

# Information Externalities: Why Lending May Sometimes Need a Jump Start

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**A** banker, according to the comics, is someone who is willing to lend money to those who can prove they don't need it. As the joke ruefully suggests, the work of a lender (whether a banker or not) is to find someone who wants money now and will be willing and able to repay a larger sum in the future. From a banker's perspective, the first part of the requirement is all too easy to fill; the second part is the hard part. Bankers must compete to find

and assess the good borrowers, and that puts bankers into the information business: the profitable lender is the one who best understands the businesses that borrowers are engaged in and the value of collateral that borrowers put up to guarantee loans.

Information about borrowers and collateral is thus essential to the flow of credit. But although information is crucial to the efficient operation of credit markets, it is often not itself produced efficiently. In credit markets where information flows are unsteady, private credit institutions may need public assistance or prodding.

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Information externalities constitute one reason credit markets are sometimes unreliable. An information externality in credit markets exists when each lender relies on information generated by the lending activities of other institutions. An information externality can cause a slowdown in lending activity to be self-perpetuating because the slowdown results in a shortage of information available to lenders.

One example arises in the mortgage market. A key informational need in a mortgage loan is an accurate measure of the value of the house that serves as collateral to guarantee the loan. The accuracy of appraisals is reduced when there are fewer recent sales. Where mortgage lenders cannot accurately evaluate collateral, elements of “mortgage redlining” can appear. In its most extreme form, mortgage redlining refers to neighborhoods in which mortgages cannot be obtained through conventional channels. Recent data collected under the Home Mortgage Disclosure Act (HMDA) show that mortgage applications of blacks and Hispanics are rejected more often than those of whites.<sup>1</sup> Some of this pattern of lending may be due to banks’ having less information about the value of the houses that blacks and Hispanics intend to buy. When banks have poor information about house values, they will tend to reject more mortgage applications.

Another example arises in commercial lending, where banks attempt to estimate the likelihood that businesses will succeed. There is some evidence that during economic downturns, banks have a harder time knowing which borrowers are likely to be profitable. As a consequence, banks tend to raise their lending requirements more during an economic downturn, creating a “credit crunch” that may pro-

long the recession. Credit crunches, such as the one commercial real estate is struggling to emerge from now, are times in which some classes of borrowers have difficulty obtaining credit at any price.

Both examples involve a fundamental interaction between slower economic activity and the amount of information available to lenders. Because the lender knows less about the loan and whether it will succeed, it is riskier to the lender, who must charge more interest or require more collateral to earn a return. Because the lender charges more, some borrowers borrow less or drop out of the market, which can result in a sustained slowdown in economic activity. The reduction in economic activity leads to less information, less information leads to a further reduction in economic activity, and a vicious circle can ensue.

This dynamic interaction between information and economic behavior involves an externality, which is defined as occurring when the actions of one person or firm influence the opportunities and choices of another as a by-product. In this case, the externality is that the failure of one borrower to conclude a loan makes loans more costly and harder to obtain for later borrowers. In economic theory, externalities hold an important place in that when they exist, the “invisible hand” of the marketplace does not necessarily result in optimal interactions. For information externalities, this implies that government intervention—of the right kind—may help to improve credit market outcomes. In particular, government intervention to reduce mortgage redlining may improve society’s welfare, even when the profit motive and not racial discrimination is the proximate cause of the redlining. And monetary policy to reduce interest rates may be a useful way to prime the credit pump during recessions.

Scholars have explored these and other aspects of the importance of information to lenders. Two other sources of information prob-

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<sup>1</sup> See Glenn B. Canner and Dolores S. Smith, “Home Mortgage Disclosure Act: Expanded Data on Residential Lending,” *Federal Reserve Bulletin* 77 (November 1991), pp. 859-81.

lems in loan markets are asymmetric information and coordination problems. These are discussed in *More Information Problems in Loan Markets*.

