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Contents

January/February 1992, Volume 77, Number 1

Financial Panics, Bank Failures, and the Role of Regulatory Policy

Stephen D. Smith and Larry D. Wall

Growth in both the price volatility and volume of financial claims in the United States during the late 1970s and 1980s has far exceeded normal patterns found in post-World War II history. Financial problems have simultaneously plagued a significant portion of the financial services sector—markets in which only depositories are operating, in which only nonbank financial firms are operating, and in which both are operating. When active, financial policy on the part of the central bank and other federal regulators has often involved use of both discount window borrowings and, in the case of certain large banks, blanket coverage of all depository liabilities.

As a part of legislation to recapitalize the Federal Deposit Insurance Corporation (FDIC), Congress recently reconsidered the role of the discount window—the mechanism by which the Federal Reserve lends to institutions unable to meet their reserve requirements—and deposit insurance. The product of this reevaluation is legislation encouraging significant changes in ways the Federal Reserve and the FDIC handle problem institutions. In particular, the legislation requires regulators to intervene before an institution is insolvent, limits the ability of the Fed to lend through the discount window to financially weak banks, and limits the FDIC's ability to protect deposits in excess of $100,000 and deposits made at foreign branches of U.S. banks.

This study focuses on the implications of these changes for the FDIC's and the Federal Reserve's ability to maintain stability in the financial system at minimum cost to other banks, the taxpayers, and the efficient operation of the financial system. The existing deposit insurance and discount window structure are taken as given. Questions of whether an alternative structure might be more efficient are therefore not considered. Moreover,

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the article is not a comprehensive look at deposit insurance or the discount window. For example, the discussion does not encompass the use of deposit insurance to protect small depositors or the use of the discount window as a mechanism for conducting monetary policy in periods when there is no crisis.

The historic policy of mixing closings and systemic risk via the so-called "too-big-to-fail" doctrine is inefficient to the extent that it increases closure costs without reducing systemic costs. This research concludes that the recent legislative changes may improve the financial system's efficiency because they encourage the separation of closure decisions from the handling of systemic risk. An additional finding is that effective use of the discount window can control systemic problems without resorting to "too-big-to-fail" as long as disruptions are not solvency based. Because regulators have more information than the market, the discount window provides a mechanism for conveying the additional information, and appropriate use of the discount window can hasten the end of systemic problems.

In order to evaluate the implications of the recent congressional actions, the first section reviews the reasons that financial intermediaries may encounter financial problems and discusses when and why these liquidity problems are a social concern. The next section provides a brief review of market and banking panics and methods used (by private market participants, governments, and central banks) to deal with them. The costs and benefits of the historic regime are then compared with those of a restructured discount-lending policy that eliminates guarantees to noninsured creditors. The latter system is contrasted with recent legislative changes, especially in terms of their implications for banking system efficiency and systemic risk.

Reasons for Liquidity and Solvency Problems at Financial Intermediaries

The fact that financial intermediaries invest in assets that are less liquid—that is, less readily converted to money—than their liabilities creates a potential for withdrawals to exceed the sum of cash inflows and securities sellable for a small discount on the market value. Intermediaries recognize this risk and ordinarily manage their position to maintain adequate liquidity. Moreover, should an institution that is widely recognized as financially viable encounter a liquidity problem, it can almost always go to other financial intermediaries and the financial markets to obtain adequate funding.[1]

If, however, market participants question the continued viability of a financial intermediary, liquidity problems can lead to the institution's demise. Concern about insolvency can lead to withdrawals by current creditors and can discourage potential investment by new creditors. To address this dilemma, intermediaries may try to sell their relatively less liquid assets. Unfortunately, forced sales of illiquid assets may only compound the problems by resulting in losses that in turn increase market concern about an institution's solvency.

The traditional explanation for the mismatch between the times to maturity of assets and liabilities is that it allows intermediaries to exploit the law of large numbers to increase their profitability. That is, most intermediaries, especially depositories, experience inflows and outflows from their creditors (depositors). If the number of creditors is sufficiently large, the bank can predict with reasonable accuracy what the net outflow is going to be and provide only for this net figure rather than the gross outflows. The difference between the gross outflow and net outflow can be profitability invested in less liquid assets (such as loans) that yield a higher rate of return than highly liquid assets (such as short-term securities).

An alternative explanation—and the two are not mutually exclusive—for the funding of illiquid loans with shorter-term deposits suggests that the mismatch is necessary to provide intermediaries with appropriate incentives in allocating their portfolios. Banks and other intermediaries can substantially change their asset structure over very short periods of time. Mark J. Flannery (1991) points out that if these changes result in a relative increase in high-risk assets, only "short-term" liability holders would be in a position to demand a higher rate of return to cover increased risk. Thus, the use of shorter-term deposits can substantially reduce any gains shareholders might realize from an intermediary's obtaining funds in the debt market, then changing its investment strategy.

Charles W. Calomiris and Charles M. Kahn (1991) explain illiquidity by focusing on the incentive for management and shareholders to engage in inefficient actions (for example, looting) when an institution approaches insolvency.[2] They argue that the ability of creditors to withdraw funds on short notice can be especially valuable in controlling such tendencies. Thus, an implication of Flannery (1991) and Calomiris and Kahn (1991) is that the decision to issue liabilities with a maturity shorter than that of assets may be an

integral part of achieving efficient financial intermediation for certain types of loans.

Whatever the cause of the liquidity imbalance, central banks are concerned about cases in which inaccurate market concern about an institution's viability can make the intermediary subject to massive deposit withdrawals (or refusals to roll over lines of credit). Private market creditors almost never have complete information on their intermediary's financial condition, and, occasionally, this lack of information can lead them to the conclusion that the institution is no longer viable. When a large fraction of the liabilities are such that they can be withdrawn on demand, the potential problem is greater. Creditors may very well view withdrawal as their best option because leaving funds in the firm puts them at risk to lose part of their investment should it fail. Alternatively, if they withdraw from an intermediary that proves viable after all, they can simply reinvest their funds. A recent paper on cascades in financial markets by Sushil Bikhchandani, David Hirshleifer, and Ivo Welch (1991) provides a rationale for withdrawal by investors. They show that even those investors that have favorable information may withdraw funds if a significant number of other investors signal that they have adverse information by withdrawing their deposits.

These liquidity "runs" on an otherwise viable institution impose private and social costs. Owners stand to lose their firm's going-concern value if their ability to transact routine business is interrupted, and management faces potential loss of their jobs. Social costs become a factor if the failure of one institution raises doubts about the solvency of others. These induced runs can cause additional costs if creditors demand currency for withdrawn deposits because converting deposits to currency can lead to an implosion of the money supply in a fractional reserve system. (In such a system only a portion of bank deposits are held as reserves and the remainder are returned to circulation, thus enabling the money supply to expand or contract as a multiple of the deposit base.) The potential reduction in the money supply is mitigated, according to George G. Kaufman's (1987) argument, by the fact that it is impractical for large institutions to withdraw currency. Therefore, Kaufman argues, funds withdrawn from one bank will be redeposited in another, presumably solvent, institution. Moreover, the central bank can generally offset reductions in reserves through open market operations. However, as E. Gerald Corrigan (1989/90) has noted, concern about bank failures can lead to disruption in the payment settlement or clearing systems. An additional point, noted earlier, is that a viable intermediary's failure may still cause some businesses to lose access to new credit (see Ben S. Bernanke 1983) and simultaneously induce intermediaries to engage in suboptimal actions. For example, the intermediary may take less risk or hold more equity capital than is socially optimal. Such activities reduce the potential for real (inflation-adjusted) economic growth.

*H*istorical Practices

The liquidity pressures discussed earlier may arise at both viable and nonviable financial institutions. Prior to the development of formal government institutions that could intervene, the threat of problems at one intermediary spilling over to another was frequently great enough that private market participants would act in concert to stabilize prices and lend to institutions that were sound but faced temporary liquidity problems.[3] However, the limited resources of private-sector participants, problems of free-riding behavior (whereby some participants benefit from the provision of the service without paying), and the lack of an incentive for intermediaries singly or as a group to consider all of the social costs associated with panics helped lead to the development of central banks and other monetary authorities. This development has centralized the activities of both price stabilization and the so-called lender-of-last-resort functions in modern economies. The concern of this study is with the latter aspect of central banking.[4]

The classical view of the lender-of-last-resort function, as outlined by Walter Bagehot (1873), argues that the central bank should lend freely, but at a penalty rate, to institutions that are solvent but facing a temporary liquidity shortage. Interestingly, he does not limit this prescription to depository intermediaries. Bagehot notes that "The Bank [of England] does, in fact, at every period of pressure, advance to the *bill brokers*; the case may be considered 'exceptional,' but the advance is always made if the *security offered is really good*" (1873, 282; emphasis added). Although Bagehot makes the case that the bill brokers should be discouraged from accepting very short-term (on-demand) deposits, he argues that it is "inevitable" that *secured* borrowings from the central bank be allowed during times of crises. Bagehot clearly takes a broad view of both financial crises (as opposed to bank runs per se) and the corresponding role of the central bank to provide advances against "good" securities.

Kaufman (1991, 106) suggests two major justifications for establishing a lender of last resort in the 1800s: (1) concern about a decline in the money supply in a specie-based monetary system and (2) "to offset temporary liquidity strains from adverse shocks that induced a large number of market participants to reassess quickly their asset portfolios and sell some assets without a concurrent threat to the money supply." Kaufman notes that the conversion to fiat money (created by the government or monetary authority) and the existence of deposit insurance has substantially reduced the importance of the first rationale but that the second reason still exists. In Kaufman's view the justification for recent lender-of-last-resort activity is prevention of losses at "fire-sale" prices when intermediaries experience a sudden, sharp increase in withdrawals.

The operation of the U.S. system of crisis management in the recent past differs from the Bagehot principles in that (a) the lender-of-last-resort function played by the Federal Reserve is for the most part directly restricted to depository intermediaries, (b) the recommendation that the lender-of-last-resort service be extended only to healthy institutions is routinely violated, and (c) advances are made at rates below, rather than at or above, market rates of interest. Furthermore, these changes in lender-of-last-resort activity are not easily rationalized under Kaufman's (1991) analysis, especially the provision of loans to failing banks.

Another important characteristic of the current U.S. system is that there exists a separate agency, the FDIC, that insures the deposits of commercial banks and thrifts. The FDIC, designed to provide a "buffer" against losses for small depositors, was created by legislation passed in response to bank runs in the early 1930s.[5] Almost immediately, however, the agency "obtained statutory authority to facilitate mergers between solvent banks when one of those banks was considered very weak and a future candidate for failure (and therefore, cost to the FDIC)" (Golembe Reports 1991, 4). Although the stated criteria for dealing with problem banks is now the lower cost of receivership or merger, it is clear that in either case the insurance agency's role was intended to be at the micro- economic (or firm-specific) level. Initially, this agency had no regulatory role per se in dealing with financial panics or bank runs beyond the promise that small, unsophisticated investors need not be concerned (except with loss of interest) about the financial stability of their chosen intermediaries.[6]

The role of deposit insurance has expanded beyond protection of small depositors to encompass, in certain instances, all deposit liabilities—the so-called too-big-to-fail doctrine mentioned earlier. Although the FDIC is sometimes credited with preventing panics that might otherwise have occurred since its creation, Michael D. Bordo, among others, has noted that many countries have managed to avoid runs without the existence of deposit insurance. In particular, the fact that there were "other countries that were panic-free before the 1960s and 1970s . . . suggests that such deposit insurance is not required to prevent banking panics" (1990, 27). Neither is the fund, in its current form, sufficient to stop withdrawals by large depositors, as the case of Continental Illinois showed (see, for example, John M. Berry 1991). This application of the too-big-to-fail doctrine, which is considered the first, in 1984, has been repeated on a number of occasions, including as recently as 1990 in a case involving the Bank of New England.[7]

Possible Regulatory Responses and Recent Legislative Changes

As noted, a liquidity crisis may be confined to a limited set of intermediaries whose failure would have only a small impact on real economic activity. However, such a crisis could involve liquidity problems threatening to significant portions of the real, or nonfinancial, sector. The discussion below considers both localized liquidity problems and systemic problems.

Problems at Individual Institutions. When the market doubts a firm's viability, private-sector funding is not likely to be forthcoming. Both the central bank and the deposit insurer can help reduce the costs associated with runs on viable institutions. The central bank can do so by providing temporary liquidity to bank and nonbank financial firms, and the deposit insurer can reduce costs at banks (nonbanks are not insured) by agreeing to absorb any losses in the event of failure, thereby removing the principal reason for withdrawals. However, both agencies can also increase the social costs of bank failure if they allow nonviable institutions to continue in operation.

Central Bank. Central banks may be asked to provide liquidity when the market signals its perception of problems by withdrawing funds from an intermediary. The lender of last resort can delay the institution's closing by making loans through the discount window. When the market receives new information suggesting that the firm is viable, the intermediary can return to the market for funding. Thus, the key to a successful lender-of-last-resort operation is the subsequent release

of good news about the firm in question. If no such good news is forthcoming, lender-of-last-resort action only postpones the inevitable closing of the institution.[8] Stated differently, successful lender-of-last-resort activities on behalf of individual institutions require an information asymmetry such that the regulators know, at least temporarily, more than the market or are more willing to lend based on identical information.

Strong proponents of "efficient markets" would argue that market prices fully impound all available information and, hence, the central bank cannot improve on market actions. This view has considerable validity, particularly in areas such as the analysis of relative prices, for which the central bank is unlikely to have exclusive information. However, in some cases releasing information may be costly (for example, when it would assist the intermediary's competitors) or obtaining information may be costly for market participants. In such cases the market may indeed lack information that regulators have been privy to in examinations and confidential discussions, information about the composition of an intermediary's assets, for example, especially its exposure to failing borrowers and the seniority of claims on failing borrowers. It is this short-term information advantage that provides a wedge giving a lender of last resort room to act for short periods of time.

Lending by the central bank when it does not have such an information advantage imposes costs on other creditors and on society. Discount window lending must be collateralized in the United States, meaning that, should a firm fail after receiving discount window loans, its losses will be spread over a smaller number of creditors. Such loans may eventually lead to transfers of wealth from creditors and those with contingent liabilities (such as the FDIC) that do not (or cannot) withdraw to those who do withdraw their backing from a failing intermediary. Further, lending without information ensuring an institution's soundness potentially allows nonviable institutions to continue making inefficient investments.

Another limitation on the effectiveness of the lender of last resort is that its position of advantage declines rapidly. Once information has been recognized as relevant and favorable for judging an intermediary's solvency, the firm has a strong incentive to release it, and the market has an equally strong incentive to seek out the information. The implication of this set of factors is that true liquidity crises should not last long. If a bank cannot reacquire the market's confidence within a short time, the firm probably is not viable, and continued lending would only postpone its inevitable closing. That is, long-term lending from the discount window is inconsistent with the idea that true liquidity problems are short-term in nature because private market participants quickly adjust to new information.

