

Credit in the Macroeconomy

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I. Introduction

Issues of credit extension and credit quality, though largely ignored by the conventional macroeconomic paradigm, seem nevertheless to have become important elements of contemporary macroeconomic analysis. A leading example is the reaction of many economists, policymakers, and journalists to the recent recession in the United States: rightly or wrongly, the conventional wisdom has pointed to factors such as the "credit crunch" and the "overleverage" of households and firms as major contributors to the U.S. economic slowdown and the erratic nature of the subsequent recovery. Similarly, recent economic downturns in the United Kingdom, Japan, and other countries have been attributed by some observers (the *Economist* magazine, for example) to problems in the banking sector or weakness of corporate balance sheets.

Are these credit-related aspects of recession and recovery a new issue, a phenomenon peculiar to the late 1980s and early 1990s? Evidently this is not the case. No recent experience of credit problems, financial distress, or insolvency rivals the experience of the Great Depression, for example. And in the postwar period, episodes such as the 1966 credit crunch and the 1980 experiment with selective credit controls highlighted possible links between credit and the macroeconomy. Rather than credit having somehow newly emerged as a factor in business cycles, what has happened recently is that there has been a confluence of economic events and developments internal to the field

of economics. In particular, as I will outline briefly in Section II, over the last two decades or so new theoretical insights about the economic implications of imperfect information have led economists to look at credit markets with a fresh interest and a fresh perspective. This fortuitous conjunction of events and ideas has contributed to an enhanced appreciation of the role of credit in the macroeconomy by most economists and policymakers.¹

The purpose of this paper is to review and interpret some recent developments in our understanding of the macroeconomic role of credit or, more accurately, of the credit creation process. By *credit creation process* I mean the process by which, in exchange for paper claims, the savings of specific individuals or firms are made available for the use of other individuals or firms (for example, to make capital investments or simply to consume).² In my broad conception of the credit creation process I include

¹It is worth emphasizing that the "rediscovery" of credit is just that; there have always been some economists who have emphasized credit's macroeconomic role and importance, certainly including Irving Fisher and possibly Keynes. Important references include Fisher (1933), Gurley and Shaw (1955, 1960), Kindleberger (1973, 1978), Minsky (1964, 1975), and Wojnilowner (1980). Gertler (1988) provides an excellent review of the evolution of thought on this topic. Note that the DRI econometric model of the U.S. economy has long given a central role to "credit crunches" and other financial factors (Eckstein and Sinai 1986), as does the more recent Sinai-Boston model (Sinai 1992).

²Note that I am drawing a strong distinction between credit creation, which is the process by which saving is channeled to alternative uses, and the act of saving itself. Thus, although inadequate saving may be a major macroeconomic problem, that issue is not my concern in this paper. Because the focus of this paper is the credit creation process rather than saving per se, I devote most of my attention here to markets for private credit, where issues of credit quality are most relevant, rather than to markets for government credit. Obviously, a study of the U.S. saving problem could not afford to ignore issues relating to government borrowing and debt.

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most of the value-added of the financial industry, including the information-gathering, screening, and monitoring activities required to make sound loans or investments, as well as much of the risk-sharing, maturity transformation, and liquidity provision services that attract savers and thus support the basic lending and investment functions. I also want to include in my definition of the credit creation process activities undertaken by potential borrowers to transmit information about themselves to lenders: for example, for firms, these activities include provision of data to the public, internal or external auditing, capital structure decisions, and some aspects of corporate governance. The *efficiency* of the credit creation process is reflected both in its ability to minimize the direct costs of extending credit (for example, the aggregate wage bill of the financial industry) and in the degree to which it is able to channel an economy's savings into the most productive potential uses.

The presumption of traditional macroeconomic analysis is that this credit creation process, through which funds are transferred from ultimate savers to borrowers, works reasonably smoothly and therefore can usually be ignored. In the standard IS-LM model of the intermediate macroeconomics textbook, for example, firms' willingness to invest is determined only by the physical productivity of capital and the real interest rate, which in turn depends on households' desire to save and wealth holders' liquidity preference. In the standard model, factors such as the financial condition of banks and firms play no role in affecting investment or other types of spending.

An alternative to this conventional view holds that the credit creation process, far from being a perfectly functioning machine, may sometimes work poorly and even break down. Furthermore, according to this alternative perspective, fluctuations in the quality of credit creation have implications for aggregate variables such as output, employment, and investment.³ It is this alternative view, as interpreted through the lens of the economics of imperfect information, that is the subject of my paper.

The rest of this paper is structured as follows: Section II is a brief introduction to recent research on credit markets based on the new economics of imperfect information. It focuses on two aspects of credit creation that have received extensive attention from economists, namely, the roles of financial intermediaries and of borrowers' balance sheets in solving information and incentive problems in credit markets.

With Section II as general background, Section III

³In this paper I consider only the implications for business cycles and macroeconomic policy of variations in the quality of credit creation. It should be mentioned, however, that issues of financial performance have recently assumed a major role in economists' thinking about longer term issues, including economic growth and development and the transition from communist to capitalist systems.

reviews the debate on the role of credit in the transmission of monetary policy. Because this research area is currently quite active (and because this meeting is taking place at a Federal Reserve Bank), I devote a good bit of space to this issue. However, the macroeconomic role of credit is certainly not limited to its role in monetary transmission: Section IV looks briefly at other ways in which credit factors are important for business cycles and macroeconomic policy, including the "credit crunch" and "overleverage" phenomena. In Section V I offer an interpretation of the role of credit in the recent U.S. recession. Section VI concludes by asking how the fundamental and ongoing changes in the U.S. financial system are likely to affect the role of credit in the macroeconomy.

II. The new economics of imperfect information: Implications for credit market analysis

To a degree that may be unfortunate but is probably unavoidable, the topics that economic researchers investigate and the interpretations at which they arrive are affected as much by the internal dynamics of the field—the development over time of new economic theories and methods—as by the external reality of economic events and institutions. The effects of the internal dynamic are quite clear in the evolution of economists' views about the role of credit markets. In this section I will briefly review the recent and rather dramatic changes in economists' ideas about credit markets and lay out a few basic themes that will recur throughout this paper. In doing so, I will cite very selectively; a comprehensive survey of this burgeoning field would require a much longer paper than this one.

Twenty years ago the dominant economic paradigm was one that assumed "complete markets," that is, perfect information. Economic theorists used the complete-markets setup to prove powerful, formal theorems about the efficiency of a decentralized market system, thus making rigorous and precise Adam Smith's "invisible hand" idea of two centuries earlier. Techniques were also developed to use the complete-markets approach to study a variety of applied economic issues, from the pricing of financial assets to the incidence of tax policies. The complete-markets paradigm remains influential in macroeconomics today in the form of the so-called real business cycle approach to dynamic macroeconomic modeling.

The essence of the credit creation process is the gathering and transmission of information. Hence it is perhaps not surprising that economic theorists, once habituated to the assumptions of complete markets and perfect information, began to downplay the role in the economy of credit creation and of the financial system more generally. An early example of this tendency was

a tremendously influential paper by Franco Modigliani and Merton Miller (1958). Modigliani and Miller showed that under the assumption of complete markets (and ignoring some complicating factors such as tax effects), firms' capital structures (their chosen mix of debt and equity finance) are economically irrelevant. Their basic point was that in competitive markets with perfect information, real economic decisions (what to produce, how to produce it) depend only on consumer tastes and available technologies and inputs, not on how the ownership claims to the firm happen to be labeled. In other words, the size of the pie is not affected by how you slice it.

In another complete-markets theoretical analysis, Fama (1980) extended the Modigliani-Miller point to the entire financial system (he focused particularly on banks). Fama argued that whether the public chooses to hold, say, bank deposits or common stocks affects only the labeling of ownership claims and is irrelevant to real macroeconomic outcomes, which depend only on tastes, technology, and resources. In short, the financial system is a "veil." One striking implication of this view—an implication that is quite counter to both the conventional wisdom and the approach to credit markets I will discuss below—is that massive bank runs would have no real effects on the economy. In Fama's model, the deposit withdrawals associated with bank runs are only a portfolio shift by the public and have no more real economic significance than would a shift of investors' funds from one mutual fund to another.