### INFORMATION ABOUT COLLATERAL: MORTGAGES, APPRAISALS, AND REDLINING

Let's start with the information problem that can contribute to redlining in mortgage markets: assessing the value of the house that serves as collateral for the loan.<sup>2</sup> Lenders rely on the sale prices of recently sold comparable houses to help gauge the value of the house being mortgaged. When there are few such comparable houses, the value of a house is harder to estimate, and lending on the collateral of such houses is riskier. Bankers then may become reluctant to lend in these areas.

The mortgage market operates in this way: when a house is bought, the purchaser typically obtains a mortgage loan to cover most of the purchase price. This mortgage loan generally requires the purchaser to make a down payment as well as pay "closing costs"—the various fees, taxes, and escrow payments associated with the transaction. This down payment, which ensures that the house is worth more than the loan, plays a crucial role in the mortgage loan.

The lender has an important stake in the down payment because when the house is worth substantially more than the loan, the lender is doubly protected against loss.<sup>3</sup> First, the homeowner fears losing the house and will be unlikely to default. Second, if the homeowner

cannot make payments, the house is more likely to be sold for more than the value of the loan, in which case the lender will receive full repayment of principal and accrued interest.

In a first mortgage that accompanies the sale of a house, the sale price is a matter of public record and indeed may shed some light on the size of the down payment. Unfortunately, for various reasons, the very real danger exists that the sale price overstates the likely resale value of the house.<sup>4</sup>

To safeguard against this, houses are typically appraised: a professional appraiser is asked to estimate the market value of the house. In the most common method of appraisal for existing single-family houses, an appraiser finds at least three recently sold houses that are similar to the house in question and are in the neighborhood. The appraiser, after adjusting the prices of the three "comparables" by adding or subtracting the value of features by which they differ from the house being appraised, weights the three adjusted values to come up with an estimate of the market value of the house being appraised, the appraised value. The "mortgage value" of the house is then calculated as the lesser of sale price or the appraised value.

Now consider a neighborhood in which there have been few recent sales. In this case, the appraiser must use house sales that are out-of-date or otherwise quite different from the house being appraised. The estimate that the appraiser then comes up with is likely to be less reliable and require more judgment on the part of the appraiser.

This will make it difficult for prospective home buyers to obtain financing for two rea-

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<sup>2</sup>This section is based on William W. Lang and Leonard I. Nakamura, "A Model of Redlining," *Journal of Urban Economics* (forthcoming).

<sup>3</sup>The use of collateral in mortgages and lending generally is discussed in Leonard I. Nakamura, "Lessons on Lending and Borrowing in Hard Times," this *Business Review* (July/August 1991), pp. 13-21.

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<sup>4</sup>One danger is that the buyer may have simply overpaid for the house. Another is that the buyer and seller may inflate the sale price of the house to reduce the borrower's down payment. Nakamura (1991) discusses explicitly how a seller's offer to pay closing costs inflates the sale price.

## More Information Problems in Loan Markets

The information externalities addressed in this article are not the only information problems scholars have identified in credit markets. Two aspects of information that are also likely to be important in credit markets are information asymmetries and coordination problems.

First, in any economic interaction the parties have different knowledge of relevant information: a borrower will know more about her own business than the banker, and the banker may know more about business conditions generally than the borrower. These differences in information are called information *asymmetries*. Second, in many markets it is important to know the intentions of other market participants: the problem of economic *coordination*.

**Information Asymmetry in Loan Markets.** One extreme example of information asymmetry is loan fraud: borrowers know whether they are frauds or not, while lenders cannot always discern fraudulent borrowers. When interest rates rise, the fraudulent borrower is unaffected because he or she is never going to repay the loan. Some good borrowers, on the other hand, may well decide to wait to borrow until rates fall again. The increase in rates worsens the average quality of borrowers—and forces the lender either to raise rates even further or to increase the required collateral.

A similar mechanism operates whenever the lender has less information about the borrower's business prospects than the borrower does. A borrower who knows that the lender has underestimated the borrower's true risk and is charging too little interest is more likely to continue to borrow after an interest rate increase than a borrower who knows the lender has overestimated the borrower's true risk and whose interest rate is too high. Thus an increase in interest rates will generally cause unusually good borrowers to reduce their borrowing more than unusually bad ones.

