Spring

1986

Federal Reserve Bank of San Francisco

Economic Review

Number

2

The Federal Reserve Bank of San Francisco's Economic Review is published quarterly by the Bank's Research and Public Information Department under the supervision of John L. Scadding, Senior Vice President and Director of Research. The publication is edited by Gregory J. Tong, with the assistance of Karen Rusk (editorial) and William Rosenthal (graphics).

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Bank Regulation and the Public Interest

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Bank regulation often is argued to be in the public interest. The rationale for this position is that an unregulated banking system would be characterized by market failures and reduced economic efficiency. This view is widely held despite the lack of systematic analysis of why market failures might arise in banking. This paper examines whether there are aspects of banking that could be expected to lead to market failures in the absence of regulation. Our analysis suggests that, to be viable, a fiat monetary system likely requires some degree of bank regulation. We also find that bank runs result from a market failure related to poorly defined property rights for depositors whenever the par value of deposits exceeds the market value of bank assets. We conclude that public policy measures that help define and enforce depositor property rights could have a positive effect on social welfare by eliminating runs and enhancing bank stability.

Much has been made of the "deregulation" of depository institutions. However, banking regulations regarding entry, capital requirements, location of offices, reserve requirements, and asset portfolio composition are still in force. The public policy debate concerning depository institutions centers on whether deregulation should proceed or whether there is a need to retain and perhaps even strengthen some aspects of bank regulation.

Arguments on both sides of this debate have referred to "public interest" considerations. Proponents of further deregulation point to the public benefit from increased competition and gains in economic efficiency. Their detractors appear to support continued regulation of depository institutions at least in part because they believe that unrestricted banking would not lead to the socially optimal behavior as defined in a microeconomic model of perfect competition. Key to the latter position is the presence of market failures associated with banking. Specifically, government intervention in the form of "correcting" market failures is presumed to have the potential to enhance the public interest.

As central as market failures are to linking the public interest to bank regulation, public policy toward banking generally has been formulated without a clear articulation of what those failures may be, why they may exist, or how regulation would correct them. In part, this is due to lack of much systematic analysis of possible market failures associated with banking.[1]

In this paper, we attempt to fill the gap by examining how bank regulation, in principle at least, might be related to the public interest because of market failures in banking. By focusing on the link between regulation and the public interest, we do not mean to suggest that the structure of bank regulation is shaped entirely or even primarily by public interest considerations. The implementation as well as the removal of regulatory constraints can

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result in a redistribution of wealth among various interest groups. Given the redistributive effects of regulations, many analysts argue that it is the relative effectiveness of the affected groups in promoting their own interests that ultimately shapes public policy. However, even within this "private interest" view of regulation, public interest considerations can play a role. This is because the dead weight losses from economic inefficiencies, whether due to market failures or regulation, will affect the degree of support for and opposition to regulations.

Since considerations of both public and private interests can have a bearing on regulation, a complete analysis of banking regulation would identify the groups benefiting from and those harmed by various regulations as well as the nature of market failures, if any, that characterize banking. Such an approach would be able to explain why certain regulations exist, how regulations would change as market forces change, how regulations affect the redistribution of income, and how they might rectify market failures.

The purpose of our paper is not to explain the incidence of regulation or to differentiate among theories of regulation. Our approach is to examine the conditions under which there could be market failures in the operations of the banking industry and to assess the types of public policy measures that might address those failures.

The organization of our paper is as follows. In Section I, we discuss the link between regulation and the public interest. We also discuss, in general, the sorts of market failures that are typically considered to justify regulation. Section II then investigates specific sources of market failures that might lead to regulation in banking. The focus there is on the connection between banks and the monetary system and on the credit intermediation services of banks. We also examine how market failures might be related to instability in banking. Finally the summary and conclusions are presented in Section III.

I. Regulation and the Public Interest

Economic theories of government regulation have been developed under two distinct lines of thought — the public and private interest theories. Within the public interest framework, the presence of market failures sometimes makes it possible for regulation to enhance economic efficiency. Microeconomic theory focuses on three major types of market failures — inadequate competition, externalities, and public goods — that lead an unregulated private market to an equilibrium not necessarily socially optimal.

