

Bank Credit Standards*

BY MITCHELL BERLIN

Banks' 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

sows the seeds of tight money episodes in the downturn.¹

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

¹Most 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.

*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



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www.philadelphiafed.org/research-and-data/publications/.

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.²

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

² 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

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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.

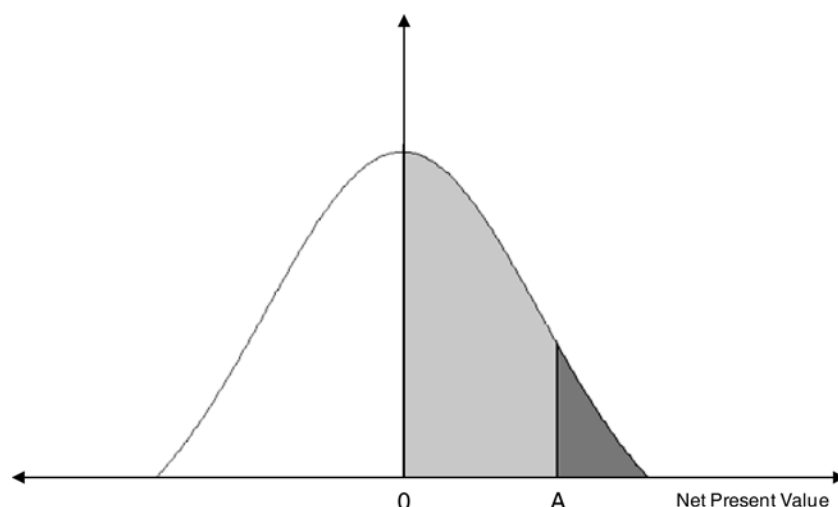
Taking this idea a step further, economists have found that firms' defaults tend to be correlated.³ Thus, we should not be surprised that a bank would demand a higher premium for default risk in a downturn as compensation for the higher probability that many loans will go bad at the same time. Although 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.

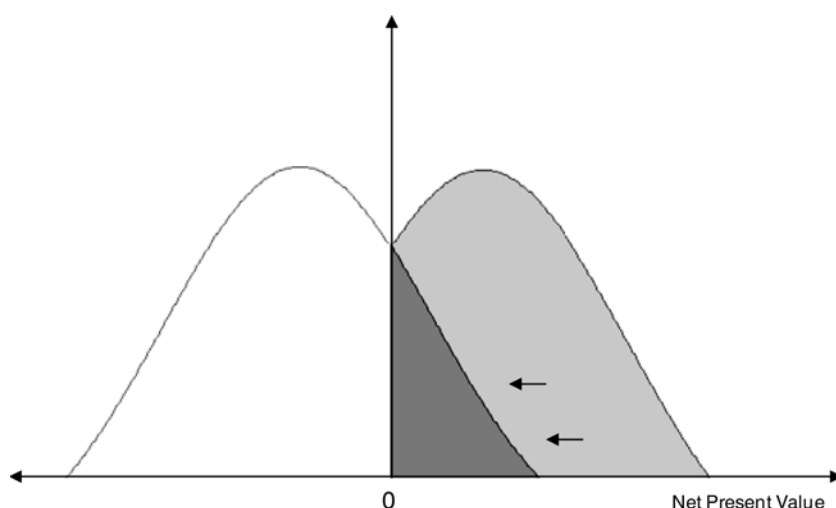
³ See the article by Sanjiv Das, Darrell Duffie, Nikunj Kapadia, and Leandro Saita.

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.⁴ 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*

⁴ 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.⁵ 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.⁶ 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-*

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

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

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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.⁷ Interestingly, changes in GDP do *not* have a significant effect

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

⁵ 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.

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

⁷ 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.⁸ 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.⁹ 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

that are not well-capitalized.¹⁰ 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

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

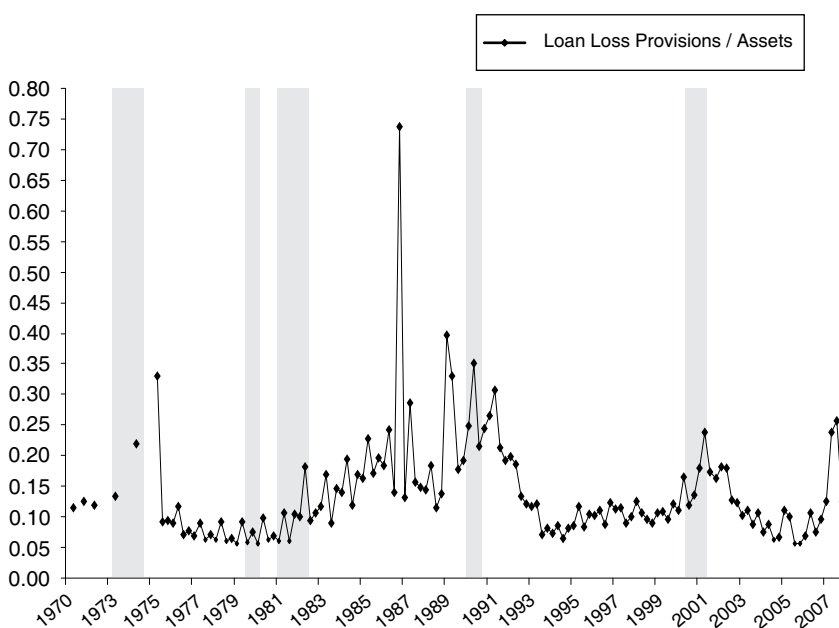
¹⁰ The concept of capital used in Holmstrom and Tirole's study is often called *net worth* or *economic capital*. This is not exactly the same thing as *regulatory capital*, although net worth corresponds fairly closely to tier 1 capital, which mainly includes equity.

⁸ 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.

⁹ 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.

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.¹¹ 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.¹² So, for example, the U.S. branch of a Japanese bank operating in New York would

¹¹ Joe Peek and Eric Rosengren's articles provide the main references.

¹² 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."¹³

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.¹⁴

¹³ Quoted in Serena Ng's article.

¹⁴ 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.¹⁵

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.

¹⁵ 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.¹⁶

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

¹⁶ 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.¹⁷

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

¹⁷ 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.¹⁸

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.

¹⁸ 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.¹⁹ 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. 

¹⁹ 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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Regulating Short-Sales*

BY RONEL ELUL

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hort-selling, the practice of selling a security the seller does not own, is done in an attempt to profit from an expected decline in the price of the security. During the recent financial turmoil, many press accounts blamed short-selling for declines in stock prices and even for the collapse of some firms. In this article, Ronel Elul discusses the issue of short-selling. He notes that research has shown that short-selling plays a valuable role in setting accurate prices for securities but that it can also be used to facilitate market manipulation. This latter consideration may provide justification for restricting short-sales under certain circumstances.

During the recent financial turmoil, many press accounts blamed short-selling for declines in stock prices and even for the collapse of some firms. Regulators in many countries responded by restricting or banning short-sales. This critical attitude to short-selling has been a feature of many financial crises, including the stock market crash of 1929 and even the collapse of the South Sea Bubble in 1720.



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Short-selling, or “shorting,” is the practice of selling a security or other financial instrument the seller does not own, in the hope of repurchasing it later at a lower price. This is done in an attempt to profit from an expected decline in the price of the security.¹ Since the investor does not own the security he is shorting, he must typically borrow (or, rather, “rent”) it

¹ This is not the only way to profit from declines in the price of an asset. Depending on the security in question, an investor may also be able to enter into a short futures contract, which locks in the price at some future date, or to buy a put option, which allows the holder of this option to sell an asset at a specified price in the future. In either of these cases, the investor will profit if the market price ends up below the price he has locked in.

*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.

from someone who does own it. Thus, short-selling is closely linked to the *securities lending* market.

Economists who have studied short-selling have shown that it plays a valuable role in setting accurate prices for securities and in aggregating dispersed information. However, they have also shown that it can be used to facilitate market manipulation. This may provide a justification for restricting short-sales under certain circumstances.

KEY FEATURES OF A TYPICAL SHORT-SALE

Suppose that shares in Highflrier, Inc. currently sell for \$10 a share. An investor believes that the stock is overvalued and would like to profit from this by selling Highflrier short. He borrows 100 shares and then immediately sells them for a total of \$1000. This transaction is typically intermediated through the investor's brokerage house, which buys and sells the securities on his behalf and also often arranges the loan of the shares.

If the investor is correct and the price later falls to \$8 a share, the investor would then buy 100 shares back for \$800, return the shares to their original owner, and make a \$200 profit (minus the transaction fees for borrowing the shares). This practice has the potential for losses as well. For example, if the shares of Highflrier in fact went up to \$25, the short-seller would have to buy back all of the shares at \$2500, losing \$1500.²

² Since the lender often retains the right to “recall” the security, as discussed below, the short-seller may not be able to wait for the price to go back down.