While the complete-markets approach remains important in economics, during the 1970s that paradigm's assumption of perfect information came under increasing criticism, and a new economics of imperfect information began to flower. In a seminal theoretical article, George Akerlof (1970) argued that allowing for imperfect information could overturn the central implication of the complete-markets model, that competitive, decentralized markets yield economically efficient results. Akerlof used as his example the market for used cars. In the used car market, the typical situation is one in which the seller (the used car owner) knows more about the good being sold (that is, whether it is a "lemon") than does the potential buyer. Akerlof argued that in this type of market, in which information is "asymmetric" between suppliers and demanders, lowering prices may not increase demand for the good in the usual way. The reason for this result is that potential used car buyers may realize that the lower the prevailing price, the more likely it is that only owners of "lemons" will choose to offer their cars for sale. Hence, lower prevailing prices may not make people more eager to buy a car. Since demand may not increase as price falls, it is possible that there is *no* price that

equates supply and demand, and the market for used cars could break down completely.

According to Akerlof's analysis, making the used car market work efficiently will generally require mechanisms for overcoming the information problem. Examples of such mechanisms are bonds or warranties offered by the seller, third-party mechanics who inspect used cars for a fee, or used car dealers who develop good reputations with the public. Analogous results in other contexts were found by Rothschild and Stiglitz (1976) in their theoretical analysis of insurance markets and by Jaffee and Russell (1976) in their analysis of the economics of bank lending.

The veritable explosion of research on the economics of imperfect information that began in the 1970s led to a parallel awakening of economists' interest in the information-gathering functions of the financial system. A major benefit of the new research was that economists gained a much deeper understanding of the fundamental difference (ignored by the complete-markets approach) between the credit market and a market like the wheat market. Wheat is a standardized commodity whose quality is easy to evaluate; thus the wheat market can operate in a decentralized, arm's-length fashion, in which suppliers and demanders need only know the prevailing price in order to decide how much to sell or buy. In contrast, the market for credit is suffused with imperfect and asymmetric information. So, in the credit market—as in Akerlof's used-car market—decentralized, arm's-length transactions based only on price (or the interest rate, in this case) are unlikely to work.⁴ Instead, in order to clear the credit market, "price" (that is, the interest rate or expected yield) may have to be supplemented by a variety of other institutional mechanisms to overcome the problems of imperfect information.

What are the mechanisms that allow the credit market to function despite imperfect and asymmetric information? The research of the last fifteen or twenty years has focused on two: 1) the existence of banks or other financial intermediaries and 2) the structure of financial contracts.

A. The special nature of banks and other intermediaries

In the market for used cars, the problems of asymmetric information may be overcome if there are independent mechanics who specialize in evaluating used cars for a fee. Or there may be used car dealers who provide warranties or who have incentives (because of repeat business) to develop a reputation for honest dealing.

⁴The analogy between Akerlof's used-car market and credit markets is drawn explicitly for the loan market by Stiglitz and Weiss (1981) and for the equity market by Myers and Majluf (1984).

Analogously, in credit markets, there is potentially an important role for various intermediaries (including banks, pension funds, life insurance companies, brokerage houses, and many other institutions) that specialize in gathering information, evaluating projects and borrowers, and monitoring borrowers' performance after the loan. Many economists have suggested that banks and similar institutions play a particularly central role in credit markets because of their expertise in conveying the savings of relatively uninformed depositors to uses (such as small business loans) that are information-intensive and particularly hard to evaluate. In short, according to this view, banks are "special."

A large theoretical literature has focused on why banking institutions are able to create credit more efficiently than either individual savers or some alternative types of institutions.⁵ Among factors that have been cited are economies of specialization (lending officers can gain expertise in a particular industry, for example), economies of scale (it is cheaper for a bank to evaluate a loan than for many small savers to do so independently), and economies of scope (it is efficient to provide lending services in conjunction with other financial services).

Empirically, there is a good bit of direct and indirect evidence that banks and similar intermediaries play a special role in the process of credit creation. For example, Fama (1985) and James (1987) showed that bank borrowers rather than depositors typically bear the "tax" associated with reserve requirements. Since borrowers would not willingly bear this tax if they had good alternatives, this finding suggests that bank borrowers receive access to credit or other lending services that they could not costlessly duplicate on open capital markets.

Several studies have emphasized the importance of bank lending relationships for small and fledgling businesses and the reliance of small businesses on banks located geographically close to them (Elliehausen and Wolken 1990; Petersen and Rajan 1992). Larger firms apparently also benefit from the special services that can be provided by banks; for example, James (1987) and Lummer and McConnell (1989) find that the announcement of bank loan agreements, which presumably indicate the approval of bank lending officers of the company's business plans, raises the price of the company's shares. Sushka, Slovin, and Polonchek (forthcoming) show that during the period in which Continental Bank was in danger of failing, the share prices of Continental's loan customers moved in concert with

the price of Continental stock, rising sharply on news of the bailout; this finding suggests that for Continental's customers, a continuing relationship with their bank was important. A number of papers have also shown that banking relationships reduce the costs to firms of financial distress (see, for example, Gilson, John, and Lang 1990).

For the purposes of macroeconomic analysis, the main implication of this literature on intermediation is the following: If banks and other intermediaries perform a special role in the credit creation process, for example, by providing credit to certain classes of customers who could not easily borrow elsewhere, then—counter to the implication of the Fama (1980) model—factors that reduce the amount of credit channeled through the banking system may have significant macroeconomic effects. Depending on the particular macroeconomic framework, these effects might occur either because the spending of bank-dependent borrowers would decline or because the net return to saving in the economy would fall, or both. Possible sources of a reduction in the supply of bank credit, most of which will be discussed below, include bank runs or panics, government restrictions on bank lending (for example, credit controls), increased costs (for example, regulatory costs), declines in banks' capital or deposit base, and monetary policies that reduce the stock of bank deposits.

B. The structure of financial contracts: the critical role of borrowers' balance sheets

A second area in which the economics of imperfect information has had a major impact is the analysis of financial contracts and financial instruments. An important insight of this research is that in a credit market with imperfect or asymmetric information, the form of the financial contract between the lender and the borrower may have important effects on the borrower's incentives to truthfully reveal information and/or to make business decisions that are in the creditor's interest. Thus, far from being irrelevant as implied by Modigliani and Miller (1958), the structure of financial claims is intimately related to borrower decisions and thus to real outcomes in the economy.

A pathbreaking application of the economics of imperfect information to the study of financial contracting was provided by Jensen and Meckling (1976). These authors reconsidered Modigliani and Miller's question of optimal capital structure, but instead of assuming perfect information as had Modigliani and Miller, they considered the more realistic situation in which potential investors in a firm have only limited ability to monitor the activities of firm management. Jensen and Meckling show that with the addition of imperfect information, the

⁵Important papers include Diamond and Dybvig (1983), Diamond (1984), Boyd and Prescott (1986), Allen (1990), and Calomiris and Kahn (1991).

Modigliani-Miller irrelevance result disappears: the actions of management (and hence, the real outcomes in the economy) are no longer independent of how the firm is financed.

A simple example will clarify the Jensen-Meckling argument. Suppose that the "insiders" (managers, directors, principal shareholders) who run a particular firm have only enough wealth themselves to own 1 percent of the firm's assets. The other 99 percent of the firm's assets must be financed (we assume) by straight debt or equity issued to the public. Jensen and Meckling showed that either financing choice inevitably entails some distortion of the insiders' incentives. Suppose, for example, that the other 99 percent of the firm is financed by an equity issue. Then, assuming that outside shareholders cannot effectively monitor the insiders' actions, the insiders will have little incentive to work hard to increase the firm's profits, since they personally receive only 1 percent of any extra profits earned. Thus, with equity finance, profits will be lower than they should be.

Reliance on debt finance instead of equity would ameliorate this particular incentive problem since with 99 percent debt finance, the insiders (as the sole equity holders) would be entitled to any extra profits they could create. However, in the Jensen-Meckling framework, debt finance turns out to create a different incentive problem: with high leverage, and assuming that direct penalties for bankruptcy are not too high, insiders have an incentive to take excessively risky actions or make excessively risky investments. The reason for this risky behavior is that with high levels of debt finance, the insiders retain most of the profits from success while the debt holders absorb most of the losses from failure.⁶

The difference between what the value of a firm would be under perfect information (with insiders acting so as to maximize total profit) and what it is under a particular financing arrangement is called the *agency cost* of that financing arrangement (the term is from a branch of economic theory called principal-agent theory). Jensen and Meckling demonstrated that both external equity finance and external debt finance have agency costs that inevitably arise from the combination of imperfect information and the separation of ownership and control. They suggested that, in practice, we should observe firms choosing capital structures that are optimal in the sense of minimizing total agency costs.