Inadequate competition could arise in a market because of cartels or because of economies of scale in production in the relevant range of demand (that is, "natural monopolies"). Government intervention in terms of legal prohibitions and penalties for anticompetitive behavior (antitrust laws and regulations) and the regulation or control of natural monopolies have been rationalized as public interest responses to this type of market failure.

The main reason a competitive market would fail to achieve an efficient allocation and production of resources is the existence of nonpecuniary externalities. In such cases, the consumption or production of goods imposes costs or bestows benefits on parties not directly involved through some nonmarket channel. As Coase (1960) has shown, externalities arise whenever property rights are nonexistent or poorly defined.

An extreme case of a good characterized by positive externalities is a pure public good — that is, a good whose quantity does not diminish as the number of persons consuming it increases. Pure public goods are characterized by the quality of nonexcludability, which makes it impossible (or too costly) for a competitive private market to charge a positive price for them. As a result, the private market cannot provide them.

Pigou's solution to externalities was the imposition of taxes or subsidies. But in some cases, the legal assignment of property rights, regulation, or the governmental provision of public goods may internalize the externalities.

In contrast to the public interest framework for regulation, the private interest approach, perhaps most often associated with the pioneering work of George Stigler (1971, 1975), sees regulation as being sought by an industry (through political activities) to further its own well-being. Often, the industry desires regulation to shield itself from the

rigors of competition. In a sense, the private interest theory views regulation as analogous to a system of taxes and subsidies in which the regulated group receives subsidies at the expense of some other "taxed" group, or vice versa. The implicit taxes of regulation, however, are often hidden or indirect, like entry restrictions, price controls, exemptions from antitrust laws, or prohibitions on certain types of activities. Similarly, the subsidies are not direct payments by government but are the higher-than-normal profits that result from regulations.[2]

Nevertheless, even within a private interest theory approach to regulation, market failures and the impact of regulation on economic efficiency can be important. This is shown in a recent work by Becker (1983) that attempts to bridge the public and private interest theories of regulation. Becker develops a model of competition among political pressure groups in which, in keeping with a private interest framework, the groups compete to secure legislation beneficial to their own interests. This model departs from the more traditional private interest theory of regulation by considering the effects of the deadweight costs of taxes and subsidies on political pressure.

In the context of this paper, an important implication of Becker's integrated theory is that there are pressures to adopt public policies (regulations) that overcome market failures, and hence raise efficiency. Regulations that enhance efficiency to the benefit of all groups will be widely supported and unopposed. Even efficiency-enhancing regulations that harm some groups may be adopted if the gains to society sufficiently outweigh the harm imposed.[3]

Economic inefficiencies related to market failures are thus relevant to both the public and private interest theories of regulation. As a result, an important first step in analyzing bank regulation would be to determine the nature of market failures, if any, in banking. In the next section, we examine the arguments for why market failures might exist in banking. We focus on market failures related to externalities (including public goods) rather than inadequate competition. In doing so, we recognize that some components of the payment system in which banks have a role, such as check clearing and funds transfers, are probably characterized by economies of scale. In fact, the Federal Reserve is a major provider of both services. Also, various government agencies regulate bank mergers. These are not, however, practices subject to much controversy that stems from the special features of banks.

II. Why Regulate Banks?

As indicated earlier, the presence of externalities gives rise at least to the potential for regulation to improve efficiency in production. Banks' (the term is used here to represent all depository institutions) provision of monetary and credit services usually is cited as the main reason banking should be the focus of public policy concern. It is often argued that government oversight of money creation, the operation of a monetary payment system, and credit intermediation is necessary. In addition, some argue that unregulated competitive banking would be unstable and susceptible to runs with widespread adverse effects.

The Monetary System

Some economists have argued that banks should be regulated because of their key role in the monetary system. Others argue that banks need not have a special role and the fact that they do in most current monetary systems is a result of regulation — not a reason for regulation.

Much of this debate turns on what is meant by "money" and whether banks create money. Some economists have argued that, because banks have the power to create money, an unregulated banking system would lead either to an infinite or indeterminate price level (see Johnson, 1968; Pesek and Saving, 1967; and Gurley and Shaw, 1960); while others (most notably Tobin, 1963, and Fama, 1983) have argued that banks do not create "money" and that regulation is not needed to make the price level determinant.