Margin Requirements. The short-seller cannot simply pocket the \$1000 he receives from selling the stock. Rather, Federal Reserve Regulation T requires the short-seller to deposit 150 percent of the proceeds into his *margin account*. In our example, this means the \$1000 proceeds of the short-sale, together with another \$500 (in cash or securities). This margin is designed to protect the broker from losses due to failure by the short-seller to return the security.³ In addition to this *purchase margin*, most exchanges also impose a *maintenance margin* of 25 percent; that is, at any point in time, the value of the margin account must be at least 125 percent of the current value of the securities that have been borrowed. For example, if the stock price rises to \$13 per share, the short-seller would need to add another \$125 to his margin account in order to meet the maintenance margin requirement and avoid having his position closed out.⁴ These margin requirements are costly, since the money cannot be used for other purposes and the short-seller often does not accrue any interest on his margin account. (A valued customer might receive some interest, but typically it will be at below-market rates.)

The Securities Lending Market. Where are the borrowed shares obtained? In the simplest case, the brokerage houses may be able to lend other customers' shares, when those customers have bought their stock on

³ This is most likely to occur if the price of the stock goes up, since, in that case, the short-seller would need to come up with additional cash in order to close out his position.

⁴ Since he initially deposited \$1500 in his margin account, and the securities he has borrowed are now worth \$1300 (so the margin requirement is 125 percent of this, or \$1625).

margin.⁵ If the broker does not have the particular security in its inventory, however, it must turn to outside sources. Institutional investors such as mutual funds, pension funds, and insurance companies often lend shares in their portfolios to short-sellers.⁶ This is particularly attractive for them, since they generally do not anticipate needing to sell those shares. However, they typically retain the right to "recall" the shares at any time.⁷

Institutional investors such as mutual funds and pension funds often lend shares in their portfolios to short-sellers.

The borrowed shares do not come free. The broker will deposit part of the margin that the short-seller posted as collateral with the lender. The interest rate received on this collateral is typically below market interest rates, and this represents the opportunity cost of borrowing the security. This cost is borne by the short-seller because it reduces the interest he receives on the cash in his margin account (if any). Moreover, if the cost of borrowing shares is sufficiently high, not only will the short-seller receive no interest, but he may actually have to pay a fee to borrow the securities.

⁵ Buying on margin means borrowing money (typically from one's broker) in order to buy securities. The securities thus purchased remain in the buyer's margin account, since they serve as collateral for the loan and so are available to the broker for lending.

⁶ This is typically done through "custodian banks," which hold the institutional investors' shares.

⁷ Pension funds and mutual funds are in fact required to retain the right to recall the securities, according to the provisions of the Employee Retirement Income Security Act (ERISA) and the Investment Company Act, respectively.

Christopher Geczy, David Musto, and Adam Reed document costs in the securities lending market. They find that if the security is not in particular demand by short-sellers, the difference between the market interest rate and that paid on the collateral is small (typically less than 20 basis points). However, if the security is in high demand, the cost of borrowing it may be rather high; that is, the interest rate received by the short-seller will be very

low. In this case the stock is said to be "on special." Geczy, Musto, and Reed find that, on average, about 7 percent of stocks are on special at any one time. For example, companies involved in mergers often tend to be expensive to short.⁸ In addition, new issues (IPOs) are also not infrequently on special. Furthermore, sometimes it may be virtually impossible to borrow the shares of a particular company – which makes short-selling infeasible.⁹ This inability to short-sell may occasionally lead to a striking mispricing of these stocks, as we discuss below.

Naked Short-Selling. According to the Securities and Exchange Commission's (SEC) regulation SHO,

⁸ In particular, the acquiring company is often on special. The reason is that a standard "merger arbitrage" strategy — often practiced by hedge funds — involves buying shares of the target and shorting shares of the acquirer (since in a successful merger the target's shares commonly rise, and the acquirer's fall).

⁹ This may occur particularly for certain new issues. One reason is that the underwriters (the investment banks that helped issue the stock) are not permitted to lend out the stock for 30 days following the IPO. Also, many IPOs involve the issue of a relatively modest amount of shares.

a broker-dealer¹⁰ cannot accept a short-sale order unless he has “reasonable grounds” for believing that the security can be borrowed; this is known as “locating” the stock.¹¹ But what if the short-seller has not actually located the shares? Or does not actually borrow those shares (because they are expensive)? This is known as *naked short-selling*. Such a strategy may be attractive if the shares are difficult (i.e., expensive) to borrow. If the short-seller obtains and delivers the shares by the settlement date (within three days of the sale, in the U.S.), the naked short-sale is essentially invisible. A naked short-sale may become apparent, however, if the short-seller fails to deliver the stock in time, either by design or due to circumstances beyond his control. Failing to deliver imposes two costs on the short-seller. First, the seller does not receive the sale proceeds (and so forgoes interest). Second, if the buyer demands the physical shares, the seller may be “bought in” immediately.¹² That is, the security will be purchased on the open market by the broker on behalf of the buyer (typically at an unattractive price).

Since naked short-selling can, in principle, lead to the level of short-selling exceeding the actual number of

shares outstanding, some executives of troubled companies have charged that it can also facilitate manipulation.¹³ As discussed below, the SEC has sought to restrict naked short-selling in recent years.

On the other hand, in some cases naked short-selling can in fact facilitate

Company. This pattern — the collapse of a share-price bubble followed by attempts to prohibit short-selling — has repeated itself many times. In another example, England banned short-sales in 1733, following the collapse of the South Sea Bubble.¹⁶

In the United States, the

In the United States, the stock market crash of 1929 led to public attacks on short-sellers, a strident defense by the New York Stock Exchange, many years of congressional hearings, and new regulation.

market liquidity. Market makers¹⁴ in particular will often engage in a modest amount of naked short-selling, since they must stand ready to sell shares even if there is a limited supply of those shares. In recognition of their role, market makers are exempt from some of the requirements to locate a lender before shorting a stock.

REGULATING SHORT-SALES

We have referred to short-sale restrictions, but what form do these regulations take in practice?

History of Short-Sale Regulation. Among the first countries to restrict short-sales was Holland,¹⁵ which banned them in 1610, following the collapse of shares in the East India

stock market crash of 1929 led to public attacks on short-sellers, a strident defense by the New York Stock Exchange,¹⁷ many years of congressional hearings, and new regulation. One example of this new regulation was the Federal Reserve’s power to set margin requirements.

Another important regulation first adopted during that period was the *uptick rule*, which restricted short-selling to taking place only at an “uptick,” that is, at a price above the previous trade’s price.¹⁸ That is, short-selling was not permitted in a falling market. The uptick rule was adopted by the SEC in 1938 and remained in force until 2007. It was a response to allegations that *bear raids* contributed to the 1929 crash. A bear raid is a strategy in which a trader (or group of traders) attempts to force down the

¹⁰ A broker-dealer is a company or other organization that trades securities for its own account or on behalf of its customers. Although many broker-dealers are independent firms solely involved in providing broker-dealer services, others are business units or subsidiaries of commercial banks, investment banks, or investment companies.

¹¹ The “locate” rules were originally instituted by the various exchanges. In 2004 the SEC adopted Regulation SHO, which instituted a uniform locate requirement, and as discussed below, the SEC has recently tightened these rules further.

¹² See the paper by Richard Evans, Christopher Geczy, David Musto, and Adam Reed for more details on fails and buy-ins.

¹³ This criticism of short-selling was also made following the crash of 1929 (see the book by J. Edward Meeker). See also the discussion of Owen Lamont’s paper, below.

¹⁴ A market maker is an individual or firm that quotes prices for a security and stands ready to buy and sell (modest amounts) for its own account on a regular basis at those prices. Market makers in equity options also sometimes short-sell the underlying stock, to either hedge or close out a position.

¹⁵ See the book by Meeker for further discussion of the history of short-sale regulations up until the 1930s.

¹⁶ The law remained in force until 1820 but had little effect on actual market practice.

¹⁷ In particular, Meeker (who was economist to the New York Stock Exchange) explicitly dedicated his 1932 book to the defense of short-selling.

¹⁸ More precisely, a short-sale was permitted at the same price as the previous trade if that previous trade itself represented an uptick.

price of a stock, for example, to cover a short position. This can be done by spreading negative rumors about the target, or alternatively, the traders take on very large short positions, with the large volume of selling itself causing the price to fall. Allegations of bear raids have also been made in the current financial crisis.¹⁹ Even the SEC cited the “market impact of rumors” preceding the collapse of Bear Stearns in enacting its short-sale restrictions in 2008.

Recent Restrictions on Naked Short-Selling and Failures to Deliver.

In recent years, the SEC has enacted rules to restrict naked short-selling and failures to deliver. Regulation SHO (enacted in 2004) instituted a requirement for short-sellers — other than market makers — to be reasonably certain that they have “located” a lender of the stock. In 2008, in response to the financial crisis, these regulations were tightened further. Currently, they (i) require short-sellers in 19 financial stocks to actually *enter* into an agreement to borrow shares before short-selling,²⁰ (ii) explicitly prohibit market participants from deceiving others regarding their ability to borrow or deliver stock by the settlement date,²¹ and (iii) require all “fails” to be closed out on the first trading day following the settlement date.²²

Other Recent Restrictions.