Now, the information externality discussed in the main body of this article can lead to a decline in the information available to lenders during recessions. If this reduction in lender information worsens the information asymmetry between lenders and borrowers, making it harder for lenders to tell worse borrowers from better borrowers, then the two problems will reinforce one another.

**Coordination Problems in Loan Markets.** A basic problem of economic coordination is self-fulfilling prophecies. If one bank believes that other banks are unwilling to lend in a particular city and that business prospects in that city will worsen as a result, the first bank will itself be unwilling to lend to businesses in that city. Thus if all banks begin to think that other banks are unwilling to lend, none of them may lend: the prophecy could be self-fulfilling. If, on the other hand, the banks coordinate their lending, it might be possible for lending (and business in the city) to revive.

Some economists find self-fulfilling prophecies unlikely because formal models of this phenomenon require that the prophecy be fulfilled exactly, an unlikely occurrence in any actual economy. But for actual economies, adverse expectations that are only partially self-fulfilling may persist for long periods. Of course, a perspicacious investor may be able to profit from market mistakes of this kind, but even so, the misperceptions may disappear only very slowly.<sup>4</sup>

Coordination problems among lenders may exacerbate redlining. If lenders desert a neighborhood, default on a mortgage loan there is likely to be very costly to the lender, since selling the house will become very difficult. One reason for the success of the Delaware Valley Mortgage Plan is that it is a coordinated plan to which a number of the leading banks in the area have committed themselves.

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<sup>4</sup>For example, in the stock market, bad news about a stock apparently often drives the stock's value below its true worth. A result of this, confirmed by research by Bruce Lehmann and others, is that "contrarian" stock purchase strategies, buying stocks that have done poorly in the recent past, have consistently outperformed the U.S. market average. Thus the U.S. stock market has apparently suffered from misperceptions that the profit motive has been very slow to eradicate. Note that these adverse expectations about stocks increase the cost of raising funds for these companies, which would tend to make the adverse expectations self-fulfilling. See Bruce N. Lehmann, "Fads, Martingales and Market Efficiency," *Quarterly Journal of Economics*, 105 (February 1990), pp. 1-29, where he examines the performance of portfolios of stocks chosen according to a contrarian rule. He shows that a portfolio of stocks rebalanced weekly to reflect the previous week's returns compared to the market (with losers more strongly weighted) outperformed a balanced portfolio in all of the 98 quarters studied in the period from 1962-1986.

sons. First, the appraised value will more often be inaccurate and will be too high or too low more often than when better information on comparable sales is available. This reduces the value of the house whenever the appraised value comes in too low but doesn't raise it when the appraised value comes in too high. On average, appraised values will reduce mortgage values of houses, and larger down payments will be required. The need for a down payment remains an important barrier to home ownership for many households; larger down payments raise the height of the barrier.<sup>5</sup> Second, the mortgage lender will typically be able to see that the appraisal is inaccurate.<sup>6</sup> Even when the appraised value is above the sale price, the lender may be unwilling to lend because he or she implicitly discounts the appraisal.

Of course, when buyers are few, unsuccessful sellers must take stock and make a decision. Some will decide to rent, rather than sell, which reduces the public information available through house sales. Others will choose to lower their prices, but then falling prices will compound the riskiness that lenders perceive in these markets.

Thus once a neighborhood suffers a slowdown in house sales, difficulties in obtaining

mortgages may perpetuate the difficulty in finding buyers. Ignorance about house sale values may thus feed on itself: the fewer the sales, the less information lenders have and the more likely they are to reject new loan applications, so even fewer sales occur. If lenders are sufficiently chary of lending in such a neighborhood, they might refuse to make any mortgages there, the extreme form of mortgage redlining.

This response on the part of the lender, while explainable in economic terms as an individual business practice, is not socially optimal. Indeed, since the passage of the Community Reinvestment Act of 1977, a bank's refusal to lend in neighborhoods in its market area may subject it to regulatory restrictions, reflecting the belief that banks have an obligation to their local communities to help them avoid lending traps such as "redlining." This type of government intervention in the marketplace can be justified theoretically, since the problem arises because of an externality (see *Externalities and the Coase Theorem*). Externalities imply that market decisions may not be social optimums because social benefits are not simply the sum of the private benefits to the parties to the market transaction. In this case, the externality is that a current house sale reduces the cost and increases the availability of mortgages to future house buyers.