The 1991 banking bill limits the Federal Reserve's discount window lending. Federal Reserve Banks are generally prohibited from lending to an undercapitalized bank (as defined by the regulators) for more than 60 days in a 120-day period. Reserve Bank lending is further limited to five days for a critically undercapitalized bank. A Reserve Bank may exceed the 60-day limit if the relevant agency or the Chairman of the Board of Governors of the Federal Reserve System certifies that the institution is viable. If either lending limit is violated without the viability certification and the bank fails, the Board may be liable to the FDIC for at least part of the losses.

The 60-day period will generally provide more than adequate time for a troubled bank to prove its viability to the financial markets. Indeed, if the Federal Reserve uses the full 60 days to lend to a bank that the market considers nonviable, a large fraction of the uninsured depositors are likely to have withdrawn their funds, thereby increasing the FDIC's share of the failed bank's losses.

The lender of last resort can strengthen the value of its discount window actions by lending only to solvent but illiquid institutions. Indiscriminate discount window activities have two adverse implications for an intermediary's remaining creditors: (1) other market institutions may judge the firm too risky, and (2) these creditors' portion of any losses on failure is increasing as the central bank acquires title to the good assets. In such a case discount window lending may actually increase the rate of withdrawal of funds from the intermediary. However, if loans are known to be restricted to solvent institutions, central bank lending signals that private information suggests an institution's solvency.

A problem arises when the central bank does not necessarily have an information advantage over the market, as is currently the case in the United States with respect to investment banks. The lender of last resort can lend to these intermediaries without increasing the deposit insurer's exposure because investment banks are not insured. However, lending operations of this type are likely to induce ex post wealth transfers because only the lender of last resort can perfect its security interest in a failing firm's collateral (that is, ensure its possession of the collateral). Because such wealth transfers are undesirable, it would be advisable for the central bank to avoid lending to intermediaries in nonsystemic situations, especially when it lacks an information advantage.

Deposit Insurer. Like the central bank, the deposit insurer can potentially intervene to stem a run on an individual institution. The deposit insurer can do so by absorbing the risk of loss should the intermediary fail. However, absent systemic problems there seem to be sound reasons that deposit insurance should not be used to protect intermediaries from failing. For one thing, in the event of an institution's failure the insurer's function would merely transfer wealth from taxpayers in general to an intermediary's creditors, without conferring any counterbalancing social benefit. Another consideration is that blanket deposit insurance also reduces the value of market signals to regulators.

There may, of course, also exist circumstances under which firms that are still able to borrow in private markets will, on the basis of information that is as good or better than private-sector information, be deemed unhealthy by regulators. Because these firms will not generally seek help from the discount window, intervention by the proper regulatory agency would result in an "early" closure (or merger) of the institution. "Early" is used here to denote the fact that, because they have less precise information, private market lenders would not deny the firm credit.

Systemic Risk. Systemic liquidity pressure occurs when institutions simultaneously attempt to shift to more liquid and secure investments, adversely affecting the liquidity position of a substantial portion of the financial system. Increased liquidity needs—for example, demand for cash after a stock market crash—can lead to such pressure. Alternatively, the crisis can result from solvency concerns about a substantial part of the financial system.

If increased liquidity needs are causing the pressure, the central bank can alleviate the problem through open market operations, as it did in October 1987. Discount window lending may be appropriate if the amount of Treasury securities is insufficient to meet the central bank's reserve target.

A crisis arising from doubts about solvency is more difficult to address. The concern can arise from a shock involving only a few nonviable intermediaries that the market cannot distinguish from viable firms. In turn, the shock may actually threaten the viability of a significant portion of the financial system. The shock can come from a "large" source, such as the default of a major international borrower or it can come, as Corrigan (1989/90) notes, from a seemingly small source such as ESM Government Securities. The shock can even come from reductions in stock market values to the extent that purchases of equity securities are partially financed by debt.[9] Whatever the initiating factor, it is the potential inability by otherwise viable institutions to pay debt claims on short notice that creates the "systemic" (or macroeconomic) risk that concerns regulatory bodies. In theory multiple avenues are open to authorities for dealing with systemic risk.

Central Bank. The threat posed to a substantial part of the financial system is important in determining the appropriate central bank response. Consider first the case of depositories. If most are solvent, the central bank could act as it does when a nonsystemic problem exists, simply lending to viable intermediaries and refusing credit to nonviable firms. If the crisis does jeopardize the viability of a substantial portion of the financial system, the role of the lender of last resort becomes more difficult. Lending may be required in order to provide the deposit insurer with time to address the problems at the nonviable banks.

The case of nondepositories is more complicated. As noted earlier, the lender of last resort generally does not have an information advantage for these firms and, thus, should not lend in noncrisis situations. However, these firms also may experience liquidity problems that could threaten the stability of the real economy, and in such a situation the lender of last resort may wish to assist them. One way of coping with the general crisis is to work indirectly through commercial banks. Doing so shifts the problem of evaluating solvency back to the commercial banks, but in fact these banks may have an information advantage from their routine dealings with the nonbank firms.

This indirect mechanism of lender-of-last-resort activities has appeal to the extent that (a) the central bank is more familiar with the financial health of firms over which it has some regulatory oversight and (b) such an action limits the ability of the private sector to borrow at a discount rate that is typically below market rates of interest. Conversely, the extra step in this process creates other problems, namely, that there must be a cost/benefit system for banks that in times of systemic stress allows for the use of such regulatory "moral suasion," whereby regulators would seek to persuade commercial banks to lend to their troubled peers for the sake of the social good. Offsetting subsidies (either implicit or explicit) are therefore required to induce depository firms to extend funds under circumstances in which, because of risk aversion or other market factors, they might otherwise not make these loans. George Kanatas (1986), for example, provides a model in which the central bank performs a lender-of-last-resort function that amounts to lending to institutions that a risk-neutral investor would deem creditworthy even though private risk-averse lenders would not.

Applying this idea to the indirect practice discussed above, regulatory authorities would need to absorb the risk by subsidizing "intermediate" lenders by an amount equal to the premium for risk aversion.[10] More generally, the very fact that moral suasion must come into play implies that a purely private cost/benefit analysis makes these loans unattractive for depository intermediaries. Because such moral suasion may not always work, it is risky to count on any indirect form of liquidity provision to prevent a period of stress from becoming a full-blown crisis. Historically, remedies for this risk involved either (a) open market operations or (b) the clause in the Federal Reserve Act (13-3) that allows for lending to nondepository firms or individuals during times when their failure would "adversely affect the economy." However, because the discounting must involve agricultural, commercial, or industrial purposes, security brokers previously were effectively constrained from using the discount window; discounting for purposes of carrying securities was omitted from the "acceptable purposes" list. The current legislation amends the clause by eliminating specific requirements for use of the discount window borrowings, thereby giving the central bank greater flexibility for providing liquidity in times of stress. Moreover, because acceptable collateral at the discount window is at the discretion of the Federal Reserve Bank, the inclusion of securities firms has the effect of expanding the asset base that can quickly be turned into cash. Open market operations typically have involved a much more homogeneous class of instruments (that is, U.S. Treasury securities).

While the current legislation enhances the central bank's ability to deal with systemic risk problems, it is still possible, in theory, for the entire system to be sufficiently illiquid that the aggregate demand for liquidity exceeds the supply of collateralizable securities. An analogous demand/supply imbalance might hold at the individual firm level as well. Consider an institution that has collateral which under normal conditions would be sufficient to meet its counterparty obligations but that under certain special circumstances is incapable of posting collateral. According to the arguments presented here, such a situation is not a systemic liquidity problem that calls for management by the central bank. Rather, it represents a risk management decision on the part of the firm, a decision that should not be subsidized, ex post, by the public. Because the central bank could lend to the collateralized counterparties of this firm if problems develop, the systemic risk associated with a possible failure of this particular institution is substantially alleviated.

Federal Deposit Insurance Corporation. The policy employed by the FDIC—that of insuring all deposit claims at certain institutions—has been justified by systemic risk concerns. However, if only a small segment of the financial system is in fact nonviable and the discount window is operating properly, deposit insurance seems to have limited value. Prompt extension of deposit insurance to all depositors may shorten a crisis, but it would do so at the cost of eliminating postcrisis market signals about intermediaries' viability. Moreover, to the extent that a financial crisis can be brought on by actions of depository or nondepository intermediaries, such blanket government guarantees are redistributive. These costs can be justified only by assuming that either (a) some counterparties to transactions with these depository firms are not sufficiently solvent to withstand default on this fraction of their contracts or (b) the discount window policy of the central bank is not capable of dealing with the secondary liquidity effects resulting from these individual defaults.

Recent legislative changes may improve the financial system's efficiency because they encourage the separation of closure decisions from the handling of systemic risk.

The types of collateralization and lending policies recommended earlier would provide for coverage of liquidity concerns without regard to the secondary activities of other depository firms. Moreover, to justify a too-big-to-fail policy on the basis of counterparties' marginal solvency implies that policymakers are essentially extending "failure insurance" for a wide range of institutions.[11] The cost of such actions is, of course, borne by the public.

If a significant portion of the financial system is in fact nonviable, blanket guarantees of deposits at all institutions may be required to give the deposit insurer

time to resolve failed institutions without substantial additional damage to the real sector. However, if such a situation has developed, the mistake was made prior to the crisis. Letting intermediaries maintain levels of capital and diversification that create an environment in which a single shock can cause a large number of failures is fundamentally a different problem than the temporary lack of liquidity healthy firms may be experiencing.

The current legislation proposes to reduce resolution costs by prohibiting the FDIC from protecting uninsured depositors or nondeposit liabilities in most circumstances. If the FDIC arranges for another bank to purchase (some of) the failed bank's assets and assume (some of) the failed bank's liabilities, it may transfer uninsured deposit liabilities to the acquirer so long as the fund suffers a loss on the uninsured deposits no greater than it would have incurred on those deposits had the institution been liquidated.

The important exception to prohibiting coverage of uninsured deposits involves systemic risk. This exception can be invoked if failure to cover uninsured claims would have serious adverse effects on general economic conditions or financial stability. Under current legislation the FDIC is allowed to exercise the systemic risk exception if authorized by (1) at least two-thirds of the Board of Directors of the FDIC, (2) at least two-thirds of the Board of Governors of the Federal Reserve System, and (3) the Secretary of the Treasury (in consultation with the President). If the systemic risk exception is exercised, the FDIC is required to recover the losses expeditiously with a special assessment on members of the insurance fund. The assessment is to be levied on each bank's average assets minus its average tangible equity and average total subordinated debt.[12]

Analysis of New Legislation

Table 1 represents what seems to be an "ideal" separation of closure and discount window policies. The shaded areas depict situations in which either private market or regulatory actions cause a spillover effect to "secondary" institutions. Three points merit emphasis. The first involves the fact that, in the system the table describes, closure decisions for individual institutions (and, by extension, "nonclosure" decisions) would not depend at all on whether there is systemic risk in the system. This point is reinforced by the observation that in this system discount window lending is the only tool (other than, possibly, open market operations) that is used to deal with secondary firms during times of crisis.

The second point of interest in the proposed scenario turns on the fact that, in the absence of systemic-risk conditions, discount window lending would be used only to support individual institutions that the market has incorrectly (and presumably temporarily) deemed to be nonviable. Discount window lending would never be employed to keep open institutions that both the market and regulators believe to be nonviable.

The final element to emphasize involves the case in which the central bank's information is "neutral," as it might be in the case of dealing with institutions over which it has no regulatory authority. In this case no action would be taken in an insolvency that has no secondary influences. However, should such a closure cause a crisis for other institutions, the central bank would stand ready to lend to those secondary firms that have good collateral, including but not limited to depositories. Likewise, in other situations causing a liquidity squeeze for secondary institutions the central bank could extend discount window lending to those institutions. The recently passed legislation follows these lines with two possible exceptions. The first is the escape clause for invoking the too-big-to-fail doctrine. Under the current framework regulators may, in cases of perceived systemic risk (indicated on the table by the shaded areas), choose both coverage of all liabilities and lending to secondary institutions. Such a response would seem justified only if a large fraction of the banking system is not viable so that refusal to apply the too-big-to-fail principle would result in collapse of the financial system. Second, as a matter of practice the secondary institutions may involve only depository firms, even though the new law expands the potential for lending to nondepository intermediaries.

It is recognized that the new regulatory system must start from a less than neutral point. Old regulations and bank actions have combined to provide an environment in which temporarily continuing to observe the too-big-to-fail doctrine may be needed as a transitional fallback position in crisis periods. Moreover, limited access to the discount window remains a viable option when the central bank has little or no information concerning the balance sheets of nondepository financial intermediaries. Despite these "transitional" frictions, the recent legislation appears to be a substantial move toward separating closure and systemic-risk management problems.

Table 1
Alternative Regulatory Responses to Failures, Based on Regulator and Market-Based Information

Regulatory Assessment	Market-Based Assessment	
	Solvent	Insolvent
Solvent	No regulatory action	Discount window lending to primary institutions
	No reason for a crisis at secondary institutions	Discount window lending to both primary and secondary institutions
Neutral	No regulatory action	Regular closure of primary institution
	No reason for a crisis at secondary institutions	Discount window lending to secondary institutions
Insolvent	"Early" closure or merger for primary institution	Regular closure or merger for primary institution
	"Early" closure for primary, discount window lending to secondary institutions	Regular closure for primary, discount window lending to secondary institutions

Market or regulatory action induces crisis for secondary firms

Conclusion

Financial panics and bank runs have been a part of the U.S. financial system for at least two centuries. Central bank lending via the discount window and closure policies on the part of governmental agencies have played important roles in handling these crises. This article has provided a review of historical and current practices relating to these areas of action, emphasizing the distinction between regulatory actions aiming to avert systemic risk (or crises) and those actions primarily addressing problems isolated at an individual institution.

The article suggests that in a world where regulators and market participants have differing (and at times conflicting) information, there exist useful discount window and closure policies, which have the following characteristics:

- Discount window lending is used solely to deal with systemic risk issues except in those cases for which the central bank's private information suggests that an individual bank is viable even though market-based financing is unavailable.
- In extreme circumstances discount window lending is made available to secondary institutions that are nondepository intermediaries.
- Closure rules are not related to systemic risk issues. Systemic risk is dealt with through the discount window policies discussed above or through open market operations.

The recently adopted banking legislation moves toward the separation of isolated solvency and systemic liquidity problems. Regulators are mandated to resolve problem banks promptly. Banks with inadequate capital will be required to develop and implement a plan to increase their capital well before they become insolvent. Problem banks unable to raise their capital are supposed to be placed in receivership or conservatorship prior to becoming insolvent. The ability of the FDIC and Federal Reserve to protect uninsured depositors is also curtailed. In addition, the bill has expanded the Federal Reserve's ability to supply liquidity to nonbank firms in a systemic liquidity crisis. Thus, excepting the transitional period, the new legislation seems to have provided a viable framework for managing bank closures by the FDIC while allowing the central bank maximum flexibility to deal with any related crises.