In sorting through these positions, it is useful to keep in mind that money has two essential, highly related, but sometimes separate economic functions. It is the numeraire or unit of account in which

prices are quoted, and it is a medium of exchange that facilitates trade by eliminating the double coincidence of wants needed for barter.

The arguments for why banks may or may not have a "special" role in the current monetary system can be best understood by considering the roles of banks in alternative, simpler systems. Below, we discuss banks' role in several types of monetary systems to determine whether there is something inherent in banks' monetary role that results in market failures.

Commodity Money

Perhaps the simplest monetary system is a commodity system in which a commodity such as gold serves as the numeraire and circulates as the sole medium of exchange. In such a system, the price level is determined by the supply and demand conditions for the numeraire commodity (for both monetary and nonmonetary purposes) relative to supply and demand conditions for other goods.

Although such a monetary system (without banks as providers of payment services) is more efficient than a barter system, it is likely that it would be less efficient than a system with bank-provided payment services.[4] Indeed, even in systems with a commodity numeraire, bank debt, either in the form of privately issued banknotes or deposit liabilities such as checks, has served a role as a medium of exchange.[5]

One economic function of banks in such a system is to economize on the real resource costs of holding and transferring the numeraire and thereby facilitate trade by providing a financial medium of exchange. The question is whether there is some private market failure that characterizes the private provision of a medium of exchange. In particular, will an unregulated banking system lead to an infinite price level and return to barter or a pure commodity system?

Based on Fama's (1980) research, the answer appears to be no. Fama pointed out that in such a commodity-based monetary system with privately produced media of exchange, the price level is still determined by the supply and demand conditions for the numeraire commodity relative to other goods.[6] In other words, the Walrasian determination of equilibrium relative prices (in terms of the numeraire) holds even in an economy in which debt (or other financial assets) is used to facilitate exchange.

Thus, the quantity of debt, or other financial assets that serves as a medium of exchange and is used for payment purposes, does not directly affect the price level. In a commodity system, the price level is determined by the supply of and demand for the numeraire commodity (not debt[7]), banks do not create money in the sense of creating the numeraire (even though they might issue their own banknotes), and no restrictions are needed for price level determinacy.

With a commodity monetary standard, there remains the issue of price stability. Unanticipated changes in the supply of the commodity (for example, gold discoveries) or changes in the nonmonetary demand (for example, the invention of printed circuit boards that require gold connectors) would affect the price level. However, changes in relative prices caused by changes in real demand or supply conditions are not nonpecuniary externalities. Moreover, since this type of instability has nothing to do with the banking system it seems unlikely that any sort of banking regulation could eliminate it. This is not to say that a commodity with stable nonmonetary supply and demand conditions, and therefore a stable price, would not be preferable to one with a fluctuating price. Both lower computation costs involved in current exchange and a reduced degree of risk in future exchange may favor such a commodity.

Changes in the monetary demand for the commodity also would cause the price level to change. Even though a decline in the banking sector might increase the demand for the numeraire commodity as a medium of exchange (and thus lead to a decline in the price level), such an effect does not constitute a nonpecuniary externality if the decline in banks' ability to produce media of exchange is caused by an increase in their real costs of production.

An increased monetary demand for the commodity might, however, be caused by a "banking panic." And if banking panics themselves result from a market failure, some form of banking regulation that eliminated panics might enhance efficiency by reducing the waste involved in actually using a commodity as a medium of exchange (that is, by reducing the amount of financial intermediation).

Such panics might also impose costs by disrupting a competitive payments system. We discuss these possibilities in more detail later in this section.

Thus, aside from the possibility of banking panics or runs, no private market failures appear to be associated with the workings of a commodity-based monetary system in which payment services are competitively provided by banks. The only sort of regulation that might be warranted would be regulation that defined which commodity would be the numeraire, although private market forces historically appear to have been able to make that determination.