Jensen and Meckling's original framework was quite simplistic; for example, it did not allow for alternatives to straight debt and equity (such as convertible debt or preferred stock) and did not consider the implications of

the fact that outside equity holders have voting rights. A voluminous theoretical literature has now corrected these omissions and tackled many other difficult questions without reversing Jensen and Meckling's basic points.⁷ For our purposes, one of their insights is particularly important—the insight that because of information and incentive problems, external finance (funds raised from outsiders) is intrinsically more expensive to the firm than internal finance (the firm's retained profits or funds controlled by insiders).⁸ Hence, of two firms with identical opportunities to make a capital investment but different levels of internal finance, the firm with the greater availability of internal finance should always be more willing to make the investment.

Another way to put this point is that *balance sheet positions matter*. All else equal, a firm with a high net worth and plenty of liquid assets available will be much more likely to undertake a capital investment, expand its business, or hire new workers than a firm with a weak balance sheet that must rely on external finance.

The empirical evidence for the view that internal finance is cheaper than external finance, and therefore that balance sheets matter, is quite strong. In an influential paper, Fazzari, Hubbard, and Petersen (1988) compared the investment behavior of rapidly growing, non-dividend-paying firms with that of more mature, dividend-paying firms. Since presumably the rapidly growing firms were relatively more constrained in terms of the availability of internal finance, the theory implies that their investment spending should have been more sensitive to their current cash flows than was the investment spending of the more mature, liquid firms. Using capital valuations derived from share prices to control for the quality of investment opportunities, Fazzari et al. confirmed this implication in the data. Many subsequent studies have found that firms' liquidity or balance sheet positions affect their willingness to make capital investments, and that firms find internal finance to be cheaper than external finance (see, for example, Fazzari and Athey 1987; Whited 1991, forthcoming; Calomiris and Hubbard 1991; and Hubbard and Kashyap, forthcoming).

An interesting interaction between the special role of banks and the importance of firms' balance sheet positions for investment was found by Hoshi, Kashyap, and Scharfstein (1991) in a study of Japanese firms. In Japan, many firms are affiliated with *keiretsu*, or indus-

⁷See, for example, Myers (1984), Narayanan (1988), Lacker, Levy, and Weinberg (1990), and Bayless and Chaplinsky (1991).

⁸While we have emphasized the agency costs of external finance, there are also a variety of more prosaic transactions costs (for example, legal and accounting costs) that are higher for external than for internal finance.

⁶This is perhaps not a bad description of the situation of the savings and loans industry in the 1980s.

trial groups. Firms within a particular *keiretsu* typically enjoy a close relationship with the industrial group's "main bank," a relationship that helps to overcome information problems and thus reduces the costs to the firm of external finance. The prediction of the theory is that investment spending by firms within a *keiretsu*, when compared with spending by non-*keiretsu* firms, would be relatively independent of changes in internal cash flow and liquidity because of these firms' easier access to external funds. Hoshi et al. confirmed that this prediction held for their sample.

With this introduction to some themes that the new economics of imperfect information has brought to the analysis of credit, I turn now to the main subject of the paper, the link from credit to macroeconomic policy and macroeconomic fluctuations. Section III discusses the role of credit in the transmission of monetary policy, an area that has recently received much attention. Section IV takes up some other ways in which credit affects macroeconomic performance.

III. The role of credit in the transmission of monetary policy

How does monetary policy affect aggregate demand? The conventional view, codified for example in textbook presentations of the Keynes-Hicks-Modigliani IS-LM model, is that the Federal Reserve can affect spending by changing the supply of the medium of exchange relative to the demand. According to this story, to slow down the growth of aggregate demand (for example), the Fed should use open market sales to drain reserves from the banking system, reducing the money supply. This contrived scarcity of the medium of exchange is presumed to drive up short-term interest rates and possibly—through substitution and expectational effects—longer term rates as well. In the last step of the process, higher interest rates depress aggregate demand by raising the cost of funds relative to the returns to capital (including housing and consumer durables).⁹ This standard view of the monetary transmission mechanism has been referred to as the "money view."

The money view embodies some strong assumptions about credit markets, although the assumptions are not usually emphasized in textbook presentations. The most striking of these is that, effectively, the money view assumes that all nonmoney assets are perfect substitutes.¹⁰ Thus, while wealth holders are sensitive

to the mix of money and nonmoney assets in their portfolios, they are indifferent among nonmoney assets (which include government bills and bonds, commercial paper, corporate bonds, stocks, bank loans, consumer credit, and so forth). Similarly, in this story, firms are not supposed to care about the type of liabilities that they have, or for that matter whether they are financed by internal or external funds. Thus, unlike changes in the mix of money and nonmoney assets, factors affecting the mix of credit instruments have no effect on the economy.

While the money view no doubt contains some truth, there are a number of reasons to be skeptical that this conventional channel is the sole source of the potency of monetary policy in practice: First, there is little reason, theoretical or empirical, to accept the money view's stark characterization of currency and bank deposits as the *only* assets for which there are not perfect or nearly perfect substitutes. On the one hand, we know that there are liquid assets in the economy whose supply is not controllable by the Federal Reserve, such as money market mutual funds and bond funds. The availability of money substitutes outside of banks must surely limit the leverage of the Fed to affect interest rates by reducing the supply of bank deposits, except at very short horizons.¹¹ On the other hand, common sense rejects the notion that all forms of private credit are the same (that is, perfectly substitutable): the types of credit instruments available to IBM and to the corner grocery store are quite different, as are the types of credit instruments held as assets by middle class individual savers and university endowment funds. (Many of these differences among credit instruments arise, of course, from the deep reasons emphasized by the economics of imperfect information.) The extreme substitutability assumptions of the money view make it a polar view; to the extent that those assumptions are violated, the channels of monetary transmission become more complex.

A second general objection to the money view is that this conventional channel seems to be too weak to account for the relatively large effects of monetary policy on spending that we sometimes observe. The theory implies that changes in the supply of money can affect *real* interest rates only over a relatively short horizon, but purchases of long-lived capital goods and housing should depend primarily on the long-term real interest rate, which is relatively immune to monetary actions.¹²

⁹Higher interest rates also strengthen the dollar, leading to reduced export demand.

¹⁰In the IS-LM model there are only two financial assets, money and bonds. "Bonds" is an aggregate of all nonmoney assets, which are assumed to be perfectly mutually substitutable.

¹¹Brainard and Tobin (1963) pointed out that the availability of money substitutes might dampen the impact of monetary policy actions.

¹²The dependence of capital spending on the long-term real rate requires the plausible assumptions that capital investment is irreversible and that there are limits on substitutability with other factors once capital is installed.

Even more damaging to the money view, most studies find that the sensitivity to interest rates of capital spending, inventory investment, and other major categories of spending is quite low (see Hirtie and Kelleher 1990 for a recent survey and some independent estimates).

Without necessarily denying that the conventional liquidity channel plays a role in monetary policy transmission, some recent research has addressed an alternative channel that 1) allows for more general patterns of asset substitutability than the money view and 2) can help explain, together with the conventional view, the apparent potency of monetary policy actions. This alternative channel, which builds on ideas emerging from the economics of imperfect information (Section II), has been variously called the "credit view" or the "lending view."¹³

A. The "credit view" of monetary transmission

In a nutshell, the credit view asserts that in addition to affecting short-term interest rates, monetary policy affects aggregate demand by affecting the availability or terms of new bank loans. This is an old idea, going back at least to the "availability doctrine" of the 1950s (Roosa 1951; see also Brunner and Meltzer 1968). An early restatement of the idea in the language of the economics of imperfect information can be found in Blinder and Stiglitz (1983).

A spare formal treatment of the credit view was given by Bernanke and Blinder (1988). Bernanke and Blinder took the conventional IS-LM model¹⁴ and added a single assumption: they assumed that besides the two imperfectly substitutable financial assets called "money" and "bonds" that appear in the standard model, there is a third asset called "bank loans" that is imperfectly substitutable with the other two assets. This assumption is motivated by the idea, discussed in Section II, that banks are special in their ability to extend credit to borrowers who, because of imperfect information, would find it difficult to borrow from other sources.

Adding the third asset to the standard model opens up a new channel of monetary policy transmission. Suppose again that in order to dampen aggregate demand, the Fed does an open market sale and drains bank reserves from the system. As the loss of reserves reduces the quantity of bank liabilities (deposits), it must also reduce bank assets. Assuming that banks

treat the loans and securities that make up their portfolios as imperfect substitutes,¹⁵ the loss of deposits will induce them to try to reduce both categories of assets.

If firms are completely indifferent about their source of finance, then a cutback in bank lending will not affect their spending or other behavior. However, if banks play a special role in providing credit to some borrowers, then a drying up of bank lending forces these borrowers to more expensive forms of credit (or denies them credit altogether). As a result, bank-dependent firms may cancel or delay capital projects, reduce inventories, or even cut payrolls, depressing aggregate demand. Similar effects may operate in the consumer sector to the extent that households are directly or indirectly dependent on banks for certain types of credit.