During the recent financial turmoil, many countries have instituted

outright bans on short-selling stock. In the U.S., on September 19, 2008, the SEC temporarily prohibited short-selling for nearly 1000 stocks whose business related in some way to the financial sector.²³ The ban was unpopular and was allowed to expire after less than a month. Many other countries also banned short-sales of at least some stocks around the same time.²⁴ The SEC also

Another outcome of the current crisis has been a decline in the amount of securities available for borrowing.

recently instituted a requirement that investment managers (including hedge funds) must report their short-sales.²⁵

Another outcome of the current crisis has been a decline in the amount of securities available for borrowing. Some institutional investors have announced that they have curtailed securities lending programs, either because of bad publicity (from accusations that short-sellers were manipulating financial stocks) or because of losses realized from their lending activities.²⁶

²³ Release number 34-58592.

²⁴ For example, the UK, Australia, Korea, and Taiwan. Most of the countries that imposed bans eliminated or relaxed them within several months, although Australia's ban was extended at least through March 2009.

²⁵ On September 18, 2008, the SEC required institutional investment managers with assets under management of at least \$100 million (including hedge funds) to report their short-sales weekly; this requirement is set to expire on August 1, 2009. Meeker notes that a similar reporting requirement was instituted by the NYSE during the First World War.

THE POSITIVE ROLE OF SHORT-SALES

Despite the public appetite for short-sale regulations, economists have shown that short-sales play an important role in financial markets and that restricting them may have negative effects.

Short-Sale Constraints and Overvaluation. One of the first to argue that restricting short-sales can lead to overvaluation of securities was Edward M. Miller. In particular, Miller showed that if short-selling is restricted and investors have different opinions about the underlying value of the security, its price does not reflect the beliefs of all potential investors but only the opinion of the most optimistic ones. This, he argued, will tend to bias the price of the stock upward. The reason is that those investors who value the stock less are limited in their ability to act on their beliefs when short-selling is not possible.

Aside from restrictions on short-selling, another key assumption that Miller makes is that investors have different beliefs: Some are innately optimistic about the firm, while others are pessimistic. Note that this is not just a matter of the optimists having different information about the firm than the pessimists. There is some empirical support for this connection between differences in opinions and overvaluation. A study by Karl Diether, Christopher Malloy, and Anna Scherbina finds that stocks for which there is wide dispersion in analysts' forecasts subsequently tend to perform badly, perhaps reflecting overpricing at the time of the forecasts.

²⁶ As reported in the *Wall Street Journal* on October 20, 2008, the losses were incurred because the banks that were managing the programs invested the cash collateral in securities backed by subprime mortgages.

¹⁹ See, for example, the article “Bringing Down Bear Stearns” in the August 2008 issue of *Vanity Fair*.

²⁰ An “emergency order” promulgated in release number 34-58166 (July 15, 2008).

²¹ SEC Rule 10b-21.

²² SEC Temporary Rule 204T, effective from September 18, 2008 – July 31, 2009. Prior to this, broker-dealers had 13 days in which to close out fails.

In another study, Michael Harrison and David Kreps argue that the overvaluation may be even more dramatic than that suggested by Miller. They show that restricting short-sales will lead the price of the security to *exceed* the valuation that even the most optimistic investor attaches to it today. The reason is that investors anticipate that, at some point in the future, *someone else* may be even more optimistic about the stock than they are. This is even true for the investor who is most optimistic about the stock's fundamental value *today*.²⁷ He knows that he may be able to sell the stock for more than its fundamental value at some point in the future, and thus he will be willing to pay a little bit more than this value *today*. As for Miller, restrictions on short-sales are necessary for this to occur because otherwise those investors who believe that the asset is currently priced above its fundamental value would sell it short. Like Miller's model, Harrison and Kreps's model also assumes that investors disagree about the value of the asset.

But why would investors disagree about the value of the security? Neither Miller nor Harrison and Kreps specify the reasons for this. However, José Scheinkman and Wei Xiong suggest that one reason may be investor overconfidence. In particular, if investors put more weight on their own information than on others', they may form different opinions about the value of the asset, even when evaluating the same information. Scheinkman and Xiong then show that this can lead to overpricing.

Owen Lamont and Richard Thaler present several cases of

overvaluation facilitated by difficulty in short-selling. One very prominent example is that of Palm and 3Com. On March 1, 2000, 3Com sold a small (5 percent) stake in its subsidiary Palm through an initial public offering (IPO) while retaining the rest (this is an example of an *equity carve-out*). The company also announced that it would give the remaining Palm shares to 3Com shareholders by the end of the year in a *spin-off*; in particular, each 3Com shareholder would receive

of $[95 \times 1.5] - 82 = \$60$ today, with a further possible profit from the residual 3Com value after the remaining Palm shares were spun off.

Arbitragers were not able to exploit this mispricing because, as a practical matter, it was very difficult to borrow Palm shares. Thus, the frenzy for tech stocks allowed this overpricing of Palm shares to persist for months.²⁹ However, Geczy, Musto, and Reed argue that Palm is an unusual case. They show that most tech stocks

If investors put more weight on their own information than on others', they may form different opinions about the value of the asset, even when evaluating the same information.

approximately 1.5 shares of Palm. This transaction is illustrated in the figure on page 16.

How did the market price this transaction? On the day of the IPO, Palm closed at \$95 a share, while 3Com closed below \$82. That is, even though each 3Com shareholder had the right to receive 1.5 shares of Palm, 3Com shares traded well below Palm's. This meant that the implied value of 3Com, less the Palm shares that were to be distributed, was actually negative!²⁸ Clearly, Palm's shares were vastly overpriced relative to 3Com's.

How could one exploit this overvaluation? If short-selling Palm were possible, there would be a clear profit opportunity: to buy one share of 3Com and short 1.5 shares of Palm, and use the Palm shares received (by the end of the year) to close out the short position. This would give a profit

were not that difficult to short in practice, and so this cannot provide an explanation for the broad-based tech-stock bubble of the late 1990s.

In another paper, Owen Lamont examines a sample of 300 firms that tried to fight short-selling, for example, by publicly attacking short-sellers or by taking legal action. He shows that their stock prices tended to subsequently perform worse than the market, which also suggests overvaluation may be facilitated by impediments to short-selling.

Short-Sale Constraints and the Revelation of Information. A key role of prices in financial markets is to aggregate dispersed information.³⁰ For example, if an investor has negative information about a company's prospects, he may short-sell that stock

²⁷ The *fundamental value* of a security may be defined as the present value of the security's future cash flows.

²⁸ As Lamont and Thaler point out, this is particularly surprising given that 3Com had ample holdings of cash and profitable ongoing operations.

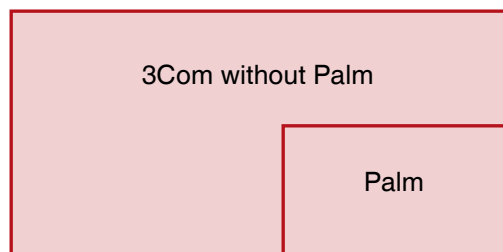
²⁹ Lamont and Thaler show that this overpricing did diminish over time and in most cases was eliminated by the time the actual date of the distribution was announced.

³⁰ An early exposition of this idea is featured in Friedrich Hayek's critique of socialism.

FIGURE

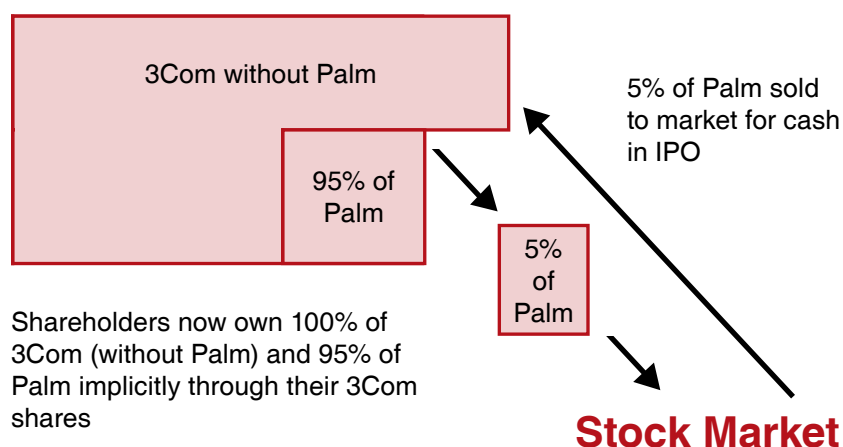
The Palm Equity Carve-Out

Company before carve-out (February 28, 2000)



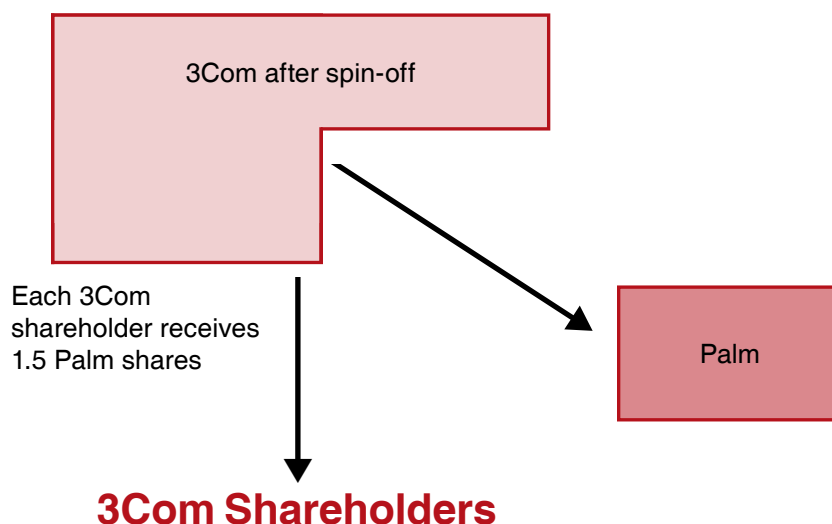
Shareholders implicitly own 100% of Palm through their 3Com shares.