Notes

1. The illiquid intermediary may have to pay a premium to obtain funds on short notice, but the extra cost has the side benefit of encouraging intermediaries to manage their liquidity position prudently.
2. This danger exists for all institutions but may be worse for intermediaries.
3. See, for example, Chernow (1991, particularly 124-25) for a discussion of the consortium put together by Morgan to deal with the potential closing of the New York Stock Exchange during the panic of 1907. Interestingly, this group also made decisions concerning the viability of individual trust companies. Much like a central bank, some were allowed to fail (for example, Knickerbocker) while others (for example, Trust Company of America) were deemed healthy and provided with emergency credit.
4. As noted earlier, the purpose of this article is not to enter the debate over (a) the wisdom of centralizing the fractional reserve system and the issuance of money (see Bagehot 1873) or (b) the causality between government price stabilization policies (or lack thereof) and the resulting health of financial intermediaries (see Schwartz 1988). Rather, the primary concern is with the appropriate use of government intervention once a period of financial stress occurs, whatever its underlying source.
5. Wigmore (1987) provides an interesting argument that neither the timing of the bank holiday nor the calm afterwards was due primarily to domestic failures on the part of the Federal Reserve and the subsequent establishment of the FDIC. He argues that the holiday was necessitated by a run on the dollar and that the crisis was abated by restrictions on gold payments and the devaluation of the dollar.
6. Emmons (1991) provides a model with roles for both the lender of last resort and deposit insurance. The lender of last resort limits the damage from early liquidation of a bank resulting from a run by depositors that monitor a bank's portfolio, while deposit insurance removes the incentives for nonmonitoring depositors to join a bank run after it has begun.
7. Although Continental is generally cited as the first application of too-big-to-fail, Golembe Reports notes that "in a very basic sense [too-big-to-fail] was born on December 4, 1956, when the Home National Bank of Ellenville, New York failed" (1991, 5). The bank had a local box factory as one of its large depositors, and employees of the box factory were facing a grim Christmas season.
8. The closing is inevitable absent the existence of a deposit insurer that will cover the losses for at least some subset of the firm's creditors.
9. See Tallman and Moen (1990).
10. Technically, the model by Kanatas deals only with risk-neutral firms and risk-averse private lenders. Therefore, lending *between* private firms is not explicitly considered. However, the model could be extended to incorporate the risk aversion discussed in the text.
11. Wall and Peterson (1990) provide a review of the failure of Continental Illinois and its impact on other allegedly financially weak banking organizations.
12. FDIC insurance assessments are ordinarily levied only on domestic deposits.

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What Hath the Fed Wrought? Interest Rate Smoothing in Theory and Practice

William Roberds

The study of monetary policy has traditionally been hobbled by a yawning gap between theory and practice. Research economists who study monetary policy are usually concerned with the behavior of one or more aggregate measures of money—M1, M2, and so forth. Participants in financial markets, on the other hand, view monetary policy as primarily affecting interest rates, especially at the short end of the term structure. Financial market press and wire accounts of monetary policy emphasize its role in reducing short-term interest rate fluctuations. This aspect of monetary policy, often referred to as interest rate "smoothing," has traditionally been either ignored or criticized by academic economists. Despite being unpopular in academic circles, interest rate smoothing is nonetheless practiced to a greater or lesser extent by the monetary authorities of every major industrialized nation and has been practiced by the Federal Reserve System since its inception.[1]

The continued and widespread use of interest rate smoothing as a proximate goal for monetary policy poses a number of questions for economic research. Three of the most important questions are as follows. The first and most obvious question is, Why smooth interest rates in the first place, in spite of all academic advice to the contrary? Second, What are the long-term consequences of interest rate smoothing for the economy? And the third question is, Provided that interest rate smoothing is a desirable objective, to what extent should interest rate smoothing take precedence over other goals of monetary policy?

These questions are difficult ones, but they are obviously crucial to the management of the nation's monetary policy. They remain by and large unanswered. Still, researchers have made a considerable amount of progress on these questions in recent years. The following discussion reviews some

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of the most important contributions by economists to the understanding of these complex issues. Because so much of the discussion of interest rate smoothing involves historical comparisons, it is appropriate to begin with a brief history of the Federal Reserve System's approaches to open market policy, with particular emphasis on the impact of Fed policy on short-term fluctuations in interest rates.

Interest Rate Smoothing and Federal Reserve Policy: Historical Summary[2]

For the purposes of this article, it is assumed that the principal instrument of Federal Reserve policy has been and will continue to be a short-term interest rate such as the federal funds rate.[3] The term policy "instrument" refers to the Federal Reserve System's practice of attempting to influence some economic variable, such as the fed funds rate, in an attempt to achieve its policy goals. The Federal Reserve's use of the fed funds rate as a policy instrument is well known and without controversy. What has been less well understood by academic economists, until recently, is the extent to which Fed policies have traditionally worked to smooth fluctuations in short-term rates. In the 1980s, however, a number of studies pointed out that 1914, the year the Federal Reserve System was founded, represents something of a watershed in the financial history of the United States, if not the world.[4] A number of changes in the patterns of financial market data are evident after that point. Chief among these are the disappearance of seasonal fluctuations in most short-term interest rates, an increase in seasonal fluctuations in the money supply, and the general increase in the tendency of rates to persist at or near their current levels over time.

How many of the changes in financial markets after 1914 can be attributed to the policies of the Fed and how many are owing to other circumstances is a matter of continuing debate. It is undeniable, however, that Fed policies did substantially contribute to changes in U.S. and world financial markets. A plausible explanation for the impact of the Fed's monetary policies is clearly laid out by Marvin Goodfriend (1988), expanding on the earlier analysis of Milton Friedman and Anna J. Schwartz (1963). In the early years of its existence, the Fed found itself in a historically unique position because of its statutory role as a public agency charged with managing the nation's money supply and also because a large domestic stock of gold reserves had built up following the outbreak of World War I in Europe. The fact that the United States was on the gold standard at the time meant that monetary policy actions had to be backed by a sufficient gold reserve to maintain the gold standard. Such reserves were readily available to the United States as the warring European nations abandoned the gold standard and started using their own gold reserves to pay for their military operations. Also contributing to the efficacy of the Fed's actions was its statutory role as a stabilizing influence on the banking system rather than as a profit-maximizing entity. Fed officials had a greater degree of latitude in their attempts to stabilize financial markets than "central banks" had enjoyed before 1914, when policy-making was often constrained by the need to safeguard the banks' (private) shareholders' profits or by an insufficient gold reserve.[5]

In the 1920s the primary focus of the Fed's monetary policy changed from the discount window to open market operations, where it has remained ever since.[6] The historical record suggests that this structural change in monetary policy did not result in any lessening of the Fed's taste for interest rate smoothing. There was little need for the Fed to smooth interest rates during the years immediately following the banking crisis of 1933, as rates on short-term government securities remained at extremely low levels. From April 1942 until March 1951, Federal Reserve open market policy was very tightly constrained by the need to finance wartime expenditures. Over this period, interest rates on short-term government securities were "pegged" at levels agreed to by the Treasury Department.

With the signing of the Treasury–Federal Reserve Accord in March 1951 the Fed regained the ability to initiate monetary policy. The data records of the 1950s and 1960s again suggest that interest rate smoothing continued to be an important goal of monetary policy. In the meantime, the development of the Federal Funds Market led to an ever greater amount of emphasis being placed on the fed funds rate as a measure of credit market conditions. By the late 1960s movements in the fed funds rate were frequently mentioned in the minutes of the Federal Open Market Committee (FOMC). As open market operations were increasingly concentrated in the fed funds market, stabilization of day-to-day movements in the funds rate became an important short-term goal of open market policy. In the mid-1970s relatively narrow ranges for the funds rate were given in the FOMC directive. Over the latter part of the 1970s the width of the "intermeeting" (between FOMC meetings) range for the fed funds rate shrank from around 1 percentage point to as little as

1/4 percentage point. As emphasized by Ann-Marie Meulendyke (1990), this extreme concern with short-term fluctuations in the funds rate developed gradually over time, not as a result of an active decision to target the funds rate tightly.

The period from October 1979 through October 1982 is officially known as the "nonborrowed reserves-targeting" (NBR) period and unofficially as "the Fed's monetarist experiment." During this time, nonborrowed reserves officially replaced the fed funds rate as the short-run target for open market operations. Whether this move was monetarist or not, its effect was to allow much more variation in the fed funds rate than had occurred under the funds rate-targeting regime. The variability of reserves during the NBR-targeting period did not change much from the funds rate-targeting period, confounding some predictions that loosening the peg on fed funds would reduce the average magnitude of fluctuations in bank reserves. (See Charts 1A and 1B and 2A and 2B.) The continued volatility in reserves during the NBR period reflects at least in part the turbulent economic conditions in that era. However, at least some portion of the fluctuations in reserves during the NBR period can be attributed to the continued use of the funds rate as an operating target. A recent study by Timothy Cook (1989) found that despite the nominal adoption of NBR targeting, two-thirds of the variation in the funds rate during the October 1979 through October 1982 period can be attributed to direct policy actions on the part of the Fed; that is, these movements in the funds rate were not necessary to meet the reserves target. If this estimate is even approximately correct, then the distinction between the open market policies in the NBR and fed funds rate-targeting periods is perhaps best characterized as quantitative rather than qualitative.

The borrowed-reserve operating procedure that has been in place since October 1982 has been seen by many academic observers and financial market participants as a retreat toward the funds rate-targeting procedure of the 1970s. Although the current operating procedure incorporates some important reforms, it is difficult to find fault with this generalization. Comparing the time series data on the fed funds rate and bank reserves since 1982 (Chart 3) with the data record of the 1976-82 period (Charts 1 and 2) shows that the current operating procedure falls somewhere between the two earlier operating procedures in terms of the variability of interest rates. In particular, Chart 3A indicates that except for an occasional well-publicized miss, the funds rate has tended to move within fairly close bounds since October 1982, particularly since 1986.

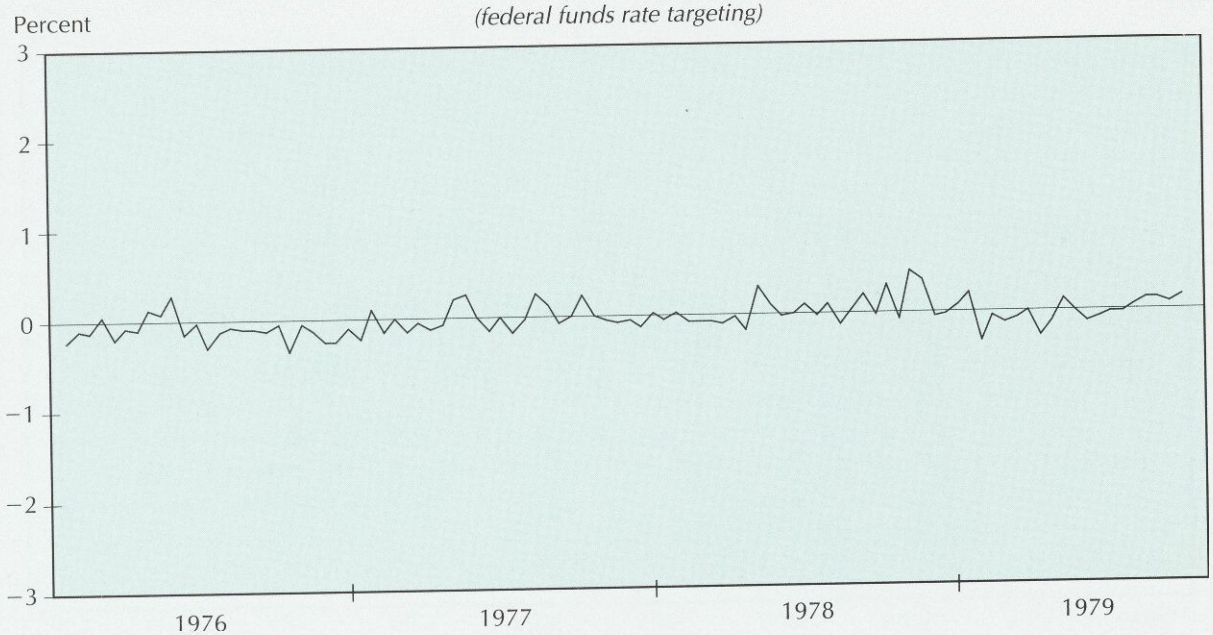
*W*hy Smooth Interest Rates?

In discussing the desirability of interest rate smoothing, it is necessary to specify carefully the horizon over which the relevant interest rate is to be smoothed. There is widespread (though not universal) agreement among economists that a monetary authority cannot successfully influence the real or inflation-adjusted rate of interest over the long run.[7] In other words, according to the mainstream view, the Fed does not have the option of simply pegging the interest rate at some level deemed to be desirable. At the other extreme, most economists would agree that it is feasible for the Fed to exercise considerable influence over at least nominal interest rates on a day-to-day or week-to-week basis. During the late 1970s, for example, short-term movements in the fed funds rate were virtually eliminated by Fed interventions. Consequently, the debate over the "short-run" smoothing of interest rates is centered to some extent on what should be designated as the short run.

The Fed's very strict smoothing of day-to-day movements in the funds rate in the late 1970s generated an unprecedented amount of attention to Fed operating procedures by the economics profession, much of it critical in tone. The logical basis for a good deal of this criticism was laid in an article by William Poole (1970). Analyzing open market operations from an informational perspective, Poole showed that strict targeting of interest rates, even in the very short run, would result in what economists call an "identification" problem. That is, strict targeting of interest rates necessarily entails some loss of information. This loss of information occurs because successful open market operations require some knowledge of the banking industry's demand schedule for reserves: specifically, what quantity of reserves would be demanded at various rates of interest. By keeping interest rates constant, even over some short interval, some knowledge of banks' demand schedule will necessarily be forgone. Thus, to smooth interest rates effectively, some variation in interest rates is desirable, even in the short run. In everyday terms, Poole's argument would say that it is easier to steer a car by making a series of small probes and corrections than to keep the same vehicle headed arrow-straight into the great unknown.