A couple of points are worth adding here: First, in many discussions the credit channel of monetary policy has been closely identified with the related idea that banks and other lenders sometimes ration credit (that is, limit the quantity of credit extended to certain borrowers or refuse to lend altogether). Credit rationing—which can be motivated as a response to imperfect information in credit markets (Stiglitz and Weiss 1981)—is certainly *consistent* with the existence of a credit channel, and it may be empirically useful in explaining the apparent "stickiness" of published loan rates. However, credit rationing is not at all *necessary* for the credit channel to exist. All that is required for a credit channel is that bank credit and other forms of credit be imperfect substitutes for borrowers. Thus the fact that many bank borrowers have potential alternative credit sources (such as finance companies) does not eliminate the credit channel, as long as the alternative credit sources are to some extent more expensive or less convenient to the borrower.

Second, while the Bernanke-Blinder treatment emphasizes the bank lending channel, credit factors may enhance the effects of monetary policy on the economy in other ways. In particular, as the discussion of Section II suggests, to the extent that monetary policy affects balance sheet positions, there will be a sort of credit channel that impacts even firms that are not dependent on bank loans.¹⁶ For example, a mone-

¹³For additional discussion of the credit view, see Kashyap and Stein (1992) and Gertler and Gilchrist (1992).

¹⁴Although Bernanke and Blinder work in the Keynesian IS-LM framework, the credit view is compatible with non-Keynesian approaches; see, for example, Fuerst (1992) and Christiano and Eichenbaum (1992).

¹⁵The assumption that loans and open market securities are imperfectly substitutable as assets from the bank's point of view is different from the assumption that loans and securities are imperfect substitutes from the point of view of borrowers. However, the former assumption is also realistic: banks hold securities such as Treasury bills primarily for liquidity, to be used as collateral, and to satisfy various legal requirements, while loans are held primarily for their expected return.

¹⁶This point has been emphasized by Gertler and Gilchrist (1992).

tary policy easing that lowers open market interest rates is likely to increase firm asset values and improve liquidity by lowering interest-to-cash-flow ratios (assuming either floating rate or callable corporate debt). If these balance sheet improvements raise the availability of internal funds and improve the terms on which firms can attract external funds, they are likely to result in increased spending. Note that although this effect (if it exists) works through open market interest rates, it is distinct from the pure cost of capital effect cited by the conventional money view.

Besides intellectual interest, there are several possible reasons why it would be useful to know if the credit channel of monetary transmission exists, and if so, how important it is. First, in an environment of rapid change in financial markets (due, for example, to financial innovation, deregulation, and new forms of financial competition), an understanding of the transmission mechanism may be important for gauging changes in the magnitude and timing of monetary policy's impact on the economy. Second, credit-related variables may prove to be useful indicators of the tightness or ease of policy, particularly during episodes, such as the recent recession, when some special factors appear to be at work in credit markets (see Section III.C below). Finally, the question whether bank lending is part of the monetary transmission process is closely related to the broader issue of whether banks are special, which is itself the key issue in current debates about reform of bank regulation and deposit insurance.

B. Empirical evidence for the credit channel

In looking for evidence for or against a credit channel of monetary transmission, a number of researchers have investigated the timing relationship between monetary tightening or loosening and bank lending. Focusing primarily on the pre-1980 period, Bernanke and Blinder (1992) found that a tightening of monetary policy, as indicated by a rise in the federal funds rate, was typically followed in the next few months by a decline in bank deposits and a similar decline in bank holdings of securities. Bank loans did not fall during the first months after a tightening; indeed, initially, loans rose slightly. However, Bernanke and Blinder's results indicated that within six to nine months after the policy change, banks typically began to rebuild their securities holdings and to reduce lending substantially, with the timing of the fall in lending corresponding closely to that of a rise in the unemployment rate. Similar empirical results have been found by Nakamura (1988), Romer and Romer (1990), and Kashyap and Stein (1992). Bernanke and Blinder interpreted this temporal pattern as being consistent with the basic credit channel story, that monetary tightening leads to reduced lending, which in

turn depresses spending. They argued that the relatively slow reaction of lending could easily reflect the difficulty of rapidly adjusting loan portfolios.¹⁷

However, a potential problem with the Bernanke-Blinder (1992) interpretation (as they noted) is that a similar timing pattern from money to loans to output might arise if only the conventional money channel were operative. Suppose, for example, that a Fed tightening raised interest rates and induced firms to reduce investment spending, in standard textbook fashion. Then, even though the cause of the spending slowdown was the higher interest rate and not a reduced supply of loans, we would still expect to see a decline in bank lending following the policy change, as firms demanded less credit. Succinctly put, the fact that a decline in loans follows a monetary tightening does not tell us whether the supply of loans or the demand for loans has fallen.

One way to try to resolve the supply-versus-demand puzzle is to look at alternative (nonbank) forms of credit. On the one hand, if loans fall after a tightening of monetary policy because of a reduction in loan supply, as is implied by the credit view, then nonbank sources of credit should rise after a policy tightening as firms and other borrowers look to alternative lenders. On the other hand, if the reason for the slowdown in bank lending is a decline in credit demand, as suggested by the conventional money view, then all forms of credit extension should fall after monetary policy tightens.

Following up this intuition, Kashyap, Stein, and Wilcox (forthcoming) looked at the pattern of commercial paper issuance during the period since that market became important during the 1960s. They found that commercial paper issuance usually expanded sharply during periods of tight money, a development that they interpreted as supportive of the credit view.

The Kashyap et al. results were refined by Gertler and Gilchrist (1991, 1992), who used data from the Quarterly Financial Reports to compare the behavior of small and large manufacturing firms. Gertler and Gilchrist found, unsurprisingly, that the post-monetary-tightening increases in commercial paper issuance documented by Kashyap et al. entirely reflected increased borrowing by large firms (the only firms that typically have access to this market). However, a more surprising result obtained by Gertler and Gilchrist was that large firms also typically *increased* their bank loans during periods of tight money. In contrast, both total borrowings and bank loans of small firms were found to contract sharply following a monetary tightening, a difference reflected

¹⁷Another reason for the slow reaction is that bank balance sheet data on loans reflect the timing of actual takedowns, not of loan decisions.

in very pronounced differences in sales growth and inventory investment between large and small firms over the two years after a policy change.

Gertler and Gilchrist's finding that smaller firms take the brunt of tight money has been confirmed in a number of studies: Oliner and Rudebusch (1992) compared investment by small and large firms and found that small firms' capital investment spending is more sharply reduced after a monetary tightening. Kashyap, Lamont, and Stein (1992) analyzed a sample of publicly traded companies and found that the companies more likely to be bank-dependent (those with no bond ratings and low internal liquidity) cut inventories relatively more sharply during the 1981-82 monetary squeeze. In an earlier paper using Depression-era data, Hunter (1982) found that large firms were able to maintain and even expand their liquidity during the severe economic downturn of that period while small firms were not. Ramey (forthcoming) found that the ratio of small firm growth to large firm growth contained a good bit of information about the future course of GNP.

The impression that it is the smaller, more marginal borrowers who are hurt most by monetary tightening is also confirmed by studies of bank behavior. For example, Nakamura and Lang (1992) used Federal Reserve surveys of bank lending officers to show that loans made at one or more points above prime shrink relative to total loans during periods of tight money, a "flight to quality" phenomenon that suggests that banks cut off more marginal borrowers when monetary policy is restrictive.¹⁸ In a similar spirit, Morgan (1992) found significant increases in the fraction of loans made under commitment during tight money periods (precommitted bank lines of credit are more likely to be held by larger, financially stronger borrowers).