Company following carve-out (March 1, 2000)



Shareholders now own 100% of 3Com (without Palm) and 95% of Palm implicitly through their 3Com shares

Company after spin-off (Before year-end)



if there are no restrictions on short-selling. In order to clear the market, the stock price must fall, and this will alert other investors to the fact that the company may be troubled. As Douglas Diamond and Robert Verrecchia demonstrate, this role may be compromised by short-sale restrictions.

Diamond and Verrecchia show that even if short-sales are restricted, prices will not be biased upward; that is, shares will not be overvalued (unlike in the studies by Miller and Harrison and Kreps). The reason is that in Diamond and Verrecchia's model, investors differ only in the information they possess. They are all equally innately optimistic (or pessimistic) about the company's prospects and — had they all had access to the same information — would all come to the same conclusion about the firm's value. While constraints on short-selling do affect the ability of those investors who possess negative information to trade on that information, market participants understand this. So when the market observes thin trading, it will infer that there is a reasonable chance that negative information exists concerning this stock; this will lead to a reduction in its price.

Nevertheless, Diamond and Verrecchia point out that since lack of trade is a less informative signal of low firm quality than actual selling pressure, short-sale constraints will have a negative effect on the *speed* of information transmission: They slow the rate at which information becomes public. Although Diamond and Verrecchia do not model this, this slow transmission of information could lead to inefficient investments by allowing bad firms to survive for longer than they should.

In a recent paper, Arturo Bris, William Goetzmann, and Ning Zhu

compare stock market regulation around the world and find that prices do indeed seem to incorporate negative information more slowly in those countries where short-sales are either not allowed or not practiced, providing empirical support for Diamond and Verrecchia's model.

WHEN DOES RESTRICTING SHORT-SALES MAKE SENSE?

The models presented above highlight the important role played by short-sales. Nevertheless, we do see cases in which governments restrict them. What might be the rationale for doing so?

A paper by Itay Goldstein and Alexander Guembel provides one possible justification for short-sale restrictions.³¹ Their work can be viewed as a model of bear raids, and it also provides an explanation of why restricting short-sales will prevent such raids. They argue that restricting short-sales can prevent manipulation of stock prices by investors. The reason is that, by selling large amounts of stock, a short-seller can force the price of the firm down, because other investors (who are not fully informed about the firm) may interpret this selling pressure as reflecting negative information about the firm's prospects. Once the price has fallen, the short-seller can

close out his position at a profit; thus to the extent that this strategy is self-fulfilling, it will be profitable for the short-seller.


The particular case they study is one in which the low stock price may convince the firm's management that its prospects are poorer than they previously believed, so that the firm forgoes profitable investment opportunities, thereby lowering its value. However, they also discuss another interpretation of their model, one in which the low stock price affects the firm's access to other sources of financing (for example, investors may be reluctant to extend the firm credit or may demand more collateral on outstanding derivative contracts) and may thus force the firm into bankruptcy. This interpretation formalizes the view — expressed in the popular press — that bear raids may have contributed to the recent collapse of some financial institutions (such as Bear Stearns).

Intuitively, this provides a rationale for restricting short-sales. In addition, Goldstein and Guembel point out that, rather than banning short-sales altogether, it may be better to make them more costly in some manner. The reason is that in their model short-selling is more profitable for those who truly have negative information about a firm than for those attempting to manipulate its stock price. Thus, the latter group may be discouraged when short-selling becomes more expensive, without

undermining the market's role in aggregating information about the firm. This is not discussed in their article, but many current regulations have this effect, such as the less favorable tax treatment of short-sale profits (they are considered income rather than capital gains), and restrictions on naked short-selling (since, as we have seen, borrowing stock can be costly).

CONCLUSION

Short-selling plays a valuable economic role in preventing overvaluation of securities and facilitating the incorporation of negative information about a company into its stock price. This role is supported by empirical studies.

But under certain conditions, short-selling can also be used to manipulate the market. By selling large amounts of stock, a short-seller may be able to convince other investors and lenders that the company's prospects are poor, thereby shutting off its access to outside financing and forcing it into bankruptcy. This also provides an argument for regulations that make short-sales more costly or difficult, since such costs make manipulation more difficult, while still allowing those with truly negative information about the company to profit. Further work is also needed on evaluating the tradeoff between the positive and negative effects of these regulations, as well as on better understanding the securities lending market. 

³¹ See the article by Yaron Leitner for further discussion of Goldstein and Guembel's model.

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Residential Housing And Personal Bankruptcy*

BY WENLI LI

Bankruptcy filings are on the rise, and millions of households have either lost their homes to foreclosure or are on the verge of losing them. One subject of debate amid this rising number of bankruptcies is how personal bankruptcy laws deal with residential housing. This subject centers on two main issues: First, how do personal bankruptcy laws affect the availability of mortgages and the terms on which borrowers obtain mortgages? Second, how do personal bankruptcy filings affect the outcome of mortgage foreclosures? In this article, Wenli Li discusses these questions and examines the economic literature to shed some light on the legislative and policy debates that are likely to recur after the current crisis is over.

The subprime mortgage crisis that started in late 2006 has caused a sharp correction in the U.S. housing market. By the second quarter of 2008, real housing prices had dropped for four consecutive quarters, year over year, according to the Federal Housing

Finance Agency house price index.¹ Meanwhile, lenders have tightened credit conditions by either charging higher rates or denying credit to those who would have gotten credit before the crisis. As a result, many

¹ The Economic Recovery Act of 2008, which was enacted on July 30, 2008, established the Federal Housing Finance Agency (FHFA) by combining the Office of Federal Housing Enterprise Oversight (OFHEO) and the Federal Housing Finance Board (FHFB). The legislation calls for OFHEO and the FHFB to be abolished one year from the date of enactment.

*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.

households, especially those whose adjustable mortgage rates are scheduled to increase, are struggling to pay their bills. Bankruptcy filing rates have gone up – following the sharp rise and even sharper decline that accompanied the 2005 changes in the bankruptcy law – and millions of households have either lost their homes to foreclosure or are on the verge of losing them (Figure 1).

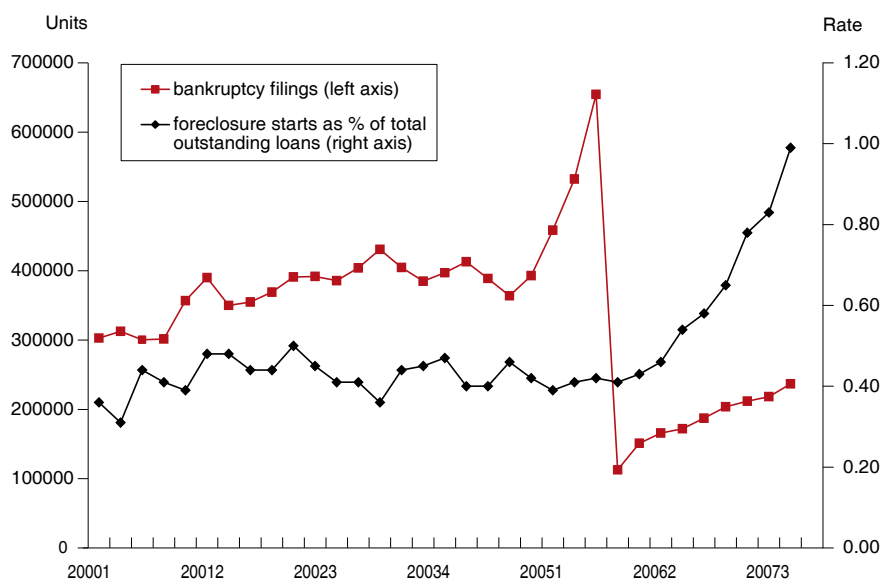
One subject that has received some attention, particularly from policymakers, as a result of the current crisis is how personal bankruptcy laws deal with residential housing. Although the Housing and Economic Recovery Act of 2008 does not contain direct changes to the current personal bankruptcy laws, proposals to reform bankruptcy laws were a central part of the debate. For instance, the Helping Families Save Their Homes in Bankruptcy Act, introduced in October 2007 but not included in the final law, amends the federal bankruptcy law to permit a bankruptcy plan to modify the mortgages of certain debtors and to provide for payment of such a loan at a fixed annual interest rate over a 30-year period.