Fiat Money

Since virtually all modern economies have moved away from commodity standards to pure fiat money, we now discuss whether banks' behavior may be of greater public policy concern in a pure fiat system. In a pure fiat system, pieces of paper that (1) have no intrinsic value, (2) are not redeemable from the issuer for real goods, and (3) do not pay interest typically serve as both the numeraire and circulate as a medium of exchange. Compared to a commodity-based system in which the commodity circulates as the medium of exchange, a fiat system may be more efficient because it does not divert a real resource from nonmonetary uses to be used as a medium of exchange. However, it may be possible to have a commodity-based system in which the commodity itself does not circulate. In that case, it is unclear whether a fiat system would be more efficient. Nevertheless, a fiat system does differ importantly from a commodity based system in that it makes the social control of money, prices and credit possible, and it provides a source of tax revenue.

A workable fiat money system, however, cannot be provided by a competitive private market. Assuming there initially would be a demand for privately produced fiat money[8], and that all fiat money had the same unit of account (for example, dollars), each private producer would have an incentive to expand the quantity of money it issued as long as the money's marginal value exceeded its marginal cost (assumed to be zero). Each producer, however, would not take into account the negative externalities of its fiat money issuance, namely, a reduction of the real value of the money stocks of other private producers and holders of fiat money. The equilibrium private market solution would be a fiat money of zero value. A fiat money with no value, of course, cannot serve as a numeraire or a medium of exchange. Since the public could be expected to anticipate this equilibrium solution, there would be no initial demand for a competitively produced fiat currency.

The common solution to this problem is for the government to sanction or to be itself a monopoly supplier of fiat currency, and to use various regulatory techniques to create and enhance the demand for it. Although a monopoly supplier does not face any inherent technical problems in limiting the supply of fiat currency, it may face political problems in doing so. A number of countries, apparently unable to raise tax revenues from other sources, have increased their rates of monetary expansion with the result of hyperinflation. Under such circumstances, governments are often unsuccessful in maintaining a demand for their currency and their fiat systems have collapsed. Commodities or foreign currencies often do begin to circulate in economies with rampant inflation. Nevertheless, the relative success of fiat systems in many developed countries suggests that governments in general can maintain a demand for their currency as long as they also limit its supply.

In practice, there have been two common methods of creating or enhancing the demand for fiat currency: reserve requirements and the prohibition of the private issuance of hand-to-hand circulating media of exchange (for example, private banknotes). Reserve requirements create a demand directly, by requiring banks to hold fiat money, as well as indirectly, by taxing a substitute financial medium of exchange. Prohibiting the private issuance of banknotes prevents them from competing with government currency as a medium of exchange, and thus is equivalent to a 100 percent tax on a substitute medium of exchange.

Reserve requirements increase the demand for fiat currency, but there probably would be some demand for fiat currency even in their absence. Fama (1983) has argued that there probably is an inherent demand for a zero-interest circulating medium of exchange because of its convenience in facilitating small transactions. However, absent reserve requirements, there still might be a need for regulations to prevent the issuance of private banknotes. Even

though privately issued banknotes are not a type of fiat money (or numeraire) they would likely be a close substitute for government currency for use as a hand-to-hand circulating medium of exchange because they would have convenience features similar to government currency. This substitutability, however, could make the demand for government-issued currency unstable and therefore make it difficult to maintain a stable price level.

Finally, it seems possible that if technology continues to lower the cost of bank-provided payment mechanisms, such as electronic payments and checks, the demand for currency as a medium of exchange would decline. Monetary authorities would then have to offset the decline to stabilize the price level. It is even conceivable that in the future if rapid technological change occurs, the demand for currency (for domestic legal monetary purposes at least) could approach zero and lead to a collapse of a reserve-free fiat system.

For whatever reason, reserve requirements are a feature of virtually all fiat systems. To enforce reserve requirements, it is necessary to restrict the sorts of financial assets that can be used in transactions as media of exchange to those that are reservable. As Black (1970, 1975) and Fama (1980) have pointed out, in an unregulated banking system, as long as there is a well-defined numeraire, virtually all assets (in principle at least) could be used as media of exchange.[9] Thus, nonreservable financial assets could be used as media of exchange to circumvent, at least partially, reserve requirements. Without regulations limiting which assets could be used as media of exchange, the degree of circumvention would depend only on the substitutability of nonreservable assets in exchange.