This line of reasoning helps us understand a conundrum. This conundrum arises because many researchers believe that redlining results from discrimination by mortgage lenders. But mortgage markets appear to be highly competitive: entry into them is extremely easy, and there are dozens, if not hundreds, of mortgage lenders in the urban markets where redlining is alleged to occur. If good credit risks are being denied credit because of discrimination, why don't nondiscriminatory lenders enter these mortgage markets and profitably end redlining? Why is government prodding desirable? The answer is that at least some redlining occurs because information is in short supply in

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<sup>5</sup>See Peter Linneman and Susan Wachter, "The Impacts of Borrowing Constraints on Homeownership," *AREUEA Journal* 17 (1989), pp. 389-402, for a discussion of the down payment constraints in house purchases. One might think that recent changes in mortgage markets, including the introduction of a wide variety of types of mortgages, would eliminate down payment constraints as a barrier to house purchase. Linneman and Wachter's evidence is that down payments remain a significant barrier to house purchase: prospective buyers with less cash available for a down payment cannot buy as large a house as they otherwise would.

<sup>6</sup>The mortgage lender will see that the sales used in the appraisal comparisons are either far from the house being appraised or are out of date.

redlined neighborhoods. And as long as the information remains in short supply, profitable entry is not possible.

The dynamic information externality does not explain how redlining gets started, but rather why it is self-perpetuating. Redlining may begin from a discriminatory practice or from a temporary neighborhood decline. For example, the Depression of the 1930s had a very deep impact on the Harlem neighborhood in New York. Although not the only factor, information externalities help explain why the Depression might have hurt mortgage lending in Harlem long after the U.S. economy as a whole had returned to normal.

Also, the size of down payments is part of the reason redlining is self-perpetuating. In wealthy neighborhoods, where potential home buyers, on average, can afford larger down payments when they are required, uncertainty about house values will not retard sales nearly as much as in poorer neighborhoods, where down payments are critical barriers to homeownership.

### REMEDIES FOR REDLINING

If a key problem in “redlining” is an information externality that increases the costs and risks of lending, appropriate remedies must take this into account. In particular, in neighborhoods where appraisals are less reliable, mortgage makers may need to be prodded to gather additional information about the house or borrower in question. Local community groups may be helpful in providing more detailed information about specific blocks and changing neighborhood boundaries. And with house equity a less secure source of repayment, the character of the borrower may become more important. Here again, local community groups may be useful in screening applicants.

The Delaware Valley Mortgage Plan (formerly called the Philadelphia Mortgage Plan) is one of the more successful banking coalitions aimed at attacking redlining.<sup>7</sup> Three key features of the mortgage plan result in relatively

strong lending across diverse neighborhoods. First, all banks commit themselves to acquiring more information by lending on the basis of the specific block the house is on and by looking thoroughly for mitigating factors when a borrower’s credit records are not spotless. This is particularly important in maintaining the stability of neighborhoods where some blocks have deteriorated but others have been maintained or upgraded. Second, the plan reduces the effective cost of transactions to the applicant. All applications recommended for rejection under the plan are reviewed by a credit committee to ensure that credit decisions are free of bias and consistent with the plan’s policies. The committee can recommend that the bank reconsider its decision, and if the bank persists in declining the application, another member bank can consider the application. Thus each application is, in effect, an application to all the member banks, which directly reduces the applicant’s transaction costs. Finally, the plan relies on extensive outreach, and referrals from community organizations play an important role in increasing applications under the plan.

These elements of the Delaware Valley Mortgage Plan together form a sensible and unusually successful attack on the underlying information problems that play an important role in redlining. Of course, the additional information and committee work are not costless. As a consequence, competitive pressures can erode lenders’ willingness to participate in plans such as these. So legislation that requires mortgage lenders to take positive steps to support community borrowing can have a valuable role in making these types of plans viable.