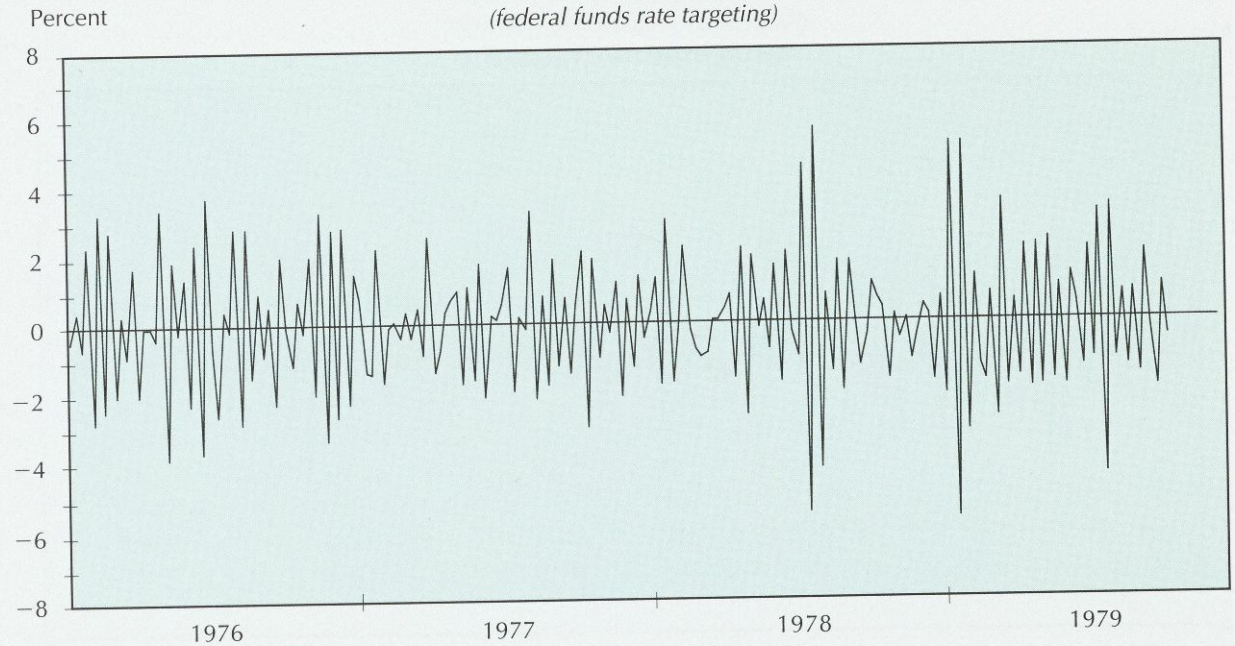
Poole's theoretical observations were borne out in practice. In the late 1970s very narrow targeting of the funds rate in the short run led to a general hesitancy to move the funds target. Moves in the funds target were generally anticipated by financial markets and were

Chart 1A
Variability of Fed Funds Rate
(federal funds rate targeting)



January 1976 to September 1979
(biweekly observations)

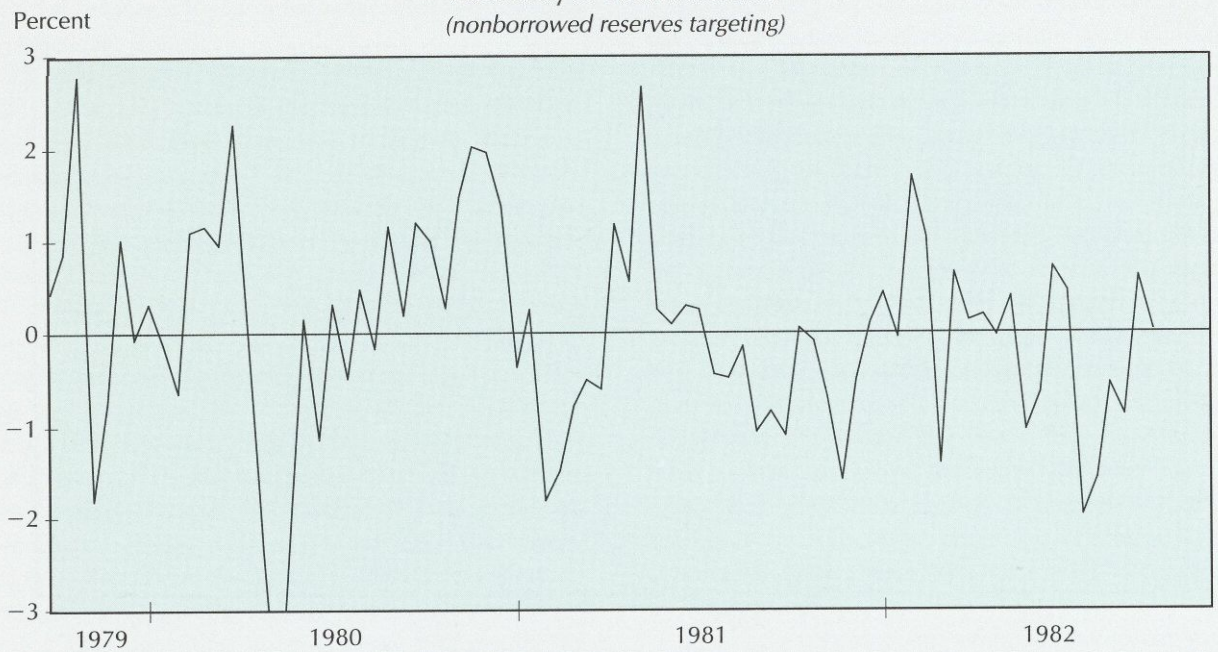
Chart 1B
Variability in Reserves Growth
(federal funds rate targeting)



January 1976 to September 1979
(weekly observations)

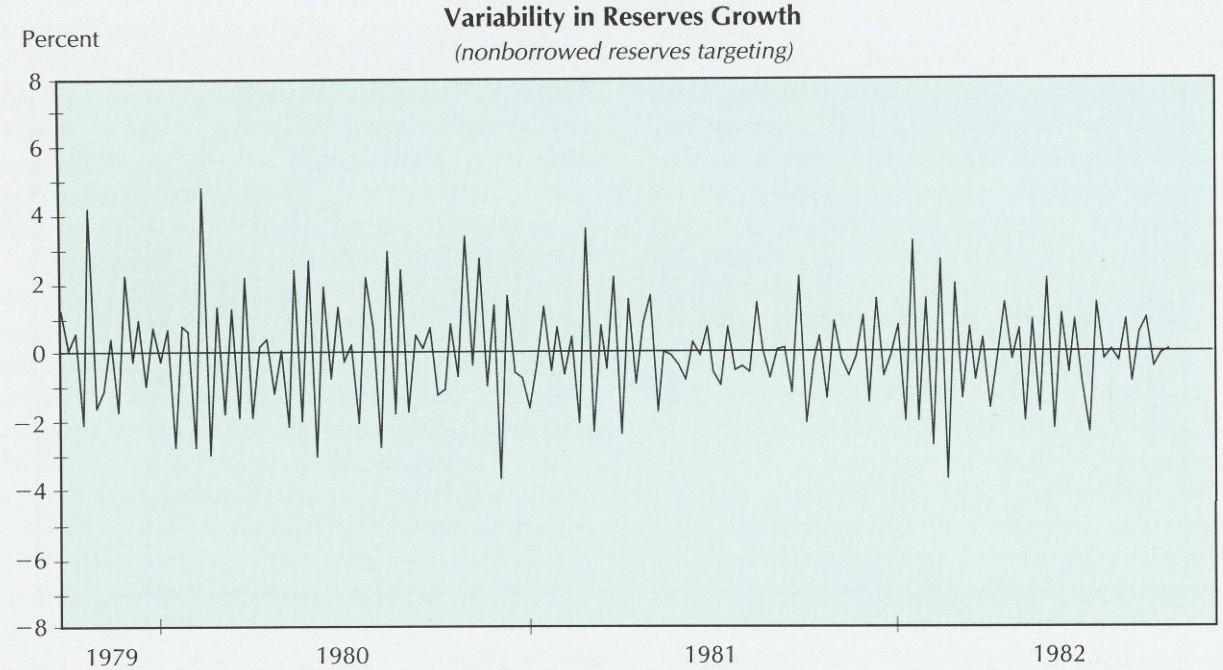
Source: All charts calculated by the author using data from the Board of Governors of the Federal Reserve System.

Chart 2A
Variability of Fed Funds Rate
(nonborrowed reserves targeting)



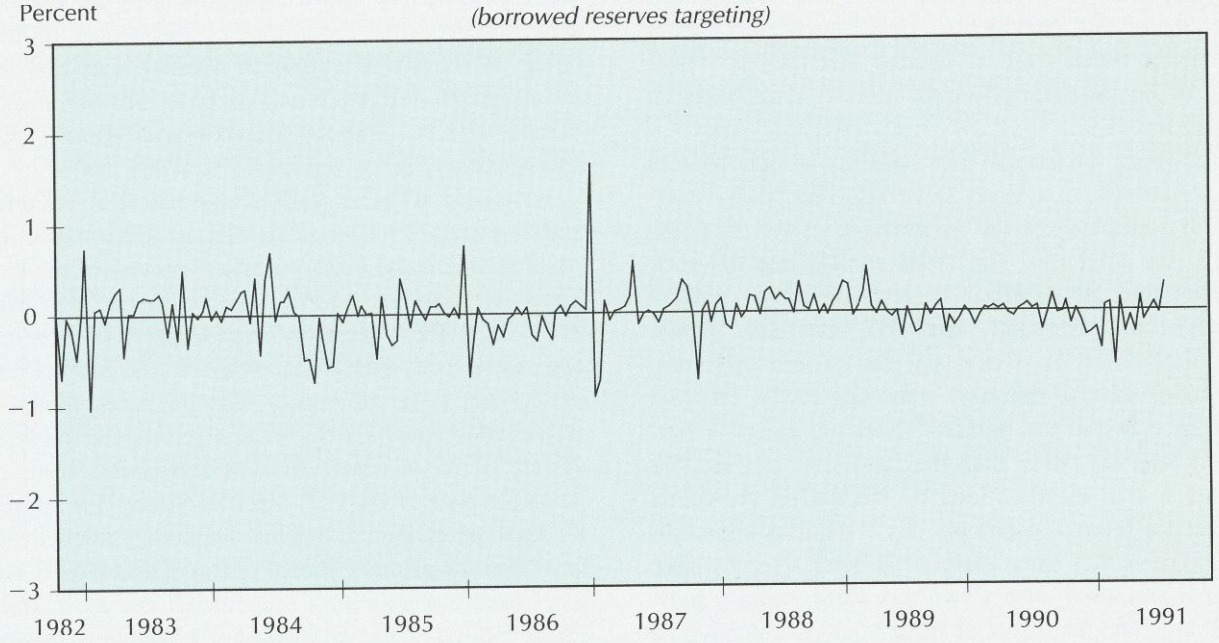
October 1979 to September 1982
(biweekly observations)

Chart 2B
Variability in Reserves Growth
(nonborrowed reserves targeting)



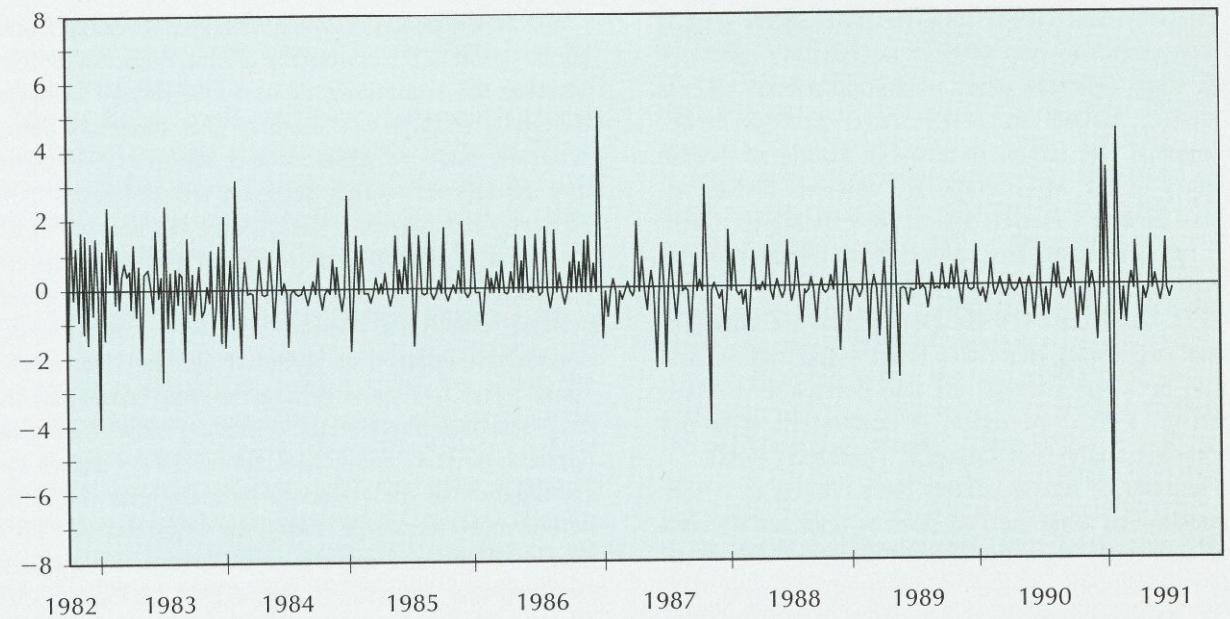
October 1979 to September 1982
(weekly observations)

Chart 3A
Variability of Fed Funds Rate
(borrowed reserves targeting)



October 1982 to July 1991
(biweekly observations)

Chart 3B
Variability in Reserves Growth
(borrowed reserves targeting)



October 1982 to July 1991
(weekly observations)

often seen both by market participants and academic observers as too little, too late. The consensus view of the funds rate targeting of the late 1970s is aptly summarized by Meulendyke (1990), who observed that during this period the "[fed funds] rate moves during the week were so limited that they provided little or no information about reserve availability or market forces."

Following the interest rate volatility associated with the nonborrowed reserves targeting, Fed policy since 1982 has emphasized the stabilization of the fed funds rate in the short run. This renewed attention to short-term interest rate stabilization continues to be a subject of academic controversy.[8] However, potentially important differences exist between the current operating procedure and that followed in the late 1970s. The first difference is that the nominal short-run target is borrowed reserves rather than the funds rate per se. The second is that interventions by the Fed in the funds market are limited to one per day. The third important difference is that since early 1984 bank reserves have to be maintained with a two-day rather than a two-week lag. The net effect of these changes has been to introduce a somewhat greater amount of day-to-day variation in the funds rate, particularly on alternate Wednesdays when reserve balances are settled.

To date, researchers have not fully resolved the extent to which these changes have helped avoid some of the difficulties associated with 1970s operating procedures. Bennett T. McCallum and James G. Hoehn (1983) provide a theoretical analysis of targeting interest rates versus total reserves under lagged and contemporaneous reserve accounting environments. They find that under contemporaneous reserve accounting, targets on total reserves perform better than interest rate targets in terms of hitting an overall monetary target. More elaborate versions of McCallum and Hoehn's model, which are capable of distinguishing between borrowed and nonborrowed reserves, are presented by Michael Dotsey (1989) and David D. Van Hoose (1988). Dotsey also presents simulations suggesting that there is little quantitative distinction between interest rate and borrowed reserves targeting. This conclusion is consistent with the econometric analysis of Daniel P. Thornton (1988).