In sum, a fiat money system may require some degree of banking regulation. However, it is not certain whether a fiat system, in which the numeraire is socially controlled and the media of exchange are regulated, is superior on microeconomic efficiency grounds to a commodity-based system in which a privately supplied commodity serves as the numeraire and the media of exchange also are supplied privately without government intervention.[10]

Even if a fiat system were not more efficient than a commodity-based system from a microeconomic standpoint, it has several distinguishing characteristics that may account for its almost universal adoption. First, the supplier of fiat money ("base money" in the U.S.) can raise revenue directly by issuing more money. Second, by varying the quantity of base or fiat money or by varying reserve requirements, the supplier can influence the price level. And third, in a fiat system with reserve requirements, the degree of financial intermediation (and possibly, real interest rates) can be influenced by varying reserve requirements or the quantity of reserves.

Regarding this third point, an increase in reserve requirements lowers the amount of financial intermediation, and this, in turn, may increase real interest rates by reducing the supply of credit. It is not possible, however, to increase the degree of financial intermediation beyond what would occur in an unregulated market. Although reserve requirements enable the social control of the degree of financial intermediation, they do so by increasing the cost of financial intermediation and are therefore a source of economic inefficiency from a microeconomic standpoint.

It seems likely that these characteristics of a fiat system are more important than any potential advantages in efficiency such a system might have over a commodity-based monetary system. If so, from a social welfare perspective, support for a fiat system with reserve requirements over, say, a commodity-based monetary system would seem to be based on the assumption that there are social benefits to government control of money and credit intermediation. The market failure implied by this perspective is that the macroeconomy, in the absence of government intervention regarding the money supply, would not have the desired stability in prices, credit intermediation, and economic activity. In pointing this out, we do not contribute to the debate about whether (discretionary) macroeconomic stabilization by the monetary authorities is either possible or a socially legitimate role of government. We merely note that if it were a goal, then some form of regulation would be necessary. The degree of regulation needed for these purposes is quite limited, however. It consists of restrictions on the private issuance of base money, limitations on the private issuance of assets that can

be used as media of exchange, and reserve requirements on assets that are used as media of exchange.

Banks as Credit Intermediaries

Aside from their roles in the monetary system, banks are involved in providing credit intermediation services. As credit intermediaries, banks generally hold a large volume of nontraded assets (loans). One reason these assets are not traded is that banks have specialized information about them that other market participants do not.

One study that attempted to establish that this aspect of credit intermediation by banks makes them special is Bernanke (1983). Because banks have specialized information, Bernanke argues that a disruption of the credit intermediation services of banks is possible and that such a disruption can be very costly to the economy.[11]

Bernanke's specific thesis is that the loss of bank intermediation services in the 1930s contributed significantly to the length and severity of the Depression. One obvious reason for the loss of credit intermediation services was the large number of bank failures.[12] But Bernanke argues that, even without failures, intermediation costs could rise if banks adjust their allocation of funds to head off depositor runs. That is, depositories could shift to "safe" assets such as Treasuries, that can be evaluated easily by the market. Such a "flight to quality" by banks could result in a reduction of the extension of new credit to the private sector and adversely affect the economy by contributing to a contraction in production.

Consistent with the framework of our analysis, such an increase in intermediation costs should be of public policy concern only if it constitutes an externality. However, higher intermediation costs could come about without external effects. One possibility is that the disruption of the banking system and the resulting higher intermediation costs come about because of an actual change in the economic environment that reduces or even eliminates the value of the information depositories have concerning borrowers. The Great Depression is a case in point. Information on the past behavior of borrowers would not have been extremely valuable to depositories in distinguishing the risks associated with lending to different customers during the 1930s. Furthermore, it might have been more costly for banks to evaluate the riskiness of new loans with a given level of confidence when the economic environment was changing so drastically.