Another approach is to reduce the down

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<sup>7</sup>For a full discussion of the Delaware Valley Mortgage Plan, see Paul S. Calem, “The Delaware Valley Mortgage Plan: An Analysis Using HMDA Data,” *Journal of Housing Research* (forthcoming).

payment constraint. The federal government assists mortgage borrowers with two mortgage loan programs, one run by the Federal Housing Administration (FHA) and the other by the Veterans Administration (VA). Both programs relax the down payment constraint and thus tend to make sales possible in neighborhoods that are informationally constrained.<sup>8</sup> The FHA mortgage program has the drawback that it requires a 3.8 percent mortgage insurance premium, making them more expensive than conventional mortgages with private insurance. VA mortgages are subsidized and less expensive than conventional mortgages but are available only to veterans. One concern that remains with these programs, as was emphasized in the discussion of the importance of the down payment to the lender, is that lower down payments tend to result in greater loan losses. In fact, delinquency and foreclosure rates are higher on FHA and VA mortgages. Thus while reducing down payments helps to make sales possible, it simultaneously increases the risk of undesirable outcomes. Indeed, it is conceivable that increased foreclosures in these government programs may, in certain circumstances, add to perceived risk in conventional mortgage lending. Thus reducing the down payment constraint cannot be viewed as a complete solution to the information problems in mortgage markets.

Thus far we have discussed the value of information in mortgage lending. For commercial loans, information—about the purpose of the loan and about the likelihood of the business success of the borrower—is often crucial

to sound lending. Information about the demand for a proposed product or service, for example, is a key input to commercial lending: the success of a pizza parlor in a town is useful in judging the likely success of a pizza delivery service. It is to this type of information that we now turn.

### **INFORMATION ABOUT BUSINESS OPPORTUNITIES: COMMERCIAL LENDING AND CREDIT CRUNCHES**

In this section, we focus on the special role of commercial banks in the financing of small businesses. The essence of this role is that banks must make judgments about whether businesses that ask for loans are likely to succeed. In making these judgments, each bank relies on information generated by past lending activity, its own and that of other banks. Hence, an information externality may be a source of “credit crunches” during recessions.

In the parable of perfect competition taught in undergraduate microeconomics, entrepreneurs are constantly searching for profit opportunities. If an entrepreneur is successful and achieves supranormal profits, other entrepreneurs observe this success, copy it, and eliminate the short-run profits of the pioneer. We thus are called to witness the triumph of the “invisible hand,” and we are told this is a social optimum. In a static sense, it is. But this narrative describes a dynamic information externality: the information generated in one period is valuable for the allocation of resources in succeeding periods.<sup>9</sup>

Bank lenders are a crucial part of this infor-

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<sup>8</sup>See, for example, Stuart S. Rosenthal, John V. Duca, and Stuart A. Gabriel, “Credit Rationing and the Demand for Owner-Occupied Housing,” *Journal of Urban Economics* 30 (July 1991), pp. 48-63, for evidence that holders of VA and FHA mortgages face reduced noncredit constraints such as down payments.

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<sup>9</sup>This section is based on William W. Lang and Leonard I. Nakamura, “Information Losses in a Dynamic Model of Credit,” *Journal of Finance* 44 (July 1989), pp. 731-46, and “The Dynamics of Credit Markets in a Model with Learning,” *Journal of Monetary Economics* 26 (October 1990), pp. 305-18.

mational chain in two ways.<sup>10</sup> First, the past loans that commercial bank lenders have made are unique sources of detailed data about the local economy and individual enterprises. In the course of making loans, banks typically obtain information about the borrower not elsewhere available. In particular, because of their access to the checking accounts of their borrowers, banks acquire more detailed information than other possible lenders.<sup>11</sup>

Second, to accurately evaluate the default risk of commercial borrowers, bank lenders continually compile and analyze both local and national information. For example, Robert Morris Associates, the association of bank loan and credit officers, collects and disseminates summary information from financial statements of different borrowers, classified by industry.<sup>12</sup> This enables lenders to compare the financial statements of borrowers with national industry norms. Of course, because local conditions are crucial to local lending, bank loan officers must be experts on their local economies and must continually search out information about local conditions.