A number of recent studies have chosen to ignore the question of what the Fed does or does not do on a day-to-day basis, focusing instead on the effects of interest rate smoothing over the seasonal horizon. Jeffrey A. Miron (1986), in particular, calls attention to the changes in seasonal behavior of interest rates and the monetary aggregates after the founding of the Fed. Miron notes that late nineteenth- and early twentieth-century money crises almost always occurred during the fall harvest season. According to Miron, in the years immediately following its founding the Fed was able to prevent the recurrence of such crises by lessening seasonal movements in interest rates and seasonally expanding the monetary base. Miron's work is extended in N. Gregory Mankiw and Miron (1986) and Mankiw, Miron, and David N. Weil (1987).[9]

Historical accounts such as that found in Friedman and Schwartz (1963) indicate that the lessening of seasonal strains in the money market was one of the most important, and perhaps the overriding, goal of early Fed policy. There seems to be widespread professional agreement, both then and now, that in the early twentieth century some amount of seasonal accommodation was needed to offset the strains put on the financial system by the seasonal cycle of agriculture. In recent years the pace of the U.S. macroeconomy has retained its seasonal character, but the available evidence suggests that the primary source of this seasonality is now the Christmas shopping season, not the agricultural cycle.[10] In other words, instead of seasonality induced by a shock to aggregate supply (that is, the fall harvest), seasonality in the macroeconomy is now driven by a seasonal shock to aggregate demand (Christmas shopping). The absence of seasonal movements in interest rates, together with seasonal movements in various monetary aggregates, indicates that smoothing of seasonal fluctuations continues to be an important focus of Fed policy.

Given the demand-driven nature of seasonal fluctuations in the U.S. economy, a natural question to ask is whether the smoothing of seasonal shocks to output should be an important focus of U.S. monetary policy. A recent study by Mankiw and Miron (1991) argues that the answer to this question would be yes if the economy behaves in a sufficiently "Keynesian" fashion—that is, if real quantities such as output and employment are sensitive enough to changes in purely nominal quantities. Mankiw and Miron estimate that nonaccommodation of seasonal demands for money could result in relatively large welfare losses, arising from seasonal movements in interest rates. Taking the opposite point of view, McCallum (1991) argues that stabilization of the economy over the year might not be inherently desirable, citing the examples of Christmas shopping and the seasonal construction cycle as two "rational" causes for seasonality. McCallum concludes that the welfare gains to the seasonal smoothing of interest rates are probably less than $1 per U.S. resident per year.

In summary, a search of the literature on the possible rationales for interest rate smoothing raises more questions than it answers. The bulk of the studies appear to weigh in against very strict short-term smoothing of interest rates in favor of some sort of reserve-based operating procedure, but it would be a mistake to characterize this issue as settled. Nor is there anything approaching a professional consensus concerning the issue of the degree to which the Fed should accommodate seasonal pressures in the money market.

What Are the Long-Term Consequences of Interest Rate Smoothing?

The classic criticism of interest rate pegging was advanced by Knut Wicksell in 1898. Wicksell reasoned that if a central bank attempted to peg interest rates below their natural equilibrium level, over the long run larger and larger infusions of cash and reserves would be needed to satisfy the resulting excess demands for money. Any such attempt to peg rates below their natural equilibrium was therefore destabilizing and ultimately doomed to failure.

Wicksell's argument against interest rate pegging (which is still found in economics textbooks) was concerned with the long-run consequences of a sustained policy. Partly as a consequence of the Fed's increased attention to interest rate objectives during the 1970s, numerous articles appeared in professional journals that explored the long-term consequences of smoothing interest rates, even when the smoothing is done over the very short run.

One of the most influential studies was a theoretical analysis by Thomas J. Sargent and Neil Wallace (1975). Sargent and Wallace were able to breathe new life into Wicksell's argument by introducing the idea of rational expectations into a model similar to that used by Poole (1970). Specifically, Sargent and Wallace demonstrated that the potentially destabilizing indeterminacy arises when a monetary authority such as the Fed attempts to stabilize interest rates, even over the very short term. For an interest rate target to be credible, it has to be backed by the willingness to defend this target via open market operations. The degree of intervention necessary to maintain the interest rate target, however, will depend, among other things, on the rate of inflation anticipated by the public over the interval that the interest rate is to be stabilized. The indeterminacy arises from the fact that essentially any expected rate of inflation is consistent with an interest rate target, given a sufficient willingness on the part of the Fed to defend the targeted rate of interest.

McCallum (1981) reconsiders the Sargent-Wallace indeterminacy and finds that it can be resolved by the use of a "nominal anchor"—for example, a monetary target—on the part of the Fed. That is, if policy is adjusted not only to smooth interest rates but also in response to changes in some other nominal target variable, then this type of policy does a better job of signaling the Fed's intentions. This result occurs because the response to movements in a nominal anchor gives the public a more definite idea concerning how staunchly a given interest rate target will be defended. To return momentarily to the automotive analogy, the use of a nominal anchor might be compared to a driver's adherence to the rules of the road. By driving on the right side of the road, stopping at stop signs, and so forth, individual drivers reduce the potential scope of their own actions. Yet this reduced freedom of action produces the desirable outcome of fewer collisions because better information about each individual driver's likely behavior is available to other drivers.

McCallum's results provide some intellectual backing for the combination of short-term interest rate smoothing and longer-term monetary targeting now in use by the Fed. In practical terms, however, the usefulness of monetary targeting schemes has been limited by uncertainty about which measured monetary aggregate is the appropriate measure of "the" money supply.[11] Despite these practical difficulties, and despite the usual amount of initial academic skepticism, the policy conclusions of the Sargent-Wallace-McCallum approach have come to be viewed as orthodoxy by a broad cross section of the economics profession, even as their theoretical analyses have become seen as somewhat dated.

Numerous refinements have been suggested for the basic approach used by Sargent and Wallace (1975) and McCallum (1981). While these refinements have offered some useful insights into the possible long-term consequences of various approaches to monetary policy, no single point of view on this subject has been widely accepted within the economics profession. The waters around this issue have been further muddied by the publication of another controversial article by Sargent and Wallace in 1982. In the context of a theoretical model Sargent and Wallace were able to show that under certain assumptions, the "best" interest rate smoothing policy was not adjusted with reference to a nominal anchor such as a monetary aggregate but according to the needs of people in the model who are engaged in trade.[12] This conclusion, though widely

discussed within the economics profession, has not been as widely accepted. Dissenting viewpoints can be found, for example, in articles by David Laidler (1984) and McCallum (1986), who view the Sargent and Wallace (1982) result as lacking in sufficient generality to be applicable to the problems of real-world monetary policy.[13]

Despite the apparent divergence of professional opinion on the subject, the literature on the long-term stability of interest rate smoothing policies has made substantial progress over recent decades. The seminal article by Sargent and Wallace (1975) provided a useful insight into the possibility that even short-term interest rate smoothing, without reference to some other policy guidelines, could be destabilizing over the long term. The recent literature in this area has tended to focus not on whether such guidelines (or "nominal anchors") are needed but on which anchor would provide for the smoothest sailing.

To What Extent Should Interest Rate Smoothing Take Precedence over Other Goals of Monetary Policy?

Certainly, monetary authorities such as the Fed were not created for the sole purpose of smoothing interest rates. This fact is recognized by researchers in this area, in that the objective of the Fed is traditionally modeled as incorporating "stable" prices and economic growth. Stability means different things to different researchers, but it is traditionally taken to mean "as close as possible to some desired path."

According to the various models that follow in the tradition of Sargent and Wallace (1975) (for example, McCallum 1981; Dotsey 1989; and Goodfriend 1987), monetary policy actions that smooth interest rates are essentially in direct conflict with the goals of price and output stability. In these models, interest rate smoothing leads to increased confusion over real versus nominal quantities and hence to greater uncertainty in both real output and prices. Thus, the analysis in these articles suggests that the practice of interest rate smoothing will eventually be at odds with other traditional stabilization objectives.

An alternative perspective on the long-term effects of interest rate smoothing is presented in an article by Wallace (1984). Wallace argues that debates over monetary policy should not be centered on questions of stability per se but rather on questions of who benefits and who loses, and by how much, as a result of monetary actions. For example, if open market operations by the Fed are able to lower the real rate of interest permanently, as occurs in Sargent and Wallace's (1982) model, then holders of nominally denominated assets (that is, fixed-rate debt) are made worse off, and people who are borrowing money are better off than they would be without this open market intervention. In an example Wallace (1984) uses, it is impossible to say that the economy as a whole is better off, either with or without the presence of monetary policies designed to influence interest rates. Under each policy scenario, some people are adversely affected while others are better off.

For many researchers it would be difficult to evaluate the real-world significance of this argument. If monetary policy can substantially influence real interest rates over time, as Wallace (1984) argues it can, then such an argument is almost surely correct. However, as noted above, many economists do not believe that real interest rates can be influenced by monetary policy, especially over the long run. For this reason, those economists would probably dispute the direct applicability of Wallace's argument. However, it is a useful exercise to apply a similar line of reasoning to what is known about the dynamics of financial markets before and after the founding of the Fed.

From the end of the Civil War to 1914 movements in interest rates were characterized by sudden, large, and relatively short-lived swings, as compared with movements in interest rates since 1914. Movements in the very short end of the term structure, as typified by the rate on overnight call money, were particularly subject to large fluctuations. Goodfriend (1991) notes that on a monthly average basis overnight money rates jumped by more than 5 percentage points on twenty-six occasions and changed by more than 10 percentage points eight times during this forty-nine-year period.[14] There were clearly winners (lenders) and losers (borrowers) who gained and lost money during these brief episodes of high interest rates, but high levels of interest rates were hardly seen by contemporary observers as the most negative aspect of these "money panics." More generally, such episodes were associated (most often in a causal fashion) with bank runs, contractions in credit, and a reduction in the overall level of real economic activity. A potentially strong argument in favor of interest rate smoothing as a goal of monetary policy would be that smoothing prevents the occurrence of such crises, given that such crises are, after the fact, in no one's best interest. Thus, if one accepts the idea that interest rate smoothing leads to an avoidance of money panics, with few other serious long-term consequences

on the economy, then the argument advanced by Wallace (1984) would lose much of its force.

The importance of central bank liquidity provision in preventing financial panics is an accepted part of central banking doctrine, dating back to at least Walter Bagehot (1873). As was noted above, the elimination of money panics associated with the harvest season has been viewed by many observers as an important accomplishment of early Fed policy. More recently, however, economists have been revising traditional views on the causes and remedies of money panics. In the recent literature the tendency has been to view pre-Fed money panics as well as the Great Depression of the 1930s not as exercises in pure mass hysteria but as being caused by the markets' rational responses to a poorly designed regulatory structure.[15] In a widely cited paper, Douglas W. Diamond and Philip H. Dybvig (1983) use such an argument to rationalize deposit insurance as a means of avoiding panics. In a related paper V.V. Chari (1989) argues that under certain conditions monetary policy may be superior to deposit insurance for this purpose because deposit insurance carries with it the potential for skewing banks' incentives toward risky investments. On the other side of the question Wallace (1988, 1990) argues, in effect, that temporary suspensions of convertibility such as occurred often during the money panics could be desirable as a means of eliciting otherwise unavailable information about the economy's demand for liquid assets.

An unfortunate aspect of the new literature on panics is that it has generally yielded only limited insights into the appropriate role of monetary policy in the prevention of panics. Overall there has been a tendency to focus on the consequences of various regulatory constraints (for example, restrictions on banks' assets, liabilities, reserves, and so forth), with relatively little attention being paid to the interaction between direct regulation, emergency credit provision, and open market policies. The implicit message (occasionally made more explicit in papers such as Ben S. Bernanke's 1983 analysis of the Great Depression in the United States) has been that the role of monetary policy in preventing the recurrence of such crises must be subordinate to that of regulation. Whether or not this last view is correct remains a matter of dispute (see, for example, James D. Hamilton 1987 for a somewhat contrary view of the Great Depression). Still, the burgeoning literature that seeks to link the structures of financial intermediation to aggregate consequences suggests that a good understanding of the potential effects of monetary policy depends on a deeper understanding of the workings of financial intermediaries. A number of recent papers—for example, John H. Boyd and Edward C. Prescott (1986), Bernanke and Mark Gertler (1987), and Sudipto Bhattacharya and Douglas Gale (1987)—have suggested that banks may represent a particularly efficient solution to the problem of how to evaluate the creditworthiness of potential borrowers. If this conclusion is accepted, it is fairly easy to rationalize the expenditure of public funds to protect the banking system in moments of illiquidity. What is lacking is a precisely defined role for open market policy in this protective mission, especially open market policies that incorporate interest rate smoothing.

Conclusion

Real-world objectives of monetary policy have historically incorporated some degree of interest rate smoothing. Traditional economic analyses suggest that, at best, very strict smoothing of interest rates through open market operations leads to some loss of information about the demand for funds provided by the central bank through such operations. Since 1975 various branches of academic economics have brought a number of different approaches to this problem.

One branch of the macroeconomics literature has had very little good to say about interest rate smoothing. This research has offered no rational basis for the practice of interest rate smoothing and has often concluded that strict smoothing of interest rates would be destabilizing in the absence of other observable policy guidelines ("nominal anchors"). Another common conclusion of these studies is that interest rate smoothing is inherently in conflict with other stabilization objectives.

Another branch of the recent macroeconomics literature has a much more benign view of interest rate smoothing. According to these studies, in some cases it may be possible for even a sustained interest rate peg to result in better monetary policy than if policy were adjusted according to movements in a monetary target. Interest rate smoothing is seen as inherently neither good nor bad, but as beneficial to some people and injurious to others. Although this branch of the literature has been influential, it is fair to say that its conclusions have not been widely accepted by the mainstream of the profession.

Yet another stream of research has focused on the changes in seasonal patterns that accompanied the founding of the Federal Reserve System in 1914.

These studies have provided interesting comparative analyses of the "smooth" financial markets characteristic of the post-1914 world versus the "noisy" pre-1914 markets. The theme underpinning much of this research seems to be that post-1914 seasonal smoothing of interest rates by the Fed could be justified because of the association of pre-1914 money panics with the agricultural production cycle. However, to date these studies have not provided an entirely satisfactory explanation of the pre-1914 panics. Nor has this branch of the literature built up much of a case as to why seasonal interest rate smoothing is needed when seasonal fluctuations are driven by shocks to demand rather than supply.

A noteworthy counterpoint to the literature mentioned above has been provided by new research in the general area of banking, and particularly in the area of modeling "runs" or "panics." While not directly focusing on the issue of interest rate smoothing, this research has the potential to provide a more complete understanding of the monetary policy's interaction with the regulatory and institutional structure of the financial system. By providing a stable operating environment for the financial sector, monetary policy actions such as interest rate smoothing may serve as a useful complement to more direct regulation. No doubt this idea will be explored in greater detail as the literature on financial intermediation develops.

As with many such debates in economics, the controversy over interest rate smoothing is a long way from being resolved. It would be a mistake, however, to say that research in this area has made no contribution to knowledge about the issue. To the contrary, the research has brought forth a number of insightful arguments both for and against this aspect of monetary policy. No doubt there is some degree of truth in all of these arguments, and each deserves careful consideration by policymakers.