To the extent that higher intermediation costs result from increased difficulty in evaluating borrowers, it is unlikely that public policy (greater regulatory or supervisory intervention) could help. Regulatory agencies could not be expected to hold any particular advantage over commercial banks in evaluating borrowers. Therefore, even federal deposit insurance might not be sufficient to affect banks' investment decisions. That is, even if the administration of deposit insurance accounted for the riskiness of a bank's assets as perceived by the insurance agency (which presumably would not have an advantage over banks in estimating risk), banks would not necessarily be less likely to shift into "safe" assets. In an environment that induces flight to quality, it might be true that some "good" borrowers would not be able to obtain credit — a problem in the 1930s cited by Bernanke. These would be good borrowers to the extent that, if the banks and depositors could obtain information costlessly about the true risk, credit would be extended. But, information is not costless and it is unclear whether public-policy measures (regulation) could reduce its cost in this case.

Alternatively, the banking industry may be disrupted not by an economic shock that changes the quality of bank assets or the ability of banks to judge the riskiness of borrowers but by a change in the public's perception of banks. In this case, the "inside" information possessed by banks is not transferred to depositors. This may be the situation to which Bernanke referred. Banks are aware of profitable loan alternatives but are unable to convince depositors, or, with the same result, unwilling to compensate depositors for the risk that they misperceive. This could be interpreted as there being "good" borrowers that were unable to obtain credit because of the public's misperceptions.

Why would the relevant information not be produced by the market? One answer, suggested by Leland and Pyle (1977), is that moral hazard hinders the transfer of information between market participants. That is, banks have an incentive to overstate the quality of their portfolios. This is especially true

if verifying banks' claims (information) is very costly. One solution to the moral hazard problem, suggested by Leland and Pyle, is for firms' managers to use their willingness to invest in a project as a signal to the market of the true quality of that project. This strategy would seem most useful for owner-managed firms. However, when ownership and control are separate, bank managers with specialized information may face a similar problem convincing potential shareholders.

The moral hazard problem could be circumvented if the relevant information were collected (and if necessary transferred) by disinterested parties — those that would not benefit from making biased evaluations of banks. Depositors constitute one set of candidates, but the usual assumption is that it is too costly for individual depositors to collect the information. A third party could acquire information on banks and sell it to depositors (or even bank shareholders). However, given the nature of information as a public good and the inability to prevent information from being resold, a private information agency might not be able to "force" all users to pay. In contrast, government regulatory agencies should not encounter this problem.

Alternatively, depositors might be willing to accept an arrangement whereby banks paid a third party directly for providing information on, say, loan quality. It might be noted that private rating agencies do currently collect and disseminate information on the debt quality of a wide variety of issuers, although it is not certain how well this would work for banks. Therefore some government role might be consistent with public policy that addresses the moral hazard problem in the generation of information on banks.

In practice, U.S. regulatory agencies currently gather information but do not provide it to depositors.[13] They also enforce regulations that control bank behavior instead of leaving the task to liability holders. This dual role does not follow directly from the information-deficiency argument, and would have to be rationalized on some other basis, such as the provision of federal deposit insurance which is discussed later.

Bank Stability

The discussion above raises the possibility that market failures in the workings of the monetary system and credit market may be a basis for some public policy measures such as reserve requirements, prohibitions against the private issuance of a hand-to-hand circulating medium of exchange, and government provision of information on banks. The susceptibility of banks to runs, which themselves may be related to market failures, also may be a source of public policy concern.

As suggested earlier, banks' roles in the monetary system may justify concern over the stability of the banking system. One reason is that disruptions to the banking system might impair the ability of a central bank in a fiat system to conduct monetary policy.[14] For example, a loss of public confidence (and the resulting instability) in the institutions whose liabilities are reservable could make the demand for base money (the numeraire) unstable. It likely could make it difficult, if not impossible, for the monetary authorities to take offsetting actions involving reserves to stabilize the price level and economic activity.[15] Also, a central bank would be unable to control shifts into currency and out of deposit accounts completely. Such shifts might cause large economic losses because currency and deposits are not good substitutes. In addition, Diamond and Dybvig (1981), as well as Bernanke, argue that bank runs impose real costs by disrupting credit intermediation and reducing production.