The finding that it is loans to small firms, rather than total bank loans, that are most affected by Fed tightening is a bit different from the basic Bernanke-Blinder (1988) story. However, Gertler and Gilchrist argue that their result is nevertheless in the general spirit of the credit view. They point out that small firms are generally financially weaker (in a balance sheet sense) than large firms, and that the costs of lending to small firms (that is, costs of information-gathering and monitoring) are typically larger relative to the size of the loan. Also, the shorter expected lives of small firms reduce the value to a bank of having an ongoing relationship with a small firm. For these reasons, based on the sorts of considerations outlined in Section II, it seems plausible that if banks are forced to reduce their lending they will cut off credit to small firms first. In contrast, the conventional

money view—which relies on cost of capital effects and ignores balance sheet factors—is hard put to explain the differential responses of small and large firms to tight money.¹⁹

The evidence discussed so far has focused on financial quantities such as money, lending, and commercial paper issuance. A complementary strategy would be to look at financial prices, that is, interest rates or interest rate spreads. For example, if the credit view is correct and tight monetary policies work by constricting bank loan supply, then in principle, during periods of tight money, bank loan rates ought to rise relative to open market rates (see Bernanke and Blinder 1988). Unfortunately, in practice, looking at loan interest rate series alone is unlikely to be helpful for sorting out the alternative hypotheses. The problem is that the true "price" of a bank loan is multidimensional, involving not only the contractual interest rate but a variety of other terms and conditions (for example, covenants, collateral requirements, and so on). Further, the usefulness of average loan rate series is compromised by the fact that the mix of credit risks assumed by banks is not constant over time: given the evidence discussed above for the idea that there is a "flight to quality" during tight money, for example, it is possible that the average rate on loans made might fall following a Fed tightening, even though the effective cost of funds to a borrower of given quality is rising.

While it is probably not useful to look at loan rates per se, there may be something to be gained from looking at interest rates on loan substitutes. An interesting case in point is the rate on commercial paper. A few years ago, Friedman and Kuttner (1992) and Stock and Watson (1989) observed independently that the spread between the four- to six-month prime commercial paper rate and the six-month Treasury bill rate has historically been an astonishingly good predictor of real economic activity (with a rise in the commercial paper rate relative to the Treasury bill rate signaling an imminent economic downturn). In preliminary work, Bernanke and Mishkin (1992) have found similar results for other countries. The question is, what is the economic reason for this predictive power?

The natural first hypothesis, that this spread was predictive because it reflected the market's perception of default risk, was found under closer examination to be inadequate. (Problems with this explanation included the fact that default by issuers of prime commercial paper is extremely rare and the finding that other natu-

¹⁸Wojnilower and Speagle (1962) made a similar observation much earlier.

¹⁹Independent of its impact on the technical debate about monetary transmission, the finding that monetary policy has a disproportionate effect on small firms—with the implication that the burdens of disinflation are not evenly shared—should be of interest to policymakers.

ral measures of default risk contained much less predictive power than the commercial paper spread.) Bernanke (1990) suggested that the paper-bill spread was a good predictor of economic activity because it was an indicator of the tightness of monetary policy. His argument was based on the logic of the credit view and complemented the findings on commercial paper issuance of Kashyap et al.: A tightening of monetary policy, if it reduces loan supply as suggested by the credit view, should force borrowers into the commercial paper market. Assuming imperfect illiquidity in that market, increased supply pressure should raise the commercial paper rate relative to the safe (Treasury bill) rate. Bernanke noted similar behavior by the spread between the bank certificate of deposit (CD) rate and the Treasury bill rate, behavior that is also consistent with the credit view if monetary tightening forces banks to try to obtain funds in the CD market.

Research on why the paper-bill spread was predictive in the past (and whether it will continue to be predictive in the future) is ongoing. The most detailed work has been by Friedman and Kuttner (forthcoming). Friedman and Kuttner agree that the transmission of monetary policy through credit is one reason for the predictive power of the spread, but they also advance an alternative hypothesis based on the cyclical behavior of firm cash flows. In brief, their idea is that whenever there is an expected downturn in final demand, whether due to monetary policy or some other reason, the combination of falling cash flows and unintended inventory accumulation creates a financing deficit for firms. This deficit forces firms into the commercial paper market (a contention that is generally consistent with the findings of Kashyap et al. about commercial paper issuance) and raises the paper-bill spread. Because this phenomenon occurs just at or before cyclical peaks, according to this explanation, an increase in the paper-bill spread signals bad times ahead.

The Friedman-Kuttner cash flows hypothesis is consistent with a scenario in which both the money and credit channels of monetary policy transmission are operative, and in which the shortage of cash flow results from the effects of tight money on final demand. (The idea of a cash flow shortage can also rationalize the findings of Bernanke and Blinder (1992) and Gertler and Gilchrist (1991) that bank loans to at least some firms initially rise after a monetary tightening.) However, the cash flows hypothesis is probably *not* consistent with a money-channel-only view of monetary transmission, for two reasons: First, absent restrictions on loan supply, the cash flow shortage story would imply an equally large increase in the demand for loans and in the issuance of commercial paper, but in fact after a monetary tightening almost all the marginal credit flows

through the commercial paper market. Second (a related point), the cash flow shortage would seem to apply to small firms as well as large, but we know from Gertler and Gilchrist that small firm borrowing falls precipitously during periods of tight money.²⁰

Much more could usefully be done to verify the existence of a credit channel for monetary policy. One possibility is to extend the U.S. empirical work to other countries. A potentially interesting case is that of Japan, whose financial system has evolved over the last twenty years from one in which most private borrowing was done through banks to a system much closer in form to that of the United States. Another possibility is to study the behavior of alternatives to bank credit other than commercial paper. Both of these avenues are being pursued in currently ongoing Princeton dissertations.²¹

C. Credit as a monetary policy indicator

The evidence I have cited so far is largely consistent with or supportive of the existence of a credit channel of monetary transmission. However, there are dissents from this conclusion in the literature, including notably King (1986), Romer and Romer (1990), and Ramey (forthcoming). The principal empirical point shared by all three of these papers is that in historical data, monetary aggregates have typically been significantly better forecasters of real economic activity than have credit variables such as bank loans. Therefore (these papers argue), the money channel of monetary policy transmission must be much more significant than the credit channel.

These results are perhaps most sharply put by Ramey (forthcoming). She constructs a trend-corrected measure of M2 velocity that does a very good job of forecasting measures of output in sample. While she also finds that some credit variables are good predictors, generally these variables lose their predictive power once the adjusted M2 velocity measure is included in the equation. She concludes that little is lost by ignoring the credit channel of monetary policy transmission.

In evaluating this evidence, I think that it is important

²⁰It is also worth noting that the cash flows hypothesis has a strong affinity with the balance sheet effects emphasized by some supporters of the credit view. Neither the complete-markets model nor the conventional IS-LM model (which does not even distinguish between different forms of credit) is consistent with the cash flows hypothesis.

²¹David Fernandez is considering the case of Japan, and has so far found evidence on the timing relationship of monetary policy and bank lending that is similar to what has been seen in the United States. Jeffrey Nilsen has been looking at the behavior of trade credit, particularly at the possibility that wholesale and retail firms increase their use of trade credit when monetary policy tightens and bank loans become more difficult to obtain.

to distinguish between two questions: 1) Economically, does monetary policy have its effects by changing the relative supply of bank loans? 2) Given money, do credit variables provide useful additional information about the stance of monetary policy or the likely future trajectory of the economy? It is quite possible that the answer to the first question is "yes" while the answer to the second question is "no."

To see why, suppose that only the credit channel is operative—that is, imagine that firms do not respond to policy-induced changes in short-term interest rates, so that the money channel is closed down. Even under these extreme circumstances, with no role for the conventional channel to affect output, we would still expect a tightening of monetary policy (open market sales) to reduce the money supply. Further, consistent with the empirical findings of Bernanke and Blinder (1992), we would expect the change in the money supply to occur *earlier* in time than the change in loans (which Bernanke and Blinder found to be roughly contemporaneous with the change in output). In this scenario the change in the money supply would be a better *predictor* than loans of output—equivalently, a better monetary policy indicator—even though, by hypothesis, the actual effect of policy is being transmitted through loans only. Only if the link of the money supply to lending became unstable (say, because banks' portfolio preference for loans versus securities fluctuated), while the link of lending to the economy remained stable, would bank loans dominate money as a forecasting variable and monetary indicator.

Thus Ramey's finding, like earlier results on the predictive power of money versus credit, really has no bearing on the issue of whether monetary policy works through the money channel or the lending channel. Her finding does have a bearing on the choice of policy indicator, implying that M2 is the single best choice (at least among quantity variables). However, even this conclusion should be drawn very gingerly: it is obviously easier to find good indicators retrospectively than prospectively. Just as no one knew in advance that M1 velocity would collapse, we cannot be sure what will happen to M2 velocity in the future, and for that reason we should hedge our bets and consider other indicators as well. Indeed, as I explain further in Section V, the last recession is a nice example of a situation in which M2 behaved very strangely, and in which knowledge of the behavior of bank lending was helpful in interpreting that behavior.

IV. Crunches and overhangs: Other ways in which credit may matter macroeconomically

Although the role of credit in monetary transmission has received the most recent attention, the information-

based analysis of credit can rationalize a number of other ways in which credit can play a macroeconomic role. I discuss the most important of these channels here. In parallel to Section II, I will first discuss macroeconomic effects of credit operating through the banking system, then turn to the macroeconomic implications of changes in the quality of borrowers' balance sheets.