Notes

1. On the prevalence of interest rate smoothing in the major industrialized countries, see Batten et al. (1990), Kneeshaw and Van den Bergh (1989), and Beaulieu and Miron (1990). For information about the Federal Reserve System's practice of interest rate smoothing, see the historical summary below, Goodfriend (1991), or Meulendyke (1989).
2. Much of the summary below is drawn from Goodfriend (1991), Meulendyke (1990), and Friedman and Schwartz (1963).
3. The fed funds rate is the rate paid by banks on funds needed to meet the banks' reserve requirements. Transactions in the fed funds market are generally limited to very short maturities, and many agreements only last a single night. On the workings of the Federal Funds Market see Goodfriend and Whelpley (1986).
4. These studies include papers by Barro (1989); Canova (1988, 1991); Clark (1986); Mankiw and Miron (1986); Miron (1986); and Mankiw, Miron, and Weil (1987).
5. The quasi-private nature of the major European central banks prior to 1914 is recounted in the various essays in Toniolo (1988). Earlier attempts at activist monetary policies by the U.S. Treasury were hindered by inadequate reserves, according to Timberlake (1978).
6. A helpful summary of the changeover from discount to open market operations can be found in Chapter 2 of Meulendyke (1989). For a more extensive discussion of this topic, see Wicker (1966). Both of these sources emphasize that this change took place gradually during the 1920s and not as a result of a single decisive change in policy. Evidently, the idea that bank reserves could be managed through open market operations was not widely understood at this time, even within the Federal Reserve System. Consequently, many Federal Reserve policymakers in the 1920s viewed open market policy as being subordinate to discount window operations.
7. At the heart of this belief is the idea that money is just an accounting device for recording the values of goods and service, and it is only the relative value between any two goods that should matter in people's economic decisions. For example, if next week the United States were to start phasing in a new currency, the "shmoo," with two of the new shmoos equal to a dollar, no one would seriously expect such a change to have any real effects. The belief that monetary policy does not affect real rates over the long run amounts to a belief that over the long run an increase in the supply of money amounts to a sort of backhanded dollar-shmoo substitution.
8. See, for example, Benjamin Friedman's (1988) comments on current Fed operating procedures; also see Spindt and Tarhan (1987).
9. Other important articles in this area differ somewhat in their interpretation of the historical record. Clark (1986) disputes the notion that the Fed was responsible for the disappearance of interest rate seasonals. Arguing on the basis of a number of statistical tests, Clark concludes that the international scope of the 1914 changes in the financial markets requires a more careful explanation than, say, that advanced in Miron (1986). Two plausible explanations are offered in Barsky et al. (1988) and Canova (1991).
10. See Barsky and Miron (1989), Beaulieu and Miron (1990), and Braun and Evans (1991).

11. See Roberds (1989) for a survey of the difficulties associated with measuring the money supply.
12. The latter point of view is generally associated with a concept known as the "real bills doctrine." The debate over the validity of the real bills doctrine goes back well into the nineteenth century, and even a cursory summary of this debate would go beyond the scope of the present article. The interested reader should consult *The New Palgrave* (Eatwell, Milgate, and Newman 1987).
13. While a full recounting of the academic disagreements about Sargent and Wallace (1982) goes beyond the scope of the present article, the essence of the debate has to do with how to best characterize money in an abstract setting. It turns out that money is something that is extremely easy to spend but difficult to characterize in an abstract sense. As a result, various branches of monetary theory have tended to emphasize differing aspects of "moneyness." The approach used by Sargent and Wallace (1982) emphasizes money's role as a store of value, so that buying and selling need not happen simultaneously. Other researchers, particularly McCallum (1986), have found this characterization of money inappropriate. These researchers have tended to emphasize the role of money as a medium of exchange—that is, its acceptability in transactions among parties not well known to each other.
14. By way of contrast, under current operating procedures, a month-to-month movement of 1 percentage point in the fed funds rate would be considered a large move. As pointed out in Miron (1986) and other papers summarized above, interest rates prior to 1914 showed as distinctly seasonal in the fall of the year, suggesting that even such large interest rate movements as described above were predictable to some extent.
15. See Tallman (1988) for a nontechnical introduction to the recent "bank panic" literature. Williamson (1987) and Gertler (1988) also present useful surveys of this literature.

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FYI

Forecasting Industrial Production: Purchasing Managers' versus Production-Worker Hours Data

R. Mark Rogers

Each month, various economy watchers—the financial markets in particular—try to gauge the strength of the economy in order to forecast orders, plan production, time investment, or price securities. One key broad indicator of the economy's strength is the index of industrial production (IP index), released by the Board of Governors of the Federal Reserve around the fifteenth of each month. To forecast industrial production, analysts use data available earlier in the month. Two indicators used for forecasting are the purchasing managers' index and aggregate production-worker hours for manufacturing. Both are broad measures of manufacturing activity released at the beginning of each month.

The purchasing managers' index is released by the National Association of Purchasing Management (NAPM) on the first business day of the month following the reference month. Data for aggregate production-worker hours for manufacturing are released (generally) on the first Friday of each month following the reference month as part of the U.S. Labor Department's Bureau of Labor Statistics employment report. These release dates mean that the purchasing managers' index is available about two weeks before industrial production data are announced, and the production-worker hours series leads the IP index by a period of ten days to two weeks.

Analysts have increasingly used these two series to anticipate the industrial production figure. This article focuses on why they are incorporated into concurrent forecasting models and how well they forecast. It also examines some of the reasons for forecast error in these models and whether such a short forecast horizon is appropriate for judging the current strength of manufacturing.

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The basic finding is that while both series provide some information on upcoming industrial production, the Labor Department series of production-worker hours is able to project with significantly greater precision on a concurrent basis. Moreover, using initial estimates gives noticeably different results from those based on revised data; forecasters should view the purchasing management data projections for industrial production as tentative until confirmed by labor data.

The Theory behind the Forecasts

Before focusing on how well these competing models forecast, it may be helpful to define these data series and look at the logic underlying the use of these indicators to project industrial production.

The National Association of Purchasing Management's Index. The purchasing managers' index is a gauge of the manufacturing sector's strength as measured by a select group within the National Association of Purchasing Management. The index components and their respective weights (out of 100) are as follows: new orders (30), production (25), supplier deliveries (15), inventories (10), and employment (20).[1] Data come from questions in the monthly NAPM survey.[2]

The survey is mailed to about 300 National Association of Purchasing Management members. The response rate varies each month, but it is not published. The questionnaires are distributed by industry according to shares in total production, although response rates affect how well the index sample is stratified. An industry's low response rate (relative to those for other industries) in a given month would result in a lower weight for that month and a measurement error.

The survey tallies the responses as to whether conditions are (1) better, (2) worse, or (3) unchanged for each of the components. From this information, the NAPM computes a diffusion index, indicating the "broadness" of worsening or improving conditions among surveyed members. This approach is in contrast to other surveys (such as those conducted by the U.S. Commerce Department's Bureau of the Census), which measure actual levels by components for indicators such as new orders, inventories, and shipments.

By the National Association of Purchasing Management's own definition, an overall index above fifty indicates an expanding manufacturing sector, and a number below fifty suggests a generalized contraction. These conclusions are based on the component indexes' being equal to the percent responding "better" plus one-half of the percent indicating "no change" (Robert S. Reichard 1988, 61). If all respondents answer "SAME," for component i the value is fifty.

$$INDEX_i = \%BETTER_i + (1/2 \bullet \%SAME_i).$$

The NAPM index is thus ordinal, not cardinal: the index does not reflect precise levels of activity but instead indicates whether a given month is better or worse than the preceding one. Diffusion indexes such as the NAPM series have the merit of being highly correlated with growth rates, but they are not as precise as surveys that measure actual production levels from period to period. This is not to say that the NAPM survey is wrong in any sense by design but simply that a diffusion index does not measure growth rates based on precise levels of activity. Because the NAPM index is designed to gauge whether manufacturing is expanding or contracting in industries represented in the survey, forecasters believe that it reasonably reflects "current" conditions in manufacturing. That is, respondents' views are seen as similar to actual production as measured in the Federal Reserve Board's index of industrial production—in statistical parlance, the two are correlated.

Production-Worker Hours. Forecasters also use production-worker hours to project industrial production. Use of this data is based on the idea that output varies according to its inputs—in this case, labor hours. By definition, output equals production hours times labor productivity:

$$OUTPUT = PRODUCTION\ HOURS \bullet OUTPUT/HOUR.$$

Any (theoretical) error in this type of concurrent forecasting model would reflect changes in productivity. In addition, it makes sense from a methodological standpoint to use production-worker hours for predicting the monthly change in the IP index because the Federal Reserve Board uses the employment-based data to derive initial estimates for many IP components.

The IP data undergo several revisions during the early stages of estimating. Because of differences in timing of data availability for actual goods produced and inputs such as labor hours and electricity usage, different methodologies are used for the various revisions. For the first IP release actual output levels are not yet available for many industries, and estimates for these are based on inputs such as production-worker

hours. By value-added weight, about one-fourth of the basic industrial production series is based on this employment data (Board of Governors 1986, 42). This portion consists of components initially and ultimately estimated with the worker hours data. Another 60 percent of the initial estimate is derived by informed judgment, with production-worker hours being the primary factor considered. The remaining approximately 15 percent is based on physical product data.[3]

The Federal Reserve Board uses the historical relationships between output and production-worker hours—along with assumptions for productivity—to derive initial estimates for various IP components. In effect, the forecasts using the hours data are mimicking this process. However, such forecasts use broad levels of aggregation. Usually, these models use broad labor-data series that have some subcomponents for which the Board of Governors actually has physical product data available.

Methodology

The Data. The data for this study come from three original sources: the Federal Reserve Board, the Bureau of Labor Statistics, and the National Association of Purchasing Management. Secondary sources discussed below were used to get original (that is, unrevised) estimates for the purchasing managers' indexes.

Current data (with full historical revisions) for production workers in manufacturing and for the average manufacturing work week were obtained from the Bureau of Labor Statistics via a commercial data vendor. Because initial percent changes are not published for production-worker hours, initial and first-revised estimates for the levels, found in monthly issues of the Labor Department's *Monthly Labor Review*, were needed to make this calculation. Use of first revisions for "the previous month" is necessary so that initial percentage changes can be calculated from published levels. The initial level for period t is the numerator, and the first-revised level in period t-1 is the base for this percent change. The relevant variable from the labor data is the percent change in aggregate production-worker hours and the average work week.

For industrial production for manufacturing, the initial percentage estimates were obtained from the Federal Reserve Board's monthly publication *Federal Reserve Statistical Release: Industrial Production and Capacity Utilization* or from the *Federal Reserve Bulletin*. Current data—that is, with historical revisions—for levels were obtained from a commercial data vendor, and monthly percent changes were calculated from levels. For statistical comparability with percentage changes for initial estimates, the calculated percentage changes for revised IP data are rounded to one decimal place. Because of differences in rounding between officially published index levels and the levels used by the Board to calculate published percent changes, official percent changes may differ slightly from those derived from levels.

Current values for the indexes produced by the National Association of Purchasing Management were obtained directly from this association through subscription. Historical data for first estimates came from secondary sources, primarily the *Wall Street Journal*, the *New York Times*, and the *Atlanta Journal*. Data for initial estimates for NAPM indexes go back to 1982, when the data were first released to the public in index form.

Empirical Comparisons of NAPM versus Production-Worker Hours Models. The model form used in this study to compare the predictive power of the NAPM index and production-worker hours is simple. The simple monthly percent change in the manufacturing component of industrial production is regressed against the level of the NAPM index or against the simple monthly percent change in production-worker hours. The level is used for the purchasing managers' index because it is a diffusion index reflecting monthly changes in the manufacturing sector. Certainly, more complex models for predicting IP can be used, but these simple models provide a straightforward basis for comparing two competing independent variables, and they reflect the methods and specifications used by market forecasters to make quick forecasts as data are released.

A regression model compares the strength of the relationship between one variable (the dependent variable) and one or more variables (the independent variables). In contrast to correlations, regressions attempt to specify the mathematical form of the relationship between the variables. As is the case with correlations, a strong statistical relationship does not guarantee that one or more variables *cause* changes in the other.

The models are seen as

$$\%\Delta IPmfg = f(NAPM, C)$$

$$\%\Delta IPmfg = f(\%\Delta PROD\ WORKER\ HRS, C),$$

where C is a constant. The regression technique used is ordinary least squares.

Markets focus on the initial IP release and, as discussed above, the initial estimate is revised. Essentially, the revised IP numbers can be considered a separate data series from the initial estimate because different estimation procedures are used. In consideration of these differences and the markets' greater attention to initial estimates, comparisons are made using initial estimates for the monthly percent change in industrial production as the dependent variable. Models using revised data are compared later. Importantly, this study uses only the manufacturing component. Explanatory variables also are in initial release form for the NAPM index and the percent change in production-worker hours. Tables 1 and 2 present the regression output for each of these two models.

The NAPM-Based Model. Table 1 presents the output of the NAPM-based model. The initial monthly percent change for manufacturing IP is regressed against the level for the purchasing managers' composite index and a constant. The model has only modest predictive power with an adjusted R^2 of 0.36 and a mean absolute error of the regression of 0.40 percentage points, compared with the mean of the absolute value of the dependent variable of 0.55 percentage points.[4]

However, the model does have the expected signs for the coefficients. For each index point change in the index, the initial manufacturing IP changes by 0.06 percentage points minus the constant of 2.87. The purchasing managers' composite index is positively correlated with manufacturing IP, as expected, and the *t*-statistics are greater than the rule of thumb of 2 (absolute value) for statistical significance.

The degree of confidence one can place in the reliability of the estimate for the coefficients is indicated by *t*-statistics. The *t*-statistic is the ratio of the coefficient value to its standard error. The greater the coefficient to its standard error (ignoring the sign of the coefficient), the greater the confidence that the coefficient is significantly different from zero. If the coefficient is not significantly different from zero, then that variable does not "explain" changes in the dependent variable.

This model might best be interpreted by setting the model solution equal to zero and solving for the index for the "no change" value. Values for the NAPM greater than this solution value would tend to be associated with increases in industrial production, while lower index levels would suggest declines in industrial production.

$$\%\Delta IPmfg = b \bullet NAPM + constant$$
$$0 = 0.06 \bullet NAPM - 2.87$$
$$47.83 = NAPM.$$

This model shows that "no change" in manufacturing *IP* is statistically associated with a value of 47.83 for the purchasing managers' index over the 1982-90 period. This zero is the point estimate for *IP* manufacturing when the *NAPM* equals 47.83. The constant is negative because index numbers below

Table 1
NAPM-Based Model

Dependent Variable: Monthly Percent Change in Industrial Production for Manufacturing, Initial Release
Regression Period: January 1982–November 1991

Independent Variables	Coefficient	Standard Error	*t*-statistic
NAPM Index, Initial	0.60E-01	0.75E-02	8.03
Constant	−2.87	0.39	−7.44

Number of Observations:	119	R^2:	0.36
Mean Absolute Percent Change of Dependent Variable:	0.55	Adjusted R^2:	0.35
Standard Error of Regression:	0.58	Durbin-Watson:	1.87
Mean Absolute Error:	0.40	Standard Deviation of MAE:	0.41
Root Mean Squared Error:	0.57		

47.83 are associated with declines in production. This figure is somewhat below the level of 50 identified by the NAPM as associated with a generalized decline in the manufacturing sector.[5] Although the difference is not statistically significant, regressions using different periods consistently estimated values less than 50.