There are two main issues concerning residential housing and personal bankruptcy law. One is how personal bankruptcy laws affect the availability of mortgages and the terms at which borrowers obtain their mortgages. The other is how personal bankruptcy filing affects the outcome of mortgage foreclosure. Economists have studied both issues, though the first issue has received somewhat more attention in the economic literature. Although the literature hasn't yet



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FIGURE 1**Bankruptcy and Foreclosure Starts**

achieved complete agreement on either question, it does shed some light on the legislative and policy debates that are likely to come up again after the dust settles somewhat on the current crisis.

EFFECT OF PERSONAL BANKRUPTCY LAWS ON AVAILABILITY AND PRICE OF MORTGAGES

There are two broad categories of household debt. Secured (collateralized) debt allows creditors to reclaim the collateral if the debtor defaults on the loan. The main examples of secured debt are mortgages and automobile loans. Unsecured debt – mainly credit card debt and installment credit – has no collateral that creditors can seize. Foreclosure laws govern the default on secured mortgage loans and are unique to each state. (See *The Foreclosure Process* for a

short description of the main features of state foreclosure laws.) However, consumers can forestall foreclosure by electing bankruptcy, which is governed by the federal bankruptcy code.

Personal Bankruptcy Laws.

There are two separate bankruptcy procedures: Chapters 7 and 13. The two chapters differ in that debtors who file under Chapter 7 are obliged to repay debt out of their assets, to the extent that their assets exceed predetermined exemption levels. Debtors who file under Chapter 13 are obliged to repay debt out of their income over a period of time after deducting reasonable living expenses.

Personal bankruptcy is governed by federal law, and there are separate federal exemption levels for the household's homestead (home equity in residential housing) and nonhomestead or other personal property (jewelry, furniture, savings,

and so forth). States also set their own exemptions. While some states allow filers to opt out of the state exemptions for federal ones, other states disallow the use of federal exemptions. As mentioned above, Chapter 7 filers surrender all of their assets above the exemption levels in exchange for the discharge of their remaining unsecured debt not covered by the asset seized. Exemptions also have significance in Chapter 13 through the "best interests of the creditors" test, which states that creditors are entitled to receive at least as much in Chapter 13 as they would have received in Chapter 7. Thus, in a state with high exemptions, creditors should also expect lower repayments in Chapter 13.

Bankruptcy laws reduce ("strip down") debts secured by cars to the fair market value of the car at the time of the bankruptcy filing, and debts that exceed the fair market value become unsecured. But they do not allow for modification of mortgage loans secured solely by the borrower's principal residence. Nevertheless, Chapter 7 bankruptcy voids deficiency payments² in the same way that it voids unsecured debt whose value exceeds total nonexempt assets. Homeowners who file for bankruptcy under Chapter 13 are allowed to repay arrears on their mortgages over a three- or five-year period. Furthermore, bankruptcy filing puts an automatic stop to lenders' collection actions, including foreclosure on the debtor's house. The stay can be lifted only by the court or after the bankruptcy case is dismissed or terminated.

The Determination of Mortgage Borrowing and Interest Rates. Like other goods and services, mortgage

² A deficiency judgment is a judgment lien against a borrower whose foreclosure sale did not produce sufficient funds to pay the mortgage in full.

The Foreclosure Process

W

hen a borrower defaults on a home mortgage, the lender may attempt to recover its losses by repossessing and selling the property. This process is governed by three types of state property laws: the judicial foreclosure process, statutory rights of redemption, and deficiency judgments. These laws vary widely across states (see the Table on pages 22-23 for a summary of the differences).

Under state property laws, two types of foreclosure are widely used. The more important type, *foreclosure by judicial sale*, is available in every state and required in many. It involves the sale of the mortgaged property under the supervision of a court, with the proceeds going first to satisfy the mortgage holder, then to satisfy other lien holders, and finally to the borrower. The second type is *foreclosure by power of sale*. Here, the mortgage holder is permitted to sell the property without court supervision. Again, proceeds from the sale go first to the mortgage holder, then to other lien holders, and finally to the borrower.^a If the proceeds do not pay off the existing mortgage on the property plus costs, most states allow the lender to collect a *deficiency judgment* against the borrower's other assets equal to the lender's foreclosure losses. Deficiency judgments are thus unsecured debt

that remains after repossession or sale and has the same priority as other unsecured debt.

After the foreclosure sale is complete, the homeowner can still regain the property if his or her state grants a statutory *right of redemption*. Up to a year after the sale, depending on the state, homeowners can redeem their property for the foreclosure sale price plus foreclosure expenses. The existence of redemption rights has resulted in investors' reluctance to purchase a foreclosed property during the redemption period and a large percentage of properties become lender-owned instead of being sold to a third party immediately after the foreclosure.^b

Foreclosure is a costly process. A typical foreclosure process can last anywhere from a few months to a year, depending on the state. The total costs of the foreclosure process consist of accrued interest, advances, cost of the lawsuit, attorney's fees, publication fees, and the fee of the sheriff or selling officer from the filing of the complaint through the foreclosure sale.^c Everybody loses in foreclosure. Lenders are estimated to lose almost 30 percent of their investment in a foreclosure,^d and debtors, at the least, lose their homes, an outcome that disrupts families and communities.

^a Where it is available, foreclosure by power of sale is generally faster than foreclosure by judicial sale. From the borrowers' perspective, the requirements of a judicial sale provide several months of free rent and protection against lenders' imposing excessive fees on borrowers.

^b One practical solution is to buy the redemption rights from the owner, either shortly before or shortly after purchasing the property at auction at a negotiated price. Typically, redemption rights are sold for amounts ranging from a few hundred to a few thousand dollars. In most cases, an owner facing foreclosure who sees no realistic way to either avoid the foreclosure or recover the property afterwards is willing to sell rights he never expects to use.

^c Researchers have found that the costs amounted to 19.1 percent of the final judgment amount – the amount mortgage borrowers owed to lenders – in the case of foreclosure sales in 1993 and 18.43 percent of the final judgment in the case of foreclosure sales in 1994. (See Debra Stark's article.)

^d GMAC-RFC (Residential Funding Corporation), America's largest private issuer of mortgage-backed securities and a leading warehouse lender, estimates that it loses over \$50,000 per foreclosed home. This number, together with the average loan size of \$201,000 at origination in 2004, yields a loss rate of over 25 percent. A warehouse loan is a line of credit that a financial institution extends to a loan originator to fund a mortgage used to purchase property. (See page 2 of the article by Desiree Hatcher, which cites a GMAC-RFC estimate.)

loans and interest rates are determined by mortgage supply and demand (Figures 2 and 3 on page 24). Lines labeled L represent the supply of mortgages. A particular supply curve shows the amount of mortgage loans

(in dollars) that lenders want to provide at each interest rate. Holding everything else the same, including estimated default risk, the higher the interest rate lenders can charge, the more willing they are to provide

mortgage loans. So, the supply curve is upward sloping. Anything that affects lenders' ability to make a profit, such as the probability that borrowers will default on their mortgages and the lenders' losses when they do, will affect

TABLE

State Foreclosure Laws — Comparison

State	Judicial Requirement	Statutory Redemption	Deficiency Judgment		
	Effective Judicial/Nonjudicial	Actual Law	Process Period (Days)	Redemption Period (Days)	
Alabama	NJ	B	61.5	365	Allowed
Alaska	NJ	B	105	365	Judicial foreclosure only
Arizona	NJ	B	90	105	Varies
Arkansas	E	B	70	365	Nonjudicial foreclosure only
California	NJ	B	117	365	Yes, judicial foreclosure only
Colorado	NJ	B	91	75	Yes
Connecticut	J	J	62	Court Decides	Yes
Delaware	J	J	190	0	No
Dist of Columbia	NJ	NJ	47	0	Yes
Florida	J	J	135	0	Yes
Georgia	NJ	B	37	0	Yes
Hawaii	E	B	220	0	Yes
Idaho	NJ	B	150	365	Yes
Illinois	J	J	300	90	Varies
Indiana	J	J	261	0	Yes
Iowa	J	B	160	20	No
Kansas	J	J	130	365	Yes
Kentucky	J	J	147	365	Yes, with restrictions
Louisiana	J	J	180	0	Yes
Maine	J	J	240	90	Yes
Maryland	J	J	46	Court Decides	Yes
Massachusetts	J	J	75	0	No
Michigan	NJ	NJ	60	197.5	Varies, case by case
Minnesota	NJ	B	95	1825	Yes
Mississippi	NJ	B	90	0	No
Missouri	NJ	B	60	365	No
Montana	NJ	B	150	0	Judicial foreclosure only
Nebraska	J	J	142	0	No
Nevada	NJ	B	116	0	Yes
New Hampshire	NJ	NJ	59	0	Yes
New Jersey	J	J	270	10	Yes, restricted

TABLE ... continued**State Foreclosure Laws — Comparison**

State	Judicial Requirement	Actual Law	Process Period (Days)	Statutory Redemption Period (Days)	Deficiency Judgment
	Effective Judicial/Nonjudicial				
New Mexico	J	J	180	270	Yes
New York	J	J	445	0	Yes
North Carolina	NJ	B	110	0	Varies case by case
North Dakota	J	J	150	180-365	Yes
Ohio	J	J	217*	0	Yes
Oklahoma	J	B	186	0	Yes, with time limitation
Oregon	NJ	B	150	180	Yes, only with judicial foreclosure
Pennsylvania	J	J	270	0	Yes
Rhode Island	NJ	B	62	0	Yes
South Carolina	J	J	150	0	Yes
South Dakota	J	B	150	197.5	Varies case by case
Tennessee	NJ	NJ	42.5	730	Yes
Texas	NJ	B	27	0	Yes
Utah	NJ	NJ	142	Court Decides	Yes
Vermont	J	J	95	272.5	Yes
Virginia	NJ	B	45	0	Yes
Washington	NJ	B	135	0	Yes, only in judicial foreclosure
West Virginia	NJ	NJ	75	0	No
Wisconsin	J	B	290	365	Yes, unless waived
Wyoming	NJ	B	60	227.5	Yes

* Before confirmation of foreclosure sale.