A. Bank loans and the macroeconomy

If banks and other financial intermediaries are special in that they play a difficult-to-replace (if not literally unique role) in credit creation, then disruptions of normal banking activity may have macroeconomic consequences. Below I consider briefly some of the more obvious factors that may lead (and have led) to banking disruptions.

1. *Bank runs and banking panics.* Before the institution of deposit insurance, depositor runs on individual banks, as well as more widespread banking panics in which many banks experienced runs, occurred periodically in the United States.²² By far the most severe episode of banking panics, however, occurred in the early stages of the Great Depression: the U.S. banking system was in almost constant crisis from the winter of 1930 until Roosevelt's bank holiday of March 1933.

What was the macroeconomic significance of Depression-era banking panics? The standard answer, given by the classic study of Friedman and Schwartz (1963), was that the banking panics depressed macroeconomic activity by inducing sharp declines in the national money supply.²³ Drawing on the information-based approach, Bernanke (1983) suggested that in addition to their monetary effects, banking panics hurt the economy by disrupting the normal flow of bank credit, with adverse consequences for both aggregate spending and aggregate supply. In support of his view, Bernanke cited contemporary complaints of credit restriction and shortage, and also presented statistical evidence suggesting that the monetary collapse of the 1930s was not big enough to rationalize the length and depth of the Depression on its own.

In subsequent work, Bernanke and James (1991) used a sample of twenty-four countries to investigate the effect of bank panics. Comparing eleven countries with serious banking panics to thirteen countries whose

²²Calomiris and Gorton (1991) provide a detailed analysis of the recurrent panics of the nineteenth century.

²³During banking panics, the public converts deposits to currency. The consequent loss of reserves by the banking system forces a contraction of deposits that is much greater than the accompanying increase in currency held by the public. Thus, absent Federal Reserve actions, banking panics contract the total money supply.

banking troubles were more contained, and holding constant initial macroeconomic conditions and money supplies, these authors found that the countries with banking panics suffered significantly more serious subsequent falls in output than the countries without panics.²⁴

The hypothesis that bank failures during the Depression had important effects through the credit channel remains controversial (see Calomiris [forthcoming] for a recent survey of this and related issues). Without attempting to resolve this controversy here, I would only note that the issue is not simply of historical interest but has important policy implications. For example, while it is widely agreed that the Federal Reserve should act as a "lender of last resort" to the banking system, there is a dispute over whether the Fed should content itself with protecting the money supply (as suggested by Goodfriend and King 1988), or whether it should act more aggressively to protect lending and other functions of banks (and other financial institutions as well). It appears that current Fed policy favors the latter approach (see, for example, Brimmer 1989). Clearly, the issue turns on whether major problems in the banking system or other financial institutions would be disruptive to the economy for reasons over and above any effects they had on the money supply.

Similar issues arise in the debate over reforming bank regulation. Proposals such as "narrow banking" (Litan 1987), which by the way has many attractive features, are designed to protect the money supply while extricating the Federal Deposit Insurance Corporation from the uncomfortable position of having to evaluate the credit risks of bank loans. However, if the lending function of banks is also macroeconomically important, the narrow banking strategy would carry some risks. For example, it is conceivable, depending on the way that Litan's lending institutions were financed, that they could be subject to "slow runs" that would depress lending and be costly at least to some sectors of the economy. If the lending function of banks is macroeconomically significant, then reform along the lines of the recent Treasury proposal, which suggested continued insurance of banks with broad powers as long as tough capital requirements were met, would probably be preferable.

2. *Disintermediation, jawboning, and credit controls.* Government, intentionally or unintentionally, can inter-

fere with the normal process of bank lending in a number of ways. Although there is some dispute about terminology, if these interventions are sufficiently serious they can lead to what is popularly known as a "credit crunch."

The classic example of a credit crunch is probably the brief episode of reduced bank lending in 1966 (see Burger 1969). The conventional interpretation of this episode, and of a similar episode in 1969-70, is that it was an example of disintermediation, in which the movement of Treasury bill rates above the Regulation Q ceiling precipitated sharp outflows of funds. After a careful review of the documentary evidence, Owens and Schreft (1992) concluded that the role of Regulation Q was overstated in those episodes, and that the primary reason for lending reductions was moral suasion and threats ("jawboning") from the Fed and various governmental branches. Whatever the specific source of the crunch, in both cases bank lending slowed significantly and the macroeconomy slipped from rapid expansion into a pause (1966) or a recession (1969-70).

In March of 1980, formal credit controls (which had been threatened but not used in earlier episodes) were imposed by the Carter Administration (see Schreft 1990). The controls took the form of direct restrictions on loan growth rates and marginal reserve requirements on additional credit extensions. The controls were reputedly "symbolic," but their real effect was powerful. Bank loans, which had been growing at an annualized rate of 15 to 20 percent before the imposition of controls, grew at only 2.5 percent in March and fell 5 percent in April (at annual rates). Consumer credit was hardest hit. The economy nosedived in the second quarter of 1980, with real GDP contracting at a 9.9 percent annual rate (Kashyap and Stein 1992) and the prime rate falling from 19 percent to 14 percent. The controls were lifted on July 3 and economic growth resumed.

None of these episodes were as dramatic as the Depression, but they do seem consistent with the view that restrictions of bank lending can have negative macroeconomic effects. Restrictions aimed only at banks would not have significant effects if borrowers could easily substitute to other credit sources. Thus the response of aggregate activity to these episodes is also evidence favoring the credit channel of monetary transmission.

3. *The "capital crunch."* Yet another factor affecting the ability of banks to lend is capital adequacy. A low level of capital reduces banks' ability to attract uninsured deposits and forces regulators to adopt tough lending standards or risk losses to the deposit insurance fund. Absent information problems, insufficient

²⁴More specifically, Bernanke and James noted that in 1930, the year before the peak of banking crises worldwide, the countries that were to experience banking panics and those that were to escape panics experienced similar rates of deflation and output decline. In contrast, in 1932 (the year following the most intense banking crises), industrial production growth averaged -2 percent in countries that had avoided panics and -16 percent in countries that had not.

capital would be a purely transitory problem as banks could simply issue new equity. However, if information is imperfect, the markets may interpret the announcement of a new equity issue as indicative of hidden asset weakness, which drives down the share price and raises the effective cost of equity finance (Myers-Majluf 1984).

There is some evidence that a shortage of bank capital, resulting primarily from real estate losses but possibly exacerbated by tougher capital regulations and regulator oversight, constrained bank lending over the 1989-91 period. Syron (1991) argued that such a "capital crunch" was recently at work in New England, following the collapse of real estate prices there. A study by Peek and Rosengren (1992), which used data for all lending institutions in New England and carefully controlled for a variety of relevant characteristics, confirmed the relationship between capital adequacy and lending. Other studies with comparable or complementary findings include Bernanke and Lown (1991), Clair and Yeats (1991), Johnson (1991), Samolyk (1991), and Moore (1992).

Although the capital crunch surely did not help matters during the recent recession, Bernanke and Lown (1991) conclude that the reduced supply of bank loans was probably less important macroeconomically than the financial problems of borrowers. I discuss the 1990-91 recession in more detail in Section V.

B. Borrower balance sheets and the macroeconomy

Although issues relating to banking are more often discussed in the credit literature, the analysis of Section II implies that financial distress as reflected in the condition of borrowers' balance sheets can also affect economic performance.

1. Debt-deflation. Irving Fisher introduced the concept of "debt-deflation" in an article in the very first issue of *Econometrica* (1933). Fisher had in mind a dynamic process in which falling asset prices (perhaps set in train by a monetary contraction or the end of a bubble) bankrupted debtors, forcing them to make distress sales of their remaining assets; this outcome forced prices down further, continuing the process. Fisher felt that debt-deflation was a major cause of the Depression, and he wrote letters to Franklin Roosevelt pleading for price level stabilization. More recently, Kindleberger (1973), Mishkin (1978), and Bernanke (1983) have also suggested that borrower distress arising from deflation was an important factor in the Depression.

Fisher's debt-deflation concept has not generally been well understood. Its initially puzzling aspect is that while an unanticipated deflation clearly makes debtors

worse off, it also makes creditors better off, and so is "only" a redistribution. Some Keynesians pointed out that a redistribution from debtors to creditors could reduce aggregate demand if debtors have a higher marginal propensity to consume than do creditors. However, this assumption is neither theoretically justified nor empirically obvious, since many creditors are small savers while some debtors are large corporations.