Logically, the NAPM production component might be more correlated than the overall NAPM index with manufacturing production. However, historical data for initial estimates for the production component were not available prior to late 1988 (Reichard 1988, 61). A sufficient number of observations were not available to run a statistically meaningful regression.[6]

The Production-Worker Hours Model. For this model the initial monthly percent change for manufacturing IP is regressed against the percent change in production-worker hours from the initial estimate. Production-worker hours are defined as the product of (for manufacturing) the number of production workers and the average work week. Because initial estimates for IP are being modeled, initial estimates for the percent change in the independent variable are also needed. Although initial percent changes are not published, initial and revised levels are. The initial percent change is calculated from the numerator in the percent, which reflects initial estimates for levels in period t, with the denominator being second estimates (first revised) for period t-1.

This model, as shown in Table 2, is significantly more accurate than the NAPM-based model. The adjusted R^2 is twice as high at 0.68, and the mean absolute error of the regression is about one-fourth lower at 0.30 percentage points.

This model also is consistent with standard assumptions about labor input and output. First, the coefficient for production-worker hours is positive. That is, *IP* goes up or down with production-worker hours. The sizes of the coefficients are reasonable. For each percentage point increase in production-worker hours, there is a 0.50 percentage point rise in manufacturing production plus 0.19 percentage points from the constant.

The model implies positive growth in labor productivity—that is, output over the long run rises faster than labor input. This result is shown in terms of a mathematical relationship between output and labor input. Rearranging terms in the model provides productivity estimates (which are merely output over labor input): productivity is a mathematical function of the constant and slope in the regression. The 0.38 figure is the constant divided by the net of 1 minus the hours coefficient.[7] The result is the break-even point on positive growth in labor productivity. Most percent changes in this independent variable are 1 − 0.38, meaning that changes in output are generally greater than changes in the labor input. Stated differently, productivity is positive over the observation period. This

Table 2
Production-Worker Hours Model

Dependent Variable: Monthly Percent Change in Industrial Production for Manufacturing, Initial Release
Regression Period: January 1982–November 1991

Independent Variables	Coefficient	Standard Error	*t*-statistic
Percent Change, Initial Production-Worker Hours	0.50	0.31E-01	16.02
Constant	0.19	0.37E-01	4.91

Number of Observations:	119	R^2:	0.69
Mean Absolute Percent Change of Dependent Variable:	0.55	Adjusted R^2:	0.68
Standard Error of Regression:	0.40	Durbin-Watson:	1.52
Mean Absolute Error:	0.30	Standard Deviation of MAE:	0.26
Root Mean Squared Error:	0.40		

finding is consistent with the more rapid rise of manufacturing output from January 1982 through November 1991—a cumulative 41 percent increase—compared with very little net change for production-worker hours.[8]

For the mean value of production-worker hours (initial estimate) over the January 1982-November 1991 period, a 0.05 percent monthly increase gives an expected value of 0.22 percent increase in industrial production. This figure implies roughly a 0.17 percent rise in labor productivity in manufacturing each month on average, the same as trend productivity growth of 2.1 percent annually.[9] Certainly, productivity is cyclical, but the coefficient is consistent with longer-term trends. The assumption of constant productivity gains probably leads to a relatively low *t*-statistic for this variable.

The only other significant shortcoming of this model is the low Durbin-Watson statistic, which indicates positive serial correlation.[10] That is, the error terms are positively correlated and should be taken into account. After the Cochrane-Orcutt technique was used to attempt to remove the serial correlation, the *t*-statistics were not appreciably different.[11] However, the presence of serial correlation in the original ordinary least squares model does suggest that the model is missing a variable, probably a productivity variable.[12]

Sources of Error. Both the production-worker hours and NAPM index models provide somewhat meaningful forecasts for the pending IP release. However, the production hours model provides significantly greater accuracy, although the error term for both models is still large relative to the absolute value of the dependent variable. The natural question to pursue next concerns the sources of each model's error.

The purchasing managers' index is closely watched by the financial markets because of its role as one of the first indicators of manufacturing strength or weakness for a given month. However, this "timeliness" is also one source of the series' relative inaccuracy. Several methodological features contribute to the index's shortcomings: (1) the index is ordinal, not cardinal; (2) the weighting scheme for respondents does not exactly mirror that for industrial production for manufacturing; (3) the sample is relatively small; and (4) the timing of the survey does not correspond to the exact period covered by the IP data.

As a diffusion index the NAPM index does not measure the level of aggregate production. The index is simply a compilation of respondents' answers about whether or not conditions are better, worse, or the same. It does not and cannot determine whether a response of "worse" more or less offsets a response of "better" because the magnitude for each is not known. Statistical correlations are much more likely to be lower with these types of ordinal measures (which indicate only the direction—not level—of production) than with series such as employment or Bureau of the Census data on orders that have actual levels estimated. Less precision is simply the nature of diffusion indexes.

NAPM stratifies its sample according to industry gross-value weights. However, each respondent's answer is given equal weight regardless of the firm's size. Although weighting gross value shares of industry contributions is a valid method, these shares or weights are not the same as for manufacturing production. Industrial production component shares are based on value-added. Also, while the survey size of about 300 is fairly large for this type of survey, it is quite small relative to Bureau of the Census manufacturing surveys or Bureau of Labor Statistics employment surveys, and a larger sampling error results. Taken together, these survey characteristics lead to noticeably greater error terms.

Finally, the greater timeliness of NAPM's survey may introduce previous month's information into the survey results along with that of the current month, reducing the index's predictive power for the current month's manufacturing IP. To ensure that the purchasing managers' index is available the first working day of the month following the reference month, surveys are sent to respondents early each month, and results are tallied around the twenty-first of each month. Thus respondents must base their answers on only about two weeks of the current month and on trends from the previous month, a pattern borne out statistically.

Forecasting models typically assume that the NAPM index for the current month has the greatest explanatory power for current-month IP manufacturing. However, the large amounts of information from the previous month suggest that the current-month manufacturing IP could more accurately be correlated with the following month's NAPM. For example, the August NAPM index may be more closely associated with July manufacturing IP than is the July NAPM index.

Table 3 shows that a regression using the purchasing managers' index (initial estimates) on a month-ahead basis (the month following the current month) has a higher R^2 than the concurrent basis regression. Although the higher R^2 is not statistically different, it does suggest that the NAPM index has at least as much information from the previous month as the current month. This carryover of the previous month's information into current month's NAPM data would account for some of the index's relatively

Table 3
NAPM-Based Model with "Leading" Independent Variable

Dependent Variable: Monthly Percent Change in Industrial Production for Manufacturing, Initial Release
Regression Period: January 1982–November 1991

Independent Variables	Coefficient	Standard Error	*t*-statistic
NAPM Index, Initial But Leading By One Month	0.62E-01	0.75E-02	8.28
Constant	−2.98	0.39	−7.69

Number of Observations:	119	R^2:	0.37
Mean Absolute Percent Change of Dependent Variable:	0.56	Adjusted R^2:	0.36
Standard Error of Regression:	0.57	Durbin-Watson:	2.01
Mean Absolute Error:	0.39	Standard Deviation of MAE:	0.41
Root Mean Squared Error:	0.57		

low explanatory power for the current month's manufacturing IP.[13] Statistically, it would make as much sense to use last month's IP to forecast this month's NAPM as it does to use this month's NAPM to forecast this month's IP.

The production-worker hours model has a better track record on average than NAPM, but it also has significant error. What are the sources of these errors? First, not all components in manufacturing IP are based on production-worker hours for initial estimates. Second, by definition this model explains output through changes in either hours or productivity. The model's errors are innately errors in forecasting productivity.

This fact may be explained partly by output shifts between high productivity sectors and low productivity sectors—on a vastly simplified basis, durables versus nondurables (because durables manufacturing on average is more intensely capitalized and has higher labor productivity). The total production hours data do not differentiate any changes in relative shares of durables and nondurables. It is possible to do so, but if the researcher intends to continue modeling with initial estimates and percent changes, data and modeling difficulties compound rapidly. However, a simple ex post model (using a variable to measure durables' share in IP) can be used to verify the importance of shifts between durables and nondurables. Although there are nondurables industries with high capital-to-labor ratios, the assumption is that labor productivity is higher for durables industries on average.

With initial estimates of production indexes for durables and nondurables output, a ratio can be constructed to measure relative shares of durables to nondurables. A percentage change in this index would reflect how share is changing monthly—for example, a rise would suggest a higher durables share and an increase in productivity. As productivity rises, output would be expected to increase with hours unchanged, as the model shown in Table 4 confirms. Percent changes in manufacturing IP are regressed against percent changes in production-worker hours and in the percent change in the ratio of initial durables to nondurables output.

Table 4 shows the production-worker hours model with a variable added for the percent change in the ratio of durables IP (advance estimate for the index) to nondurables IP. A positive number indicates that durables output rose relative to nondurables. As expected—because greater output in durables would suggest higher labor productivity—the coefficient is positive, with a *t*-statistic greater than 5. This result indicates that productivity changes attributable to shifts in output do explain some of the error in the simple production-worker hours model. Of course, the ratio of durables to nondurables output is known only after the fact and cannot be added to a predictive model. The ratio of durables to nondurables hours can be used

Table 4
Production-Worker Hours Model with Durables Share Variable

Dependent Variable: Monthly Percent Change in Industrial Production for Manufacturing, Initial Release
Regression Period: January 1982–November 1991, excluding June 1985 and May 1990

Independent Variables	Coefficient	Standard Error	*t*-statistic
Percent Change, Initial Production-Worker Hours	0.46	0.30E-01	15.59
Percent Change, Ratio of Durables to Nondurables	0.16	0.30E-01	5.19
Constant	0.18	0.34E-01	5.32

Number of Observations:	117	R^2:	0.75
Mean Absolute Percent Change of Dependent Variable:	0.55	Adjusted R^2:	0.74
Standard Error of Regression:	0.37	Durbin-Watson:	1.45
Mean Absolute Error:	0.27	Standard Deviation of MAE:	0.24
Root Mean Squared Error:	0.36		

instead, but using initial estimates complicates the data-gathering process.

There are other reasons the production-worker hours model has error. First, the Labor Department data are reflected only for the pay period up to and including the twelfth of each month. Actual monthly hours may differ and, in fact, the Federal Reserve Board does attempt judgmental adjustments to account for the differences when appropriate. Another problem is that the hours data simply cannot reflect how intensively labor works. Production lines in some industries may be run at varying speeds, within limits, with a constant level of labor hours, providing a very significant source of error in this type of model.

This version of the production-worker hours model still has a low Durbin-Watson statistic. Including a productivity variable would probably yield additional information.

Combined Model. One might ask whether either of the two data series has information content that the other does not have. Could combined use of both series improve forecasting? Table 5 shows the simple production hours model with the initial NAPM index variable added. This model gives slightly better forecasts than the simple production-worker hours model with an adjusted R^2 of 0.79 versus 0.69. Even though multicollinearity probably exists, the coefficients are reasonable. Both dependent variables' coefficients remain strongly positive although slightly lower in value. However, the constant term's value turns negative, offsetting the combined positive values of coefficients for production-worker hours and the NAPM index.

The Longer Run

Economists use the types of models discussed here to predict current-month changes in manufacturing. However, these predictions are for initial estimates. How well do these models predict more reliable revised output data? The production hours model may have a significant advantage in predicting initial estimates simply because of the methodology for initial IP. Does using revised data affect the relative accuracy of the competing models? Specifically, how well do initial estimates for purchasing managers' data and for production-worker hours predict revised estimates for manufacturing production? Table 6 gives comparable statistics for the "initial-initial" models. Table 7 provides a summary of the error measures for models using revised data as the dependent variable. For an interesting baseline of comparison, forecast

Table 5
Combined Model

Dependent Variable: Monthly Percent Change in Industrial Production for Manufacturing, Initial Release
Regression Period: January 1982–November 1991

Independent Variables	Coefficient	Standard Error	*t*-statistic
Percent Change, Initial Production-Worker Hours	0.43	0.28E-01	14.95
NAPM Index, Initial	0.33E-01	0.47E-02	6.99
Constant	−1.51	0.24	−6.19

Number of Observations:	119	R^2:	0.79
Mean Absolute Percent Change of Dependent Variable:	0.55	Adjusted R^2:	0.79
Standard Error of Regression:	0.34	Durbin-Watson:	1.81
Mean Absolute Error:	0.25	Standard Deviation of MAE:	0.22
Root Mean Squared Error:	0.33		

numbers are compared with the revised number "predicted" by using the initial IP figure.

With the revised IP data, the absolute mean value of the dependent variable is larger—0.63 versus 0.55—indicating larger errors in absolute magnitude. Thus, the error in percentage terms is perhaps a slightly more valid measure because it takes into account the different magnitudes of the variable being explained. Table 6 shows the production-worker hours model and pooled model having a significant advantage over the NAPM model for initial IP. Table 7 shows the production-worker hours and pooled model with revised IP numbers maintaining their advantage—but just barely. All three models lose explanatory power. However, the "advance IP model" for predicting revised IP numbers indicates that revisions have been substantial and that the loss of explanatory power is to be expected.

Each month, forecasters predict the initial estimate for IP. However, most use the readily available revised data for both the dependent and independent variables. How do models with fully revised data perform? Is there a difference between using initial estimates versus revised estimates?

As seen in Table 8, the model using the composite NAPM index is the weakest performer. With a sufficient number of observations available, a model using the NAPM production component shows essentially no improvement over the overall NAPM index. This finding is surprising because it seems likely that the other four components in the overall index, theoretically not as closely tied to production, would generate some error. The pooled model—with the overall NAPM index included—does not perform quite as well as the production-worker hours model. Over this period the production-worker hours model with all revised data is slightly more accurate than with initial estimates for the independent variable. Overall, the production-worker hours model maintains its superiority when the models use revised data—but not by the same degree.