Note: J: judicial foreclosure; NJ: nonjudicial foreclosure; B: both judicial and nonjudicial foreclosure are allowed; Actual: what is required by law; Effective: what is carried out in practice. In general, a nonjudicial foreclosure will proceed in states where a power-of-sale clause can be written into the contract. There are a few states (MI, IA, SD, and OK), however, where a judicial foreclosure is pursued, i.e., effective, even though it is not required by law.

Source: http://www.foreclosures.com/www/pages/state_laws.asp and <http://www.realtytrac.com/foreclosure-laws/foreclosure-laws.asp>.
Compiled by Kelly D. Edmiston and Dan Reichgott.

the supply of mortgages. Graphically, this is represented as a shift in the supply curve, say, from L_1 to L_2 (if the factor makes mortgage lending more profitable).

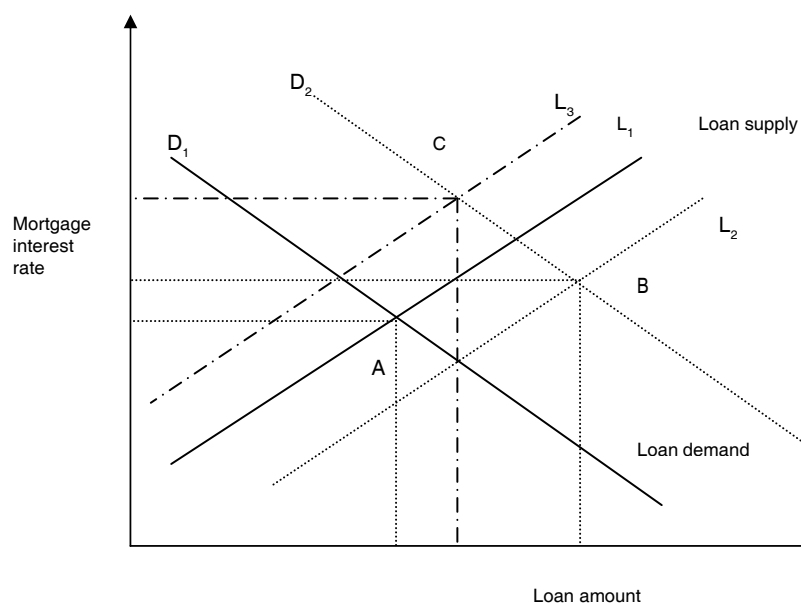
By contrast, mortgage demand,

as depicted by lines labeled D, moves in the opposite direction to interest rates. A particular demand curve shows the amount of mortgage loans (in dollars) that households wish to borrow at each interest rate holding

everything else constant, including the default rate. The higher the interest rate, the smaller will be households' demand for mortgages. Thus, the demand curve is downward sloping. Anything (other than the interest rate)

FIGURE 2

Mortgage Demand and Supply (Mortgage Exemptions)



that affects households' incentives to borrow will affect the position of the demand curve. Graphically, a factor that makes mortgage borrowing more or less attractive is represented as a shift in the demand curve, say, from D_1 to D_2 (if the factor makes taking out a mortgage more attractive).

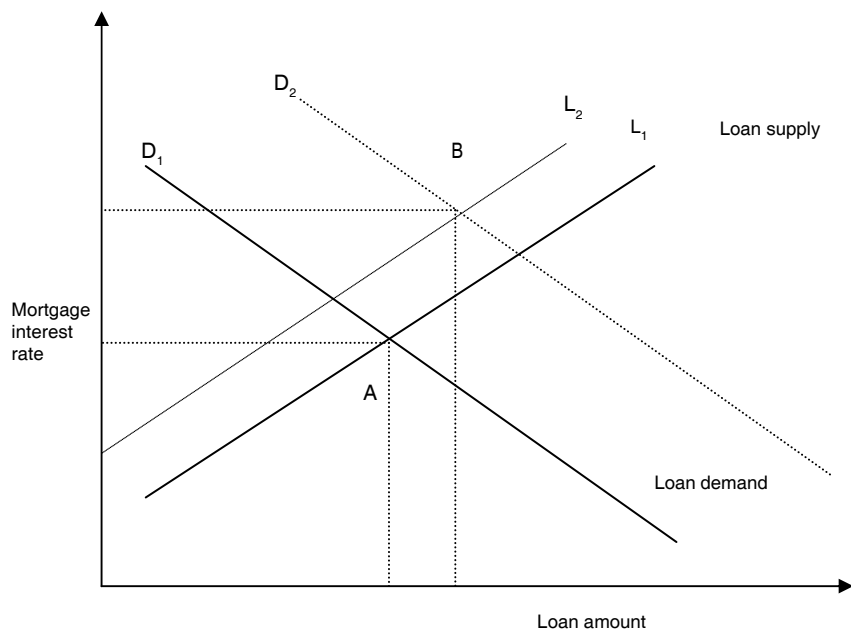
The final market interest rate and mortgage loan amount, or the market equilibrium rate and loan amount, are determined by the intersection of the demand and supply curves. Economists have identified several channels through which the provisions of personal bankruptcy laws affect mortgage demand and supply.

Debt Discharge and Bankruptcy Exemptions. The first channel comes from partial or full discharge of unsecured debt and car loans under personal bankruptcy. When debtors are in financial distress, they can file for bankruptcy, obtain discharge of their nonmortgage debts, and use the funds that would otherwise go to nonmortgage lenders to repay their mortgages and thereby keep their homes, at least for a time. Figure 2 depicts how debt discharge and bankruptcy exemptions affect mortgage loan amounts and mortgage interest rates.

The more generous the homestead and nonhomestead exemptions, the more funds borrowers are likely to have after filing for bankruptcy. In addition, higher homestead exemptions directly protect debtors' home equity and, consequently, reduce borrowers' incentive to default on mortgage loans. These positive effects of bankruptcy debt discharge on mortgage payment are termed "wealth effects," since they leave borrowers with more wealth or funds that can be used to make their mortgage payments, which subsequently increase lenders' profits for a given mortgage demand. The supply curve will shift out because of this effect.

FIGURE 3

Mortgage Demand and Supply (Automatic Stay)



But exemptions also have a counteracting effect on supply. To the extent that higher exemptions increase households' incentives to file for bankruptcy (and perhaps default on their mortgage) or increase lenders' losses in the event of a mortgage default, the supply curve will shift inward. The total effect of exemptions on the supply of loans depends on the relative strength of these two effects: The supply curve will shift out from L_1 to L_2 if the first effect dominates, and it will shift in from L_1 to L_3 if the second force dominates.

Generous bankruptcy exemptions affect mortgage borrowers' loan demand as well. In particular, if borrowers are better sheltered by bankruptcy laws in the event of financial distress, they will be more likely to demand larger mortgages. As a result, mortgage demand will shift out (for example, from D_1 to D_2 in Figure 2).

To see the net effects of exemptions, consider a state that increases its exemption level. The new equilibrium loan amount and interest rate are determined by the new loan supply and demand curves. If supply shifts out, say, from L_1 to L_2 , the equilibrium loan amount will definitely be higher (see point B). Whether the interest rate will be higher depends on whether demand increases more than supply. (As drawn, the interest rate is higher.) If the loan supply curve shifts inward, for example, from L_1 to L_3 , the interest rate will certainly be higher, but it is unclear whether equilibrium loan supply will be higher or lower (see point C). (As drawn, the dollar amounts of loan supply are smaller than at point B.)

Automatic Stay. The second channel concerns the automatic stay provision in bankruptcy law. A bankruptcy filing imposes an automatic stay on all collection efforts,

including foreclosure sales. The stay can be lifted only by the court. In other words, foreclosure cannot occur without the court's approval. This generates substantial costs for lenders in dealing with borrowers who are incapable of maintaining their mortgage payments despite their

A bankruptcy filing imposes an automatic stay on all collection efforts, including foreclosure sales. The stay can be lifted only by the court.

bankruptcy filing. The longer these households get to stay in the house, the more likely it is that the house may be damaged, since these households no longer have the incentive to do regular maintenance, since it's likely they will lose the house. In addition, if foreclosure turns out to be the final outcome, the lender loses the profits from having sold the house earlier. Both of these effects reduce lenders' profits and thus reduce loan supply. In Figure 3, this corresponds to an inward shift of the supply curve from L_1 to L_2 .