The adverse effects of debt-deflation can be better rationalized in terms of the modern literature on the role of balance sheets (Bernanke and Gertler 1990). A debt-deflation, which redistributes wealth away from borrowers, increases borrowers' need for external finance at the same time that it makes them less creditworthy. To the extent that current borrowers are also the people with special knowledge and access to new investment projects, a debt-deflation reduces aggregate spending by blocking potential investors' access to credit. For example, a Depression-era farmer, driven close to bankruptcy by falling crop prices, could neither pay for needed new farm equipment on his own nor obtain credit to do so. Thus some capital investment opportunities were effectively cut off from the economy by the process of debt-deflation.²⁵

2. Overhang: The debt buildup of the 1980s. A financial phenomenon that received much attention was the buildup of corporate debt during the 1980s.²⁶ That decade saw sharp increases in ratios of debt to GNP and of interest expense to earnings (Kaufman 1987; Bernanke and Campbell 1988, 1990), as well as several years of negative net equity issuance, as firms recapitalized or underwent leveraged buyouts.

The buildup of debt in the U.S. corporate sector naturally raises two questions: 1) Why did it happen, and 2) what are its economic implications? Although space does not permit an exhaustive discussion of the complex debates that have raged about both of these questions, I will summarize some main points and try to make the connection between these issues and the themes examined in this paper.

The causes of the corporate debt buildup were disparate. One reason for the growth of debt was probably simple optimism (whether justified in an *ex ante* sense or not, I don't know); firms expected that future earnings growth would justify the increase in borrowing. The optimism story is consistent with the boom in the stock

²⁵The creditors could take over the farm and hire the farmer to work it; but in this case the farmer's incentives to work hard and creatively would be diminished.

²⁶Household debt also expanded; for brevity, and because my own research has focused on corporate debt, I do not discuss that development here. For a popular survey of the corporate debt issue, see Bernanke (1989).

market (as well as the increases in household debt) that also occurred during the decade. Indeed, despite the large absolute increases in debt and interest burdens during the 1980s, the equally sharp rise in share prices implied that debt-equity ratios did not change significantly. Other factors that economists have cited as contributing to the expansion in debt include tax advantages created by the tax reforms of the early 1980s, deregulation and reduced antitrust enforcement, the development of a liquid secondary market for junk bonds, and expectations of continued inflation or asset price increases.

Another explanation for the increase in debt comes straight from the theoretical literature described in Section II. Recall that a basic implication of that literature is that capital structure can affect management decisions and thus the efficiency of the firm (Jensen and Meckling 1976). During the 1980s, Michael Jensen of Harvard Business School brought his academic research to the real world by actively advocating the use of higher debt levels to improve corporate performance. Jensen publicized his "free cash flow theory," which claimed that increased leverage would particularly benefit the shareholders of mature, cash-rich firms (Jensen 1986). Jensen argued that managers of this type of corporation, having no really good way to invest the "free cash flow" thrown off by existing, profitable operations, would be tempted to waste these funds in expanding their corporate empires into areas in which they did not have adequate expertise or information. According to Jensen, high leverage reduces the scope for this type of activity by diverting cash flow into interest payments, and thus increases the value of the firm.²⁷ While Jensen's personal advocacy was probably not the only reason for increased attention to the possible efficiency benefits of leverage, discussions of the leverage phenomenon in the business press did frequently point to the cost savings and other efficiencies that higher debt would force on companies. The stock market may have believed this story as well, since share prices typically rose sharply in response to announcements of recapitalizations or leveraged buyouts.

What about the effects of the debt buildup of the 1980s? In assessing the economic effects of the debt buildup, I think it is important to distinguish microeconomic/productivity-related effects from macroeconomic/business cycle effects.

At the microeconomic level, the debate has centered on whether firms that increased leverage actually achieved productivity gains, as suggested by Jensen's

free cash flow theory and similar theories. Empirical analysis of this question is complicated considerably by the problems of interpreting accounting data of firms undergoing financial reorganization, and of isolating increased profitability due to increased efficiency from other sources of increased profit such as tax benefits or renegotiations of union contracts. My reading of this debate, which is still ongoing, is that increased leverage led to modest productivity gains in some cases. Perhaps the most compelling evidence in favor of productivity benefits has been found by Lichtenberg and Siegel (1990a, 1990b), who showed that LBO firms typically achieved some efficiency gains by streamlining their administrative and management functions (and by reducing staff accordingly). Such economies are important, of course, but on the other hand they are unlikely to generate ongoing productivity gains.

The macroeconomic question is, does high leverage make recessions worse and recoveries slower? The type of analysis described in this paper implies that the answer to this question is yes: the same theoretical arguments that say that debt will induce tough cost-cutting by firms in normal times suggest that debt-laden firms will be even quicker to shed workers or scrap expansion plans when financial conditions worsen. When a recession causes a general decline in sales and profits, firms with already-high levels of debt and interest burden face a tighter cash flow squeeze. At the same time, a softening of asset values, typical of recession, further worsens the balance sheets of the most leveraged firms. The cash flow shortfall, coupled with the greater difficulty of raising external funds, will tend to depress firms' spending. In a feedback loop reminiscent of the debt-deflation phenomenon, this reduction in spending may aggravate the recession and force yet other firms into financial difficulties.

The direct evidence that the debt buildup of the 1980s worsened the recent recession is still somewhat limited at this point. Nevertheless, as I explain further in the next section, there is more in the way of circumstantial evidence, including notably the unusually early decline in employment and inventories (suggestive of tough cost-cutting by leveraged firms) and the slow recovery of spending after the initial recessionary stimuli had passed. The employment and inventory response observed in 1990-91 is consistent with studies by Cantor (1990) and Sharpe (1992), who showed that highly leveraged firms tend to cut employment more sharply in economic downturns, and by Kashyap, Lamont, and Stein (1992), cited earlier, who found a link between firms' financial condition and their inventory behavior in the 1981-82 recession. As I indicate below, the demand for external finance seemed unusually weak in the last recession, a circumstance that is also suggestive of the

²⁷Note the close similarity of this argument to the Jensen-Meckling discussion of the agency costs of equity finance. Note also that Jensen, in his later argument, ignored the possible agency costs of debt discussed in his earlier work.

weakness of borrower balance sheets.

From the policy perspective, it is important to recognize that the economic costs and benefits of leverage may be quite different at the firm level and at the level of the whole economy. In particular, since firms will include as a benefit of leverage its tax shield but exclude as a cost the contribution of leverage to macroeconomic instability, it is likely that firms on their own will use more debt than is socially optimal. This argument suggests that tax reforms to reduce the relative advantage of debt finance would be desirable. More subtle suggestions are to allow debt contracts to have "recession clauses" that index repayments to macroeconomic conditions (Gertler and Hubbard 1989) and to restructure the regulation of corporate governance in ways to allow for increased management accountability to shareholders without the device of high leverage.

3. Balance sheets and cyclical dynamics. Whatever the final conclusion concerning the role of leverage in the last recession, it is interesting to ask whether such financial dynamics might be part of most if not all recessions. Over the years many authors have developed variations on that general theme: for example, it has been argued that economic expansions, by leading to a parallel expansion or overexpansion of credit, plant the seed of a financial crunch or collapse, which then triggers the economic decline (see Minsky 1964; Wojnilowner 1980; and Eckstein and Sinai 1986).

Work based on the imperfect information approach supports the view that financial factors are important in the business cycle, although the mechanism identified is somewhat different. For example, Bernanke and Gertler (1989) analyze a sort of "financial accelerator" effect, in which balance sheet conditions propagate nonfinancial initiating shocks.²⁸ In their story, an initial negative shock to productivity or spending causes firms' internal liquidity to fall and worsens their balance sheets. These adverse financial developments force firms to reduce their spending, a response that worsens and extends the recession. Bernanke and Gertler's analysis is consistent with recent empirical work by Hardouvelis and Wizman (1992), who find that the cost of funds of financially weaker firms tends to rise in recessions, despite the general procyclicality of interest rates. I expect to see a good bit more research in this area, including the addition of financial dynamics to "real business cycle" macromodels, whose proponents have up until now given little attention to monetary and financial factors.

V. An interpretation of the 1990-91 recession

In the introduction to this paper I referred to the conventional wisdom that factors such as the "credit crunch" and overleverage had played an important role in the recent recession. In this section I briefly give my own impressions of how financial factors contributed to the 1990-91 downturn. I draw heavily on Bernanke-Lown (1991), to which readers are referred for further details. The companion paper for this conference looks much more extensively at the recent experience, and particularly at how financial developments over the previous decade set the stage for this recession.