Conclusion

Several findings bear keeping in mind as forecasters use NAPM and the production-worker hours models to predict IP: (1) For a given month, NAPM is not particularly accurate for predicting IP although over several months it reflects trends reasonably well. (2) Of the two, the production-worker hours model is a better indicator for initial manufacturing IP releases, partly because of the IP methodology. (3) Both types of models corroborate near-term trends but are only modestly successful in forecasting the current month's IP number. (4) The models "miss" for different reasons. The

Table 6
Relative Error Estimating Initial Industrial Production With Initial Estimates for Independent Variables[a]

	Adjusted R^2	Mean Absolute Error	Standard Deviation of MAE	Mean Absolute Percent Error[b]
NAPM Composite Index	0.35	0.40	0.41	93.59
NAPM Production Index[c]	0.32	0.41	0.42	90.28
Production-Worker Hours	0.68	0.30	0.26	71.85
Combined Model	0.78	0.25	0.22	60.72

Mean of Absolute Value of Dependent Variable: 0.55

Table 7
Relative Error Estimating Revised Industrial Production With Initial Estimates for Independent Variables[a]

	Adjusted R^2	Mean Absolute Error	Standard Deviation of MAE	Mean Absolute Percent Error[d]
NAPM Composite Index, Initial	0.23	0.49	0.46	108.32
NAPM Production Index, Initial	n.a.	n.a.	n.a.	n.a.
Production-Worker Hours, Initial	0.42	0.45	0.37	92.47
Combined Model, Initial	0.48	0.42	0.35	93.29
Initial Estimate IP	0.58	0.38	0.31	85.24

Mean of Absolute Value of Dependent Variable: 0.63

Table 8
Relative Error Estimating Revised Industrial Production With Revised Estimates for Independent Variables[a]

	Adjusted R^2	Mean Absolute Error	Standard Deviation of MAE	Mean Absolute Percent Error[b]
NAPM Composite Index, Revised	0.21	0.50	0.46	108.89
NAPM Production Index, Revised	0.20	0.50	0.47	108.73
Production-Worker Hours, Revised	0.50	0.41	0.35	87.92
Pooled Model, Revised	0.51	0.41	0.34	91.15

Mean of Absolute Value of Dependent Variable: 0.63

[a] *Error measures cover the January 1982-November 1991 period.*
[b] *Nine observations in which the dependent variable equals zero are omitted from this measure because a dependent variable equal to zero results in a divisor of zero.*
[c] *Initial estimates for NAPM components were not available prior to October.*
[d] *Nine observations (different from previous table) in which the dependent variable equals zero are omitted from this measure.*

production-worker hours model falls short because of the rapid changes in overall manufacturing productivity—including the effects of shifts in the production mix (more or less production of durables relative to nondurables). The NAPM model's errors arise from a lack of controlled weighting of the NAPM survey and its inherent lack of precision as a diffusion index. (5) The size of revisions to industrial production show that, as with other indicators, these measures of concurrent production can fail to predict the strength of the manufacturing sector. Finally, (6) significant differences arise in using initial estimates in the models as opposed to using revised estimates. In particular, the production-worker hours model has a decided advantage with initial estimates but much less so with revised data.

Notes

1. This index is discussed in greater detail in *The Report on Business: Information Kit*, compiled by the NAPM Information Center, Tempe, Arizona.
2. The survey also has questions about commodity prices and exports and imports, but these are not factored into the overall index.
3. There are three types of data used in estimates for industrial production. From initial estimates through benchmark revisions, these are physical product data, production-worker hours, and kilowatt hours. However, no kilowatt hours data are available for the initial estimates.
4. The R^2, or coefficient of determination, is a measure of how much of the variation in the dependent variable is explained statistically by the variations in the independent variables. As variables are added to a model, the R^2 can only go up or show no change. The adjusted R^2 is a variant of the R^2 measure that takes into account the number of independent variables, allowing competing models with differing numbers of variables to be compared more easily.

   The mean absolute error is merely the average error without regard to the sign of the error. This error measure is more intuitive than the standard error of the regression. One can use this measure to compare the error with the magnitude of the dependent variable.

   The standard error (as shown in Table 1) of the regression provides an approximate confidence interval for model estimates. A point estimate—taken by plugging in values for the independent variables—plus the standard error (or multiples of the standard error) on either side of the point estimate gives an approximate confidence bond in which one believes the actual values of the dependent variable lie. The approximate 95 percent confidence bond is the point estimate plus or minus two times the standard error. The smaller the standard error, the narrower the confidence bond and the greater confidence one has in the point estimate.
5. Over the entire January 1948–November 1991 period, using revised data series, the NAPM composite index level that is statistically associated with no change is 49.1. This value differed noticeably depending on the estimation period used in the regression.
6. Because revisions to NAPM data primarily reflect new seasonal factors, revised data are a close approximation of initial estimates. A regression using revised production component data as the independent variable to explain initial IP is shown in Table 6. Over the September 1988–November 1991 period, the two series have a correlation coefficient of 0.99.
7. For productivity growth to be positive, the percent change in *IP* must be greater than the percent change in production-worker hours. The model solution results in $\%\Delta IP = b_1 \cdot \%\Delta HRS + CONSTANT$, where b_1 is the slope. Because the percent change for hours equals that for *IP*, $\%\Delta HRS$ can be substituted for $\%\Delta IP$, so that $\%\Delta HRS = b_1 \cdot \%\Delta HRS + CONSTANT$. Rearranging the terms yields $\%\Delta HRS = CONSTANT/(1-b_1)$. This is the formula for deriving the break-even point for hours for maintaining positive labor productivity.
8. Based on revised levels for both series. The comparison periods make these series difficult to compare because both November 1991 and January 1982 were during downturns when both employment and output were deviating from trend.
9. This 2.1 percent productivity figure is low relative to traditional measures, probably owing to definitional differences inherent in the model.
10. The Durbin-Watson statistic measures the degree that model errors are correlated over time, called serial correlation or autocorrelation. That is, the error in the current period may be affected (statistically) by the error in the previous period; an error may carry over from period to period. Classical regression analysis assumes that error terms are unrelated. A value of 2 or "close" to 2 suggests no or very little serial correlation in a regression model.
11. The Cochrane-Orcutt technique is one of several methods used to remove the effects of serial correlation. This technique introduces an error term into the model to try to quantify the relationship between errors over time.
12. As discussed in a later section, rather than looking at the problem as a missing variable that would reflect changes in the quality of labor, the variable should be one that takes into account shifts in production between sectors with different capital-to-labor ratios.
13. The same comparison was made for the production-worker hours model. With the dependent variable "led" by one month, there was an R^2 of near zero.

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Review Essay

Breaking Financial Boundaries: Global Capital, National Deregulation, and Financial Services Firms

by David M. Meerschwam.
Boston: Harvard Business School Press, 1991.
306 pages. $35.00.

B. Frank King

There is a large body of literature analyzing the development of America's financial system during the last two decades, but it says little of the international forces that helped to bring about the transition or of similar experiences in other nations. David M. Meerschwam adds a global perspective to the literature with *Breaking Financial Boundaries*, which examines post-World War II changes both in the international financial system and in domestic systems in Japan and the United Kingdom as well as the United States. After outlining the forces for change and their results and implications, he discusses the impact of newly integrated, and newly volatile, financial markets on (large) financial institutions' management strategies.

Meerschwam, a member of the Harvard Business School faculty, sees the vast, jarring changes in financial systems and institutions in the two decades since the demise of the Bretton Woods international exchange rate system as a story of the breakdown of barriers between financial markets in the global economy and within nations. He approaches the complex story primarily by analyzing the history of economies, institutions, and ideas and concludes that market integration has brought increased flexibility, freedom, and efficiency, as well as instability. These results, of course, have implications for financial institutions and their customers and for governments, which seek both efficient intermediation and economic stability.

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The International Financial System

Meerschwam begins with one of the subjects designed to set his book apart—international forces that have affected financial evolution. The history he presents interweaves economists' ideas about international balance-of-payments adjustment and developments in the international exchange system. Its focal point is the impact on national financial systems of the early 1970s' breakup of the Bretton Woods fixed exchange-rate system adopted at the end of World War II. This is the first of a series of discussions that cover the effects of the same basic forces in four only somewhat different economic environments—the United States, the United Kingdom, Japan, and the international economy.

In contrast to later parts of the book, Meerschwam's treatment of international forces is steeped in the history of economic thought. His text is a helpful layman's tour of two centuries of theory of international trade and finance; it is footnoted for more seriously interested readers. The author outlines the development of intellectual backing for fixed exchange rates supported by the gold standard. He illustrates how the Keynesian revolution in the 1930s ushered in the development of more or less nihilistic theories that cast doubt on whether economies would move toward an equilibrium balance of trade under any exchange-rate system.

What had emerged out of the interplay of ideas by the mid-1960s, Meerschwam argues, was professional confusion among economists about the nature of the international adjustment mechanism and strong support of flexible, market-determined exchange rates. There were three main arguments for flexible rates: that they yielded economic efficiency at little cost, that they secured exchange rate stability through stabilizing speculation, and that they protected governments' domestic monetary and fiscal policies from external influences.

By the early 1970s substantial trade imbalances in several large trading countries and, eventually, a run on the dollar led to crises which demonstrated that the Bretton Woods system was unworkable. And, Meerschwam contends, with no strong intellectual support for a remodeled fixed rate system, the nations of the world chose to adopt a market-oriented flexible rate system.

The main point the author makes is that rate flexibility did not protect countries' domestic policies from external forces. Rather, during the oil price shock of 1973-74, as governments around the world found it quite difficult to accommodate the externally generated supply restrictions, flexible rates merely allowed national policymakers to delay controlling inflation. Their procrastination promoted much more volatile economies, which in turn generated much more volatile domestic inflation rates and international capital flows.

Existing markets evolved and new markets and financial instruments were developed to facilitate these flows and manage the risks that accompanied them. As markets changed, so did ways of doing financial business. Gone were the old "rules of the game," which had emphasized controlled prices, strong customer relationships, and segmented product markets. Large financial institutions were virtually required to compete in the new and evolving markets if they were to survive.

National Financial Systems

The double volatility of inflation rates and international capital flows inevitably affected national economies around the globe. Meerschwam examines three important domestic financial systems—in the United States, Japan, and the United Kingdom—that converged toward similar organization during the 1970s and 1980s. These three systems had evolved over long periods of time in differing economic and cultural conditions. By the 1940s these countries had reached different levels of (a) concentration of private financial institutions and government influence, (b) formality of relationships between government and financial institutions, and (c) the extent to which government operated to allocate credit.

Meerschwam points out, however, that even diverse cultural and economic conditions did not prevent marked common organizational characteristics. In each economy financial institutions operated under strong government influence. In each, financial product markets were segmented by institution and important financial prices were controlled. Dealings between financial institutions and their customers were influenced much more by relationships than by (often controlled) prices. In the early post-World War II era, these conditions combined with relatively stable economic climates in each country to make most financial institutions profitable and to limit the incentive to innovate.

The period during which the three financial systems fit the above description was actually quite short.

Meerschwam suggests the 1950s and 1960s; however, one might take a year or two off each end. Even during these two decades forces for change were operating. By 1963, for instance, the negotiable certificate of deposit allowed larger U.S. banks to tap the money markets at home and abroad for funding, providing a major addition to competition in money and loan markets.

It is in the discussion of forces for change, both domestic and international, that Meerschwam makes one of his most valuable contributions. Building on his earlier discussion of developing international capital flows and markets, the influence of flexible exchange rates on macroeconomic policy formulation, and the attraction of foreign operations to large financial institutions, Meerschwam argues convincingly that these forces overcame national economic and cultural idiosyncracies to bring about further convergence among national systems. National parallels are clearly displayed: national markets became increasingly international, and in each market prices became increasingly market-determined and flexible, market segmentation was substantially reduced, and government relations were amended.

Less convincingly, the author contends that crumbling market barriers have caused significant financial instability. Each of the three nations he discusses certainly had its financial crises in the 1970s and 1980s, exhibiting more volatile interest rates and capital flows. While inflation promoted market integration, it probably also played a major role in financial instability by generating excessive expectations of asset appreciation and volatile interest rates. In addition, Meerschwam mentions government subsidies to bank risk-taking, which appear in each country's financial system, but gives these no serious discussion as sources of problems for financial institutions and volatility for financial systems.

Meerschwam claims that the forces he discusses lie at the base of the evolution in both international and national systems. However, he gives only superficial treatment to a crucial set of developments—the rapid advancement of information-communications and data-manipulation technology and of intellectual techniques for valuing complex financial assets and assessing their risk that have played a major role in financial evolution since World War II. This progress has made the information that those engaged in financial transactions require—and that financial institutions make their money by providing—cheaper to acquire, process, and communicate and has increased the precision and accuracy of analysis. Meerschwam's failure to address this topic adequately is a significant shortcoming, for without these developments it is difficult to imagine that segmented national and international financial markets would have opened up, that the number and complexity of financial instruments and transactions could have increased, and that the price and relationship flexibility that have been characteristic of the past two decades would have been introduced. It is not that the state of the art entirely determines developments, but it can be argued that many private and public decisions about how to react to the pressures of the international economy would have been different had not substantial innovations in communication and analysis occurred.

Institutional Strategies

Whatever their root causes, changes in financial systems present financial institutions' managers with a new set of challenges. Meerschwam turns to these in the final section of his book. Unfortunately, this discussion suffers from the author's certainty that financial systems will continue to undergo complex and unpredictable change. In the face of such change, confidence and concreteness fade and generic discussion takes their place.

His first attempts to outline strategy are appropriately cautionary. Through discussions of Continental's energy lending, Citibank's LDC adventures, Morgan Stanley's demanding entry into the Tokyo market, and the Crédit Suisse joint venture with First Boston, he illustrates some of the pitfalls of seemingly appropriate strategies gone awry.

Building on these introductory discussions, Meerschwam emphasizes the rapidity of change in financial products and markets, the integrated nature of financial products, and the potential contestability of most financial markets. This line of thought leads him to the dilemma so often apparent in others' discussion of financial firms' strategy: Should a financial institution choose a niche or offer a wide selection of integrated products? To his credit, Meerschwam does not back down from the difficult question by selecting both. Rather, he points out that offering a broad array of products involves substantial difficulties: transfer pricing, allocating compensation, and cost control, to which one might add risk management. He then suggests that value added depends on taking advantage of market anomalies, production efficiency, superior ability to join firm and employee resources, and information advantages. These ideas do not differ greatly

from suggestions many others have offered for many other types of firms.

The author's final foray into strategy leads him to the raison d'être for financial intermediaries—information advantage. He believes that future advances in communications and analysis technology may make information processing far less costly to members of the public, thus eliminating or severely diminishing the need for financial intermediaries' value added. In such an event, financial intermediaries would be left with (possibly transitory) knowledge advantages to be exploited through advisory services.

Summary

Breaking Financial Boundaries makes four claims to value added: It bridges a gap between the extensive academic literature on recent financial evolution and the business managers who need to be in the know but have little time for or familiarity with the argot of academia. Second, Meerschwam's work emphasizes international forces that are important bases for understanding developments in financial systems in the 1970s and 1980s and developing business strategies for the future. Further, the book shows how this evolution has been influenced by interactions among financial firms, national financial systems, and the global financial system. Finally, *Breaking Financial Boundaries* provides guidance for managers of financial institutions on their best approach to the global financial system's changing condition.

The author clearly achieves his first goal. The bridge from academics to the practitioner is solidly anchored with copious footnotes to academic literature at the same time that it is, for the most part, built of straightforward, understandable stories of developments in international and national markets. For those familiar with the more scholarly literature there is little new here, but the author's aim was integration rather than creation.

The other three goals are not as well achieved as the first. The book's international perspective does indeed broaden readers' understanding of important evolutionary forces. However, it gives short shrift to important elements related to information processing and risk subsidies.

Analyses of interactions among financial markets, financial firms, and governments are common in scholarly work as well the popular press. Meerschwam is neither the first nor the most successful in pointing out interactions.

Meerschwam's concluding consideration of corporate strategies is his most difficult challenge, and it is this section of the book that disappoints most. His discussion reads rather like a long conversation, carried on well past midnight—interesting and insightful if one was there but difficult to follow when recounted. Readers not willing to work hard on integrating its elements would be well advised to skip it, settling for the significant added value in the book's first three sections.

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