Information about borrowers is of value in

lending to large and small borrowers alike. However, banks have a relative advantage in lending to small, relatively risky borrowers rather than large, relatively safe borrowers because the local information banks are able to gather about their borrowers is of most value in lending to smaller, riskier borrowers.<sup>13</sup> Recent evidence on loans to smaller borrowers studied by Timothy Hannan shows that such borrowers pay higher interest rates in concentrated banking markets, that is, markets in which there is less competition among local bank lenders.<sup>14</sup> This implies that nonbank lenders (or nonlocal banks) find it harder to enter these markets to provide a check on the market power of the local banks, presumably because the nonbank lenders lack the local information that the local banks have.

Because past and existing loans convey information that is useful in the making of new loans, a decline in local lending and the concomitant decline in economic activity will tend to make future lending riskier. Bank lenders will have less information upon which to judge new applications, and that will make them more uncertain in their judgments.

This leads banks to raise their risk premiums in lending, which in turn makes borrowing riskier for the borrowers, who face a higher

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<sup>10</sup>A classic discussion of the informational role of banks is found in Douglas B. Diamond, "Financial Intermediation and Delegated Monitoring," *Review of Economic Studies* 51 (July 1984), pp. 393-414.

<sup>11</sup>Fischer Black, "Bank Funds Management in an Efficient Market," *Journal of Financial Economics* 2 (1975) and Leonard I. Nakamura, "Commercial Bank Information: Implications for the Structure of Banking," in Lawrence J. White and Michael Klausner, eds., *Structural Change in Banking*, Irwin (forthcoming); both discuss aspects of the use of checking accounts as sources of information for commercial banks.

<sup>12</sup>*Annual Statement Studies*, Robert Morris Associates, Philadelphia. Robert Morris Associates also publishes the *Journal of Commercial Lending*, which regularly includes articles on lending to particular industries.

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<sup>13</sup>See Nakamura, "Commercial Bank Information..." (forthcoming) for a fuller discussion of the evidence for this proposition. Specific evidence on bank lending to hospitals is in Paul S. Calem and John A. Rizzo, "Banks as Information Specialists: The Case of Hospital Lending," *Journal of Banking and Finance* (forthcoming). Theory and statistical evidence suggest that smallness and riskiness are associated and that both contribute to a firm's dependence on bank lending. It should be pointed out, however, that there exist large, risky firms and small, safe ones.

<sup>14</sup>Timothy H. Hannan, "Bank Commercial Loan Markets and the Role of Market Structure: Evidence from Surveys of Commercial Lending," *Journal of Banking and Finance* 15 (February 1991), pp. 133-49.



repayment<sup>15</sup> and a greater risk of bankruptcy. Note that the borrower's business prospects need not have changed. But although the expected return to the borrower's business is the same, the lender perceives a greater risk because lenders have less information. The net effect is a higher probability of bankruptcy for the borrower; the lender's uncertainty becomes greater risk for the borrower.<sup>16</sup> Borrowers then borrow less; the higher risk causes them to lower their planned economic activity. The higher risk faced by borrowers reduces their borrowing both because of the borrower's aversion to risk and because of the increased costs businesses face when financial distress occurs.

Banks also attempt to counter the loss of information by making the noncredit terms of lending more onerous—requiring more collateral or personal guarantees. The higher noncredit terms may be impossible for the borrower to meet, or the borrower may feel the terms entail an unacceptable degree of personal risk.

The loss of information may be exacerbated if the bank decides that specific types of lending are unlikely to be profitable for a sustained

period of time or that the bank is carrying too much risk exposure in one area already. The bank may transfer personnel away from that area or lay them off, thus further reducing the information the bank has.