By contrast, the automatic stay on collection efforts will increase borrowers' demand for mortgages, because they will be able to stay in their homes for some period in the event of financial distress. As the new demand curve shifts out, say, from D_1 to D_2 , the new equilibrium rate and loan amount will be at point B. The new interest rate will be higher; whether the loan amount will be higher depends on whether the increase in loan demand more than offsets the decline in supply.

What Economists Have Found.

Taken together, whether bankruptcy requirements make the provision of equilibrium credit more extensive or more difficult depends on the net effect of the forces mentioned above.

In their 1999 paper, Jeremy Berkowitz and Richard Hynes examine Home Mortgage Disclosure Act ((HMDA) data³ and find significant wealth effects associated with higher homestead exemptions. In particular, they find that higher homestead exemptions have tended to reduce mortgage rates and the probability of being denied a mortgage. In other words, higher exemptions shift the supply curve out. Personal exemptions, on the other hand, do not have a statistically significant impact.

By contrast, Emily Lin and Michelle White argue that Berkowitz and Hynes's empirical results are biased because they estimate a model that takes into account only the household's decision to default on its mortgage. Instead, Lin and White argue that an empirical model should include *both* the household's decision to file for bankruptcy, and its decision as to whether to default on its mortgage. Examining the same HMDA data as Berkowitz and Hynes, they find a *positive* relationship between the homestead exemption levels and the probability of borrowers being denied both mortgage and home improvement loans after taking into consideration borrowers' incentive to file for bankruptcy. The relationship between personal property exemptions and the probability of being denied either loan, however, is insignificant, as found by Berkowitz and Hynes. Explaining these results, Lin and White argue that borrowers' increased incentives to default on mortgages because of

³ <http://www.ffiec.gov/hmda/>

Furthermore, in a separate but related paper, Reint Gropp, John Scholz, and Michelle White show that more generous bankruptcy laws disproportionately affect low-asset households. In particular, using data from the Survey of Consumer Finances (SCF),⁶ they find that generous state bankruptcy exemptions increase the amount of credit held by high-asset households and reduce the availability and amount of credit to low-asset households, taking account of other observable characteristics that might differ across households. They also

Another aspect of the issue concerning personal bankruptcy laws and residential housing is whether personal bankruptcy laws

their homes. The second force comes from the automatic stay on lenders' collection activity imposed by the bankruptcy court. A bankruptcy filing helps debtors save their homes (at least temporarily) by stopping lenders from closing and by giving debtors extra time to repay their overdue mortgage payments. This second force is particularly strong under Chapter 13, which allows debtors to have a repayment plan that spans three to five years. Bankruptcy trustees may also help debtors challenge excessive fees and penalties imposed by lenders. Katherine Porter, in her study, finds that mortgage lenders add questionable or excessive fees in half

help financially distressed borrowers save their homes. This question is of particular importance in light of the current financial crisis.

The same forces that affect mortgage demand and supply discussed earlier also affect homeowners' ability to keep their homes. Again, the first force is the wealth effect. Under either Chapter 7 or Chapter 13, bankruptcy exemptions allow borrowers to shift their resources toward mortgage payments and thereby help them keep

of all foreclosures. Lower fees in turn increase borrowers' ability to keep their homes.⁸

Finally, Melissa Jacoby argues that even in cases where debtors do end up losing their houses to foreclosure sale, bankruptcy filing gives them time to avoid a fire sale, in which the house is sold at a large discount.

Of course, other forces counterbalance the aforementioned positive effects. A bankruptcy filing delays the foreclosure process and imposes costs on both borrowers and lenders. Borrowers have to pay bankruptcy filing fees, lawyer fees,

⁷ In their paper, Souphala Chomsisengphet and Ronel Elul argue that bankruptcy exemptions affect lenders' credit supply and mortgage loan terms only to the extent that they affect borrowers' payment behavior and, thus, their credit bureau score.

⁸ These arguments are nicely laid out in Michelle White and Ning Zhu's article.

trustee fees, and so forth. In a Chapter 13 filing, trustee fees alone amount to between 6 to 10 percent of the total payments borrowers have to make through the repayment plan. The cost to lenders is even higher, and it includes lost mortgage interest, the time cost of money, and depreciated property value.

Do Homeowners Keep Their Homes? The empirical evidence on whether bankruptcy filing helps homeowners retain their homes is mixed.

First, the treatment of homeownership is an important matter for many bankrupt households. Economists have found that the majority of Chapter 13 filers are homeowners who (presumably) wish to save their homes. For example, Hülya Eraslan, Pierre-Daniel Sarte, and I studied Chapter 13 bankruptcy filings in Delaware between 2001 and 2002 and found that over 80 percent of the filers owned homes at the time of filing and that their mortgage loan-to-value ratio exceeded 90 percent. In another study, Michelle White and Ning Zhu also found that the vast majority (96 percent) of their bankrupt Delaware households were homeowners. This is despite the fact that a major bankruptcy reform adopted in 2005 was intended to force some bankruptcy filers to repay their unsecured debts in Chapter 13. Even in Chapter 7, the homeownership rate approached 50 percent, according to Ning Zhu's 2007 article.⁹

On the other hand, it is not clear whether the bankruptcy filing helped borrowers remain homeowners in the long run. First and foremost, the failure rate of Chapter 13 repayment

plans is surprisingly high. In separate studies, Scott Norberg and Andrew Velkey and Hülya Eraslan, Pierre-Daniel Sarte, and I document that the final discharge rates of Chapter 13 cases are as low as 33 percent. That is, only about 33 percent of Chapter 13 filers successfully completed their repayment plans. Borrowers who fail to complete their repayment plan will not have their unsecured debt discharged, and lenders will immediately resume

Researchers find that filing for bankruptcy prolongs borrowers' stay in their home before they eventually lose it to foreclosure sales.

their collection efforts as soon as borrowers exit bankruptcy. These low discharge rates are also corroborated by anecdotal evidence in the legal literature.

Second, despite their bankruptcy filing, a significant number of homeowners still end up losing their houses to foreclosure sales within five to six years of their bankruptcy filing. Sarah Carroll and I studied homeowners who filed for bankruptcy between 2001 and 2002 in New Castle County, Delaware, until 2007 and found that close to 30 percent of these filers still lost their houses to foreclosure sales. The rate increases substantially, to 40 percent, if we consider homeowners who were already one year late on their mortgage payments at the time of filing, compared to 43 percent of those homeowners who went to foreclosure without filing for bankruptcy. This finding is consistent with Raisa

Bahchieva, Susan Wachter, and Elizabeth Warren's survey result that many homeowners in financial distress are simply hanging on to their houses without any realistic hope of repaying their mortgages.

The Costs of Borrowers Staying in their Homes. Researchers find that filing for bankruptcy prolongs borrowers' stay in their home before they eventually lose it to foreclosure sales. For example, Thomas Springer and Neil Waller find that bankruptcy filing lengthens the foreclosure process by half a year to one year. Sarah Carroll and I find that a Chapter 13 bankruptcy filing adds, on average, one year to the borrower's foreclosure process. A study by Brent Ambrose, Richard Buttimer, and Charles Capone, and another by Dennis Capozza and Thomas Thomson also find supporting evidence that bankruptcy filing delays foreclosure sales but has little effect in helping mortgage loans to become current.

But this result is a double-edged sword. While borrowers may have enjoyed additional benefits from staying in their own homes, the cost to lenders is high. In addition to the added cost mentioned earlier in the event that the bankruptcy plan fails and the foreclosure process begins again, lenders collect very little in cases under Chapter 13. For example, Norberg and Velkey find that the average repayment rate for secured lenders under Chapter 13 is 31 percent, and Hülya Eraslan, Pierre-Daniel Sarte, and I find the rate to be a mere 22 percent.¹⁰

Finally, there is also evidence that final sale price is negatively correlated with the length of a borrower's stay in bankruptcy and foreclosure together. For instance, Sarah Carroll and I find

⁹ In their 2005 article, Raisa Bahchieva, Susan Wachter, and Elizabeth Warren document similar findings for an earlier period.

¹⁰ See my 2007 *Business Review* article for more details.

that longer time-to-sale is associated with lower sale price; the correlation coefficient of the gap between bankruptcy filing and foreclosure sale and the final foreclosure sale price adjusted for inflation and house price growth is -0.16.

Although the existing literature finds that bankruptcy filing offers extra breathing room to homeowners who try to keep their homes, the eventual success rate is low and the added cost to lenders is high.

A Caveat. Before concluding, it is worth noting that many of the empirical studies cited in this section are based on a sample of bankruptcy filers, instead of a random sample of households in the U.S. consisting of both bankruptcy filers and nonbankruptcy filers. This can lead to what economists call a selection bias. The outcomes for the bankruptcy filers may not be the result of the features of the bankruptcy process but may be the result of some factor common to households that file for bankruptcy.