From the point of view of conventional macro analysts, the 1990-91 recession had some puzzling aspects. The most puzzling of these was the slow recovery of the economy once what appeared to be the initial stimulus—the Iraqi invasion of Kuwait, which both inflated oil prices and punctured consumer confidence—had been reversed. In particular, conventional reference points such as the ratio of inventories to sales led to substantial overestimates of the likely speed of recovery in the second half of 1991 and in 1992. As the economy continued to sputter, the claim that financial factors were retarding recovery began to get a closer look.

To get some sense of the role of credit in the recent recession, Lown and I studied the behavior of loans by banks and similar intermediaries. We found that the decline in loan growth during the 1990-91 period was noticeably worse than is typical during a recession. For example, over the first three quarters of the 1990-91 contraction (which has turned out to be the peak-to-trough period), we found that total lending by domestically chartered commercial banks rose by only 1.7 percent, while total intermediary lending (including savings and loan associations) fell by 3.6 percent—in both cases, a weaker performance than in any of the previous five recessions. (Taking account of loan securitization, which slowed markedly during the period, would probably make those growth rates even lower.) We also found the lending slowdown to be strongly regionally concentrated, with the sharpest contraction by far in New England, followed by the mid-Atlantic region.

As I observed in Section III, a potential source of slower loan growth in general is tightening of monetary policy. Interestingly, the evidence indicates that 1990-91 might be the only recession since the 1950s in which tight money was *not* a significant factor in the slowdown of lending. The typical tight money episode involves 1) a sharp increase in the federal funds rate and other short-term rates (implying an inverted yield curve); 2) increased issuance of CDs and other managed liabilities by banks suffering a drain of core deposits; 3)

²⁸See also Greenwald and Stiglitz (1988) and Gertler and Hubbard (1989).

increased commercial paper issuance as firms substitute away from bank loans; and 4) increases in CD and commercial paper rates relative to bill rates, reflecting the supply pressure of new issuances. Although some of these factors were relevant in 1988-89, none was present in the 1990-91 period. Instead, this time monetary policy became easier at an unusually early point in the cycle.

If monetary policy did not cause the unusually slow rate of loan growth, what did? As noted in Section IV, a part of the story was the "capital crunch" problem described by Syron (1991). In a pattern that was most visible in New England and the Northeast generally, falling real estate values increased the rate of loan losses of commercial banks. The resulting depletion of bank capital—together with related factors such as the new Basle capital standards and the increased vigilance of regulators—reduced the ability of some banks to lend. This cutback of bank lending was far from a universal phenomenon, but it did cause problems for some borrowers.

However, although supply restriction explains some of the weak loan growth, Lown and I concluded that an unusual decline in the demand for loans was a more important cause of the slowdown. While we supported this conclusion with econometric estimates, our main piece of evidence was the pattern of credit substitution: we found that, unlike the typical recession in which alternatives to bank credit (such as commercial paper) expand when bank loans contract, during the 1990-91 period all forms of credit contracted roughly proportionally, indicating a general decline in credit demand. In contrast, during 1989, alternatives to bank loans grew as bank lending slowed, a pattern more typical of a "credit crunch."

The obvious next question is, what caused the unusually severe decline in the demand for credit? In our article, Lown and I did not decompose this shift in demand into its sources, but for reasons discussed in the last section I find it plausible that the burdens of corporate and household debt and the generally weakened condition of balance sheets were significant factors. The extra weight of debt and interest burdens, together with falls in asset prices, can explain why the drop in the demand for credit was worse than normal for a recession. Standard indicators of financial condition ranging from loan losses to bankruptcy rates to the ratio of interest to cash flows all suggested unusual financial stresses during the recession.

If one is looking for a single cause or starting point of the recession, the credit markets perspective I have surveyed in this paper would suggest looking past the Iraqi invasion to the real estate boom and bust that was already in its latter stages by 1990. The fall in real

estate prices and the overhang of empty office space had a number of direct negative effects on aggregate demand, including reductions of consumer wealth and confidence and dire implications for the construction industry. However, this bust probably also had important indirect effects through its impact on financial conditions, both by depleting bank capital and by increasing financial distress among potential borrowers. Neither the direct or indirect effects are of the type that can be resolved quickly, a difficulty that may help to explain the slowness of the recovery. Only recently, as banks have moved well toward recapitalizing themselves and borrowers have reduced their debt burdens, has the economy begun to rebound significantly.

Several implications for macroeconomic policy can be drawn from the credit markets perspective on the recession. First, the characterization of the lending slowdown as being largely demand-driven is good news for bank regulators and examiners, who shouldered more than a reasonable amount of blame for the recession. From a macroeconomic policy point of view, however, it makes little difference whether a credit crunch or a debt overhang is the more important. Either phenomenon is properly thought of as a malfunction of the credit creation mechanism that prevents the economy from reaching its potential.

Second, contrary to some people's impressions, even if banks' and borrowers' problems are severe, monetary policy does not become impotent to affect the economy. Monetary ease can still lower interest rates (the money channel), stimulating demand in interest-sensitive sectors where credit constraints are less serious, as well as stimulating exports by weakening the dollar. From the credit perspective, lower interest rates, by reducing the flow of interest payments and raising asset values, also improve the liquidity and balance sheet positions of borrowers. Finally, even when capital problems constrain many banks, there are always others (including new entrants) that are able to lend.

Although monetary policy is not rendered impotent by credit problems, this tool can become more difficult to use when the credit creation process is not working well. A particular problem is the interpretation of monetary indicators. If a malfunctioning of the credit creation mechanism artificially reduces the demand for funds, driving down market interest rates, then interest rate indicators will overstate the degree of monetary ease.²⁹ Conversely, the unwillingness of banks to issue managed liabilities when they do not have the capital to support lending may artificially depress the broad

²⁹In the IS-LM-type model of Bernanke-Blinder (1988), either a capital crunch in banking or a debt overhang can be thought of as reducing desired spending at any given safe interest rate and thus shifting the IS curve down and to the left.

money aggregates, overstating the degree of monetary tightness. Both types of indicator problems seemed to occur during the recent recession.

VI. Conclusion: Institutional changes and the role of credit

A great problem for academics doing research on financial markets, as well as for participants in those markets, is adjusting to the pace of institutional change. In recent years in particular, deregulation, financial innovation, and internationalization have changed financial markets radically. An important question is how these changes, ongoing and prospective, will affect the role of credit in the macroeconomy.

In one sense, I do not think that the fundamental role of the credit creation process in the economy will be affected much at all by the process of financial change. Despite the greatly increased sophistication and flexibility of financial arrangements, as well as improved communications and computation, potential borrowers must still be screened, evaluated, and monitored by experienced individuals. Thus there will continue to be a special role for banks or similar institutions.³⁰ This basic fact seems unavoidable, despite the trend to securitization and other developments that admittedly have increased standardization of lending practices and improved the liquidity of bank assets. Similarly, new types of financial instruments have not significantly reduced the importance of firms' balance sheets or the cyclicity of credit risks. Although financial arrangements will become more complex, I expect that financial factors will continue to play a role in the business cycle, and that the tools economists have developed will be useful in understanding that role.

However, there is a somewhat narrower area in which the evolution of financial markets may fundamentally change the role of credit in the economy. That area is the realm of monetary policy, discussed in Section III. In particular, a number of financial trends may contribute to a weakening of the credit channel of monetary transmission in the years to come. First, the deepening of markets for bank-managed liabilities, increased securitization, and the removal of reserve requirements on managed liabilities will all act to make it easier for banks to insulate their sources of funds from the effects of open market operations. Second, the development of alternative credit sources, ranging from finance companies to overseas lenders, will both reduce the Fed's influence on the volume of lending and increase the ability of borrowers to substitute away from bank loans.

At the same time that this is happening, other trends will also be weakening the conventional money channel of monetary transmission: these trends include the proliferation of money substitutes—including substitutes for currency such as debit cards—and the phasing out of bank reserve requirements. By reducing the demand for Fed liabilities (and making that demand more unstable), these changes may well make it more difficult for the Fed to control short-term interest rates.

As monetary control weakens, the temptation may arise to try to arrest the process of change in financial markets (a strategy followed to some extent by the German Bundesbank, for example). This temptation should be resisted, because most of the changes in financial markets are acting to make the credit creation process (and thus the economy) more efficient. Using monetary policy to influence the economy will become more difficult, but—at least until we move to a completely cashless society—it should still be feasible. I am hopeful that the current wave of research on the role of credit in the macroeconomy will be of some practical use in that effort.

³⁰Beckett and Morris (1992) find empirically that while the substitutability of bank loans with other sources has increased over time, bank loans remain "special" for many borrowers.

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