These information problems in lending are local. Are they important for entire economies? This is primarily an empirical matter. But on a theoretical level, economywide shocks can clearly be prolonged by this essentially local mechanism. If, for example, an oil price hike leads to fewer loans being made across the country, each local credit market thereafter has less information, which will in turn tend to reduce local lending in each market in the next period, creating an economywide impact of reduced lending.<sup>17</sup> As a result, the aggregate temporary dislocation can have prolonged effects through local channels. Similarly, the economywide impact of reduced mortgage lending can exacerbate and prolong recessions in the housing market.

Thus a temporary decline in aggregate lending may become prolonged because, in addition to the normal dampening effects of a reduction in demand on economic activity, banks also face a reduction in the information available to them about borrowers. As a consequence, banks will tend to reduce their holdings of loans to risky borrowers and increase their holdings of loans to less risky borrowers (including, possibly, their holdings of U.S. government and agency debt).

This means that recessions will, from the borrower's perspective, typically be characterized by periods of relatively tight credit, when little new lending is going on. Also, banks have less information during these periods, making it somewhat harder for them to discern when times are improving and new loans less risky.

The problem of information loss during re-

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<sup>15</sup>The banks require a higher risk premium because as risk increases, the expected return to the loan decreases. With higher risk, the borrower fails to repay the full amount of the loan more often. Of course, if the bank is risk averse and cannot fully diversify the risk of the loan, the risk premium will increase by even more, and the impact of the information externality will be even greater.

<sup>16</sup>This analysis applies with both risk-averse and risk-neutral lenders. In the risk-neutral case, the greater uncertainty on the part of lenders implies that lenders will more often be either too optimistic or too pessimistic than when there is more information available. The borrower is then sometimes charged too much and other times too little. The uncertainty of the lender randomly redistributes borrowing costs across borrowers, which increases the effective risk faced by the average borrower. This increase in borrower riskiness results in a higher probability of bankruptcy and thus greater average borrowing costs for borrowers.

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<sup>17</sup>See Lang and Nakamura (1990) for the underlying theory.

cessions and the fact that this information loss constitutes an externality imply that too little lending occurs during recessions. As a consequence, the monetary authority may wish to encourage lending by pushing short-term interest rates down to offset this effect during recessions.

In the absence of the externality, interest rates should reflect and mediate, in Irving Fisher's classic terminology, the impatience to spend (the preference for present over future consumption) and the opportunity to invest (the return on capital investment).<sup>18</sup> With no information externality, actions of the monetary authority to raise or lower the interest rate interfere with this equilibrium.

The transmission of information through credit markets is likely to be least efficient during recessions, as the evidence below points out. With this information externality, then, a reduction in interest rates during a recession may indeed improve social welfare by encouraging additional lending, which provides informational advantages as the recession turns to recovery.

**Empirical Evidence on Information Losses During Recessions.** The information theory just outlined applies primarily to smaller, riskier firms that are more dependent on bank credit. Larger, safer firms have access to nonbank sources of funds. A decrease in bank lending to these risky firms could have a prolonged effect on the availability of credit to these firms and thus on their economic activity if the theory is important empirically.<sup>19,20</sup>

Data taken from the Federal Reserve's Sur-

vey of Terms of Bank Lending suggest that recessions indeed appear to be foreshadowed by a "flight to quality" in which the ratio of "safe" commercial loans (to borrowers considered "prime" customers) to total commercial loans (the sum of prime and less than "prime" borrowers) increases.<sup>21</sup> Although these data are available only since 1979, all three recessions since then were foreshadowed by a flight to quality, as measured by the ratio of safe lending to total lending.

In each case, the flight to quality signals a persistent shift in real U.S. economic activity, as the theory just outlined suggests. The impact of a reduction in risky lending on real U.S. growth (as measured by real gross domestic product) grows for at least a year and persists strongly for at least two years.

Balance sheet data on corporate liabilities also support the point that small borrowers are affected crucially in recessions. Stephen Oliner and Glenn Rudebusch show that a decline in bank lending following a monetary contraction

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sions, decreases in bank lending to these borrowers would likely not have much aggregate importance. The empirical evidence that follows shows that recent changes in the market structure of lending have not eliminated the aggregate importance of bank lending.