For example, the fact that a large number of homeowners lose their houses despite filing for bankruptcy may be simply because only households in desperate financial straits file for bankruptcy. In a properly designed test we would be comparing outcomes for essentially identical households: some who file for bankruptcy and some who don't. Therefore, while the stylized facts remain true, it is hard to conclude definitely whether bankruptcy helps homeowners preserve their homeownership. Since any changes in bankruptcy law would not only alter the bankruptcy outcome but also affect households' decision to file for bankruptcy, a fully convincing analysis should take account of both effects.

WHAT'S NEXT?

The existing literature on bankruptcy and homeownership has

focused on two questions. First, how do personal bankruptcy provisions affect credit supply? Second, how do the personal bankruptcy provisions affect households' homeownership outcome? While the literature generally supports the conclusion that more generous bankruptcy provisions lead to more restrictive credit supply, answers to the second question are

mortgages, and automobile loans to borrow. In the second period, upon learning their income and asset value, they must decide whether to repay their loans, default on their mortgages, and/or enter bankruptcy. While instructive, this framework doesn't allow researchers to explore certain types of long-term decisions. For example, Chapter 7 bankruptcy filers


Any analysis that examines only those that have entered bankruptcy may lead to relationships that appear much stronger than they actually are or, in some cases, relationships that are completely illusory artifacts.

much more mixed. Economists agree that homeowners take advantage of personal bankruptcy to try to retain their homes, particularly under Chapter 13. Nonetheless, only a small proportion of households succeed in keeping their homes in the long run. Furthermore, while bankruptcy filing adds to the length of the foreclosure process, the cost to lenders is high.

Proponents of recent legislation are likely to argue again that existing mechanisms to avoid foreclosure in bankruptcy need to be strengthened. To better evaluate such proposals, research needs to advance on two fronts.

First, we need to build a consistent framework that takes into consideration the effect of bankruptcy provisions and filings on credit supply and demand as well as mortgage payments and homeownership retention. Michelle White and Ning Zhu have taken the first step and provided a highly simplified framework in which households live only two periods. In the first period, households decide how much unsecured debt,

cannot file for bankruptcy for the next six years, a factor that households will take into account when they decide whether to enter bankruptcy. The next step will be to extend this framework to a dynamic setting in which households will enjoy or suffer the effects of their decisions beyond the current period in which the decision is made and its immediate future.

Second, we need to collect additional national data, particularly in panel form, that will allow researchers to follow households over time. Such data will help us overcome the selection bias that the existing literature suffers from. Any analysis that examines only those that have entered bankruptcy may lead to relationships that appear much stronger than they actually are or, in some cases, relationships that are completely illusory artifacts. A national database will also help us overcome regional bias, since bankruptcy exemptions and foreclosure laws differ substantially from state to state. 

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ACCOUNTING FOR HOUSING IN CONSUMER PRICE INDEXES

In this paper, the authors take stock of how statistical agencies in different nations are currently accounting for housing in their consumer price indexes (CPIs). The rental equivalence and user cost approaches have been favorites of economists. Both can be derived from the fundamental equation of capital theory. Concerns about these approaches are taken up. They go on to argue that an *opportunity cost* approach is the correct theoretical framework for accounting for owner-occupied housing (OOH) in a CPI. This approach, first mentioned in a 2006 OECD paper by Diewert, is developed more fully here. The authors explore the relationship of this new approach to the usual rental equivalency and user cost approaches. The new approach leads to an owner-occupied housing opportunity cost (OOHOC) index that is a weighted average of the rental and the financial opportunity costs.

The authors call attention to the need for more direct measures of inflation for owner-occupied housing services. In a 2007 paper, Mishkin argues that central banks with supervisory authority can reduce the likelihood of bubbles forming through prudential supervision of the financial system. However, the official mandates of central banks typically focus on managing *measured* inflation. Barack Obama has pledged to give the Federal Reserve greater oversight of a broader array of financial institutions. They believe that an important addition to this pledge should be to give the BLS, BEA, and Census Bureau the funds and the mandate to aggressively develop improved measures of inflation for owner-occupied housing services. Central banks and national governments have many policy instruments at their disposal that they could use, in the future, to control inflation in housing markets. What

they lack are appropriate measures of inflation in the market for owner-occupied housing services. The proposed new opportunity cost measure for accounting for OOH in a CPI will not be simple or cheap to implement. However, the current financial crisis makes it clear that the costs of *not* having an adequate measure for inflation in the cost of owner-occupied housing services can be far greater.

Working Paper 09-4, "Accounting for Housing in a CPI," W. Erwin Diewert, University of British Columbia, and Alice O. Nakamura, University of Alberta School of Business, and Visiting Scholar, Federal Reserve Bank of Philadelphia

OPPORTUNITY COST TREATMENT OF OWNER-OCCUPIED HOUSING IN MEASURES OF INFLATION

This paper provides a brief introduction to a proposed new opportunity cost treatment of owner-occupied housing in measures of inflation for the United States. In addition, the paper introduces, and provides links to, a collection of nine other papers that discuss various aspects of the treatment of owner-occupied housing in measures of inflation for a number of nations, including Canada, Germany, Iceland, and the United States.

Working Paper 09-5, "Introduction to Price and Productivity Measurement for Housing," Bert M. Balk, Erasmus University Rotterdam; W. Erwin Diewert, University of British Columbia; and Alice O. Nakamura, University of Alberta School of Business, and Visiting Scholar, Federal Reserve Bank of Philadelphia

MODELING APPROACHES TO LABOR MARKETS AND IMPLICATIONS FOR INFLATION DYNAMICS

This paper reviews recent approaches to modeling the labor market and assesses their implications for inflation dynamics through both

their effect on marginal cost and on price-setting behavior. In a search and matching environment, the authors consider the following modeling setups: right-to-manage bargaining vs. efficient bargaining, wage stickiness in new and existing matches, interactions at the firm level between price and wage-setting, alternative forms of hiring frictions, search on-the-job and endogenous job separation. They find that most specifications imply too little real rigidity and, so, too volatile inflation. Models with wage stickiness and right-to-manage bargaining or with firm-specific labor emerge as the most promising candidates.

Working Paper 09-6, "Inflation Dynamics with Labor Market Matching: Assessing Alternative Specifications," Kai Christoffel, European Central Bank; James Costain, Banco de España; Gregory de Walque, National Bank of Belgium; Keith Kuester, Federal Reserve of Philadelphia; Tobias Linzert, European Central Bank; Stephen Millard, Bank of England; and Olivier Pierrard, Banque Centrale de Luxembourg

A MODEL OF HOUSING AND CONSUMPTION WITH REALISTIC LABOR INCOME AND HOUSE-PRICE UNCERTAINTIES

The authors estimate a structural model of optimal life-cycle housing and consumption in the presence of realistic labor income and house-price uncertainties. The model postulates constant elasticity of substitution between housing service and nonhousing consumption and explicitly incorporates a house adjustment cost. Their estimation fits the cross-sectional and time-series household wealth and housing profiles from the Panel Study of Income Dynamics quite well and suggests an intra-temporal elasticity of substitution between housing and nonhousing consumption of 0.33 and a housing adjustment cost that amounts to about 15 percent of house value. Policy experiments with estimated preference parameters imply that households respond nonlinearly to house price changes with large

house price declines leading to sizable decreases in both the aggregate homeownership rate and aggregate nonhousing consumption. The average marginal propensity to consume out of housing wealth changes ranges from 0.4 percent to 6 percent. When lending conditions are tightened in the form of a higher down payment requirement, interestingly, large house-price declines result in more severe drops in the aggregate homeownership rate but milder decreases in nonhousing consumption.

Working Paper 09-7, "Housing Over Time and Over the Life Cycle: A Structural Estimation," Wenli Li, Federal Reserve Bank of Philadelphia; Haiyong Liu, East Carolina University; and Rui Yao, Zicklin School of Business, Baruch College

OPTIMAL INFLATION RATE AND POLICY TRADE-OFFS IN A TWO-SECTOR MODEL

The authors develop a two-sector monetary model with a centralized and a decentralized market. Activities in the centralized market resemble those in a standard New Keynesian economy with price rigidities. In the decentralized market agents engage in bilateral exchanges for which money is essential. The model is estimated and evaluated based on postwar U.S. data. They document its money demand properties and determine the optimal long-run inflation rate that trades off the New Keynesian distortion against the distortion caused by taxing money and hence transactions in the decentralized market. The authors find that target rates of -1 percent or less are desirable, which contrasts with policy recommendations derived from a cashless New Keynesian model.

Working Paper 09-8, "Sticky Prices Versus Monetary Frictions: An Estimation of Policy Trade-offs," S. Boragan Aruoba, University of Maryland, and Visiting Scholar, Federal Reserve Bank of Philadelphia, and Frank Schorfheide, University of Pennsylvania, and Visiting Scholar, Federal Reserve Bank of Philadelphia