in lending standards is an important area for further economic research. A careful examination of the recent episode in credit markets should lead to valuable insights for researchers and policymakers. 

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<sup>19</sup> Viral Acharya and Tanju Yorulmazer argue, for example, that banks may choose correlated investment strategies because they know that regulators will bail out banks when a large number of banks fail at the same time. To explain their finding that banks' real estate investments reflect trend chasing, Mei and Saunders suggest that bank regulation may lead to correlated investment strategies. They argue that once examiners have permitted one bank to make an investment, others can follow.

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