<sup>20</sup>The empirical question of whether credit disturbances play an important role in aggregate activity has been a recurrent one in economics. Ben Bernanke, in an influential article, has given evidence that the Depression of the 1930s was exacerbated by the bank failures that were endemic at that time. He argued that the bank failures led to a greater cost of financial intermediation: investment became more difficult because the bank failures greatly compromised the banking system's ability to evaluate and monitor loans. See Ben Bernanke, "Non-Monetary Effects of the Financial Collapse in the Propagation of the Great Depression," *American Economic Review* 73 (June 1983), pp. 257-76.

<sup>21</sup>The empirical evidence discussed here is in William W. Lang and Leonard I. Nakamura, "The Flight to Quality in Bank Lending," Working Paper 92-20, Federal Reserve Bank of Philadelphia, 1992.

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<sup>18</sup>Irving Fisher, *The Theory of Interest*. New York: Macmillan, 1930. This classic work is subtitled, "As Determined by IMPATIENCE To Spend Income and OPPORTUNITY To Invest It."

<sup>19</sup>If the junk bond market, for example, could substitute fully for banks in lending to risky borrowers during recessions,

depresses investment spending by small firms.<sup>22</sup> In a separate test, they show that small firms are more dependent on internal cash flows for investment during a recession.

Data on sales by small firms also tend to support this argument. Mark Gertler and Simon Gilchrist show that after a monetary tightening, the sales growth of small firms declines more sharply than that of large firms.<sup>23</sup>

These papers strongly suggest that reductions of bank lending to smaller, riskier borrowers are an important element in recessionary periods. They argue that bank loans to small firms are important to aggregate activity, making it appear likely that information externali-

ties exacerbate declines in economic activity.

## SUMMARY AND CONCLUSIONS

Commercial banks are information specialists. By and large, competition and the profit motive provide good incentives for banks to do an excellent job of information-gathering and loan analysis. Lenders depend, however, on past transactions to provide information to help them evaluate current loans. Periods in which loan markets become thin thus tend to become self-perpetuating, as the slowdown in lending reduces information and the resulting ignorance begets uncertainty and makes borrowing riskier, so even fewer loans are made. This represents a dynamic information externality. As a consequence, when information thins out, as when few mortgages are made in a given neighborhood or when lending to risky borrowers declines in a recession, there may be a useful role for the government to play in encouraging credit activity.

<sup>22</sup>Stephen D. Oliner and Glenn D. Rudebusch, "The Transmission of Monetary Policy to Small and Large Firms," mimeo, Federal Reserve Board, June 1992.

<sup>23</sup>Mark Gertler and Simon Gilchrist, "Monetary Policy, Business Cycles and the Behavior of Small Manufacturing Firms," NBER Working Paper No. 3892, 1991.

## Other Dynamic Information Externalities

Information externalities are crucial to credit markets because the provision of credit is so intimately tied to information. Yet, information externalities exist not only in credit markets but throughout the economy.

For instance, Rafael Rob has shown that information externalities are important to capacity decisions in growing industries.<sup>3</sup> Rob's analysis begins with the point that in such industries, producers will be uncertain about the shape of the demand curve and must guess about how much capacity the market will bear. Each addition to capacity—as it comes to market—provides additional information about the demand for the product. This information is then of value to the next firm that adds capacity.

Another area in which information externalities are important is in new inventions and ideas. Although patent protection allows an inventor to keep some of the value of a new idea or invention, subsequent inventions and ideas that build upon it can appropriate much of this value. Basic research is subsidized for this reason, since basic research may have little immediate market value but may have great ultimate social value, value garnered by those who build on the original idea.

Indeed, the development of any new industry is likely to be rife with instances of firms' benefiting from the risks and ideas of others. For example, many personal computer manufacturers have benefited from the firms, such as Apple and IBM, that pioneered this market. If this is the case, society will benefit when research and development are subsidized.

<sup>3</sup>Rafael Rob, "Learning and Capacity Expansion Under Demand Uncertainty," *Review of Economic Studies* 58 (July 1991), pp. 655-75.