Assessing Banks Runs

A number of studies present models that explain why banks are vulnerable to runs. A useful example is Diamond and Dybvig. In their model, banks add value by transforming illiquid assets into liquid assets. They provide a kind of "insurance" for consumers, who are uncertain as to the timing of their consumption and, therefore, when they will need to tap their illiquid resources. An important characteristic of the transformation banks provide is that banks fund their illiquid assets with par-value liquid deposits.[16]

The uncertain timing of consumption makes the volume of withdrawals uncertain for banks. As a result, banks may not hold enough reserves to cover deposit outflows, and may have to undertake what is assumed to be a costly liquidation of assets. Depositors trying to avoid sharing in the resulting losses run on banks in such situations. In the Diamond and

Dybvig world, bank runs impose real costs on the economy because they disrupt credit intermediation and output. And depositors making withdrawals beyond the volume expected by banks (beyond the amount of reserves held by banks) impose social costs on other depositors.

In identifying the source of the market failures associated with bank runs, we note that externalities can arise when there are poorly defined property rights. This is what occurs with liquid par-valued deposits when banks incur losses that exceed net worth. The situation is analogous to the problem of a communal good. In that case, resources are used up "too" quickly as individuals attempt to convert the communal good to a private good. Similarly, with par-valued deposits, depositors have a fixed claim on a pool of assets. When depositors believe that the value of the assets is less than the par value of the fixed claims and the bank remains open, depositors' property rights are not protected. Accordingly, depositors act on their incentives to convert the communal pool of assets to private assets by withdrawing funds: they run on the bank.

The par-value feature of deposit contracts results in poorly defined (or poorly protected) property rights which can lead to externalities and expose individual institutions to runs. With par-value deposits, therefore, even a run on an individual bank can involve a market failure.

The more traditional concern with bank runs has been whether the banking system as a whole is vulnerable to panics. The Diamond and Dybvig model can provide little guidance on that question. Their model includes elements that make a run on one bank possible, but a systemwide run unlikely. Runs in their model are possible because the volume of withdrawals is uncertain. However, with a very large number of depositors, the withdrawals from the banking system should be predictable with a small error. If there were a number of banks, instead of one as in the Diamond and Dybvig model, the prediction errors for individual institutions would be larger. Even this complication should not be important since the free trading of bank assets, which are not risky (no default risk) in the Diamond and Dybvig model, would effectively pool systemwide reserves.

The problem of bank runs, however, involves more than bank liquidity and the predictability of deposit withdrawals. Bank portfolios are risky, and a bank can sustain sufficiently large losses as a result of credit and interest rate risk to generate a run.

With individual institutions susceptible to runs because of risky portfolios, the system as a whole also could be unstable if the value of bank assets is frequently reduced by common exogenous factors. Kindleberger (1985) makes exactly this point. He indicates that exogenous macro shocks were the predominant causes of bank failures in the 1920s and 1930s. Exogenous macro shocks such as the strength of the dollar, the unexpected drop in inflation and relative price changes (such as declines in oil prices) are again at the core of the problems of many failed and weakened banks in the 1980s. To the extent that such macro shocks stem from unexpected changes in fiscal and monetary policy, they represent the external effects of government activity on the private economy.

Another reason that the banking system generally is depicted as being susceptible to instability is that the failure of one bank increases the probability of runs at other banks. Such "contagion" effects, if they exist, would represent a classic example of externalities. The existence of contagion effects in banking, however, has not been substantiated by post-Depression empirical work. This lack of empirical support may be due to the presence of deposit insurance, but other evidence indicates that depositors are able to distinguish, to some degree, safe institutions from unsafe ones. Beebe (1985), for example, argues that the behavior of large bank holding companies' stock prices indicates that the market is able to make distinctions among holding companies on the basis of factors affecting the quality of their individual portfolios. In addition, Rolnick and Weber (1983) raise doubts that the evidence from the free-banking era supports the presence of contagion effects in banking.

Policy Responses

Whether contagion effects or macro shocks determine the potential for systemwide instability in banking, the vulnerability of banks to runs remains a problem of property rights. That problem is a function of three factors — par-value accounts, risk in banking, and the liquidity of deposits. The incentive to run on banks can be removed by muting the

adverse side effects of any one of the three components.

Par-Value Accounts

The par-value feature of deposits could be eliminated by converting depositors to equity holders, as are money market mutual fund shareholders. In a world of complete markets and no uncertainty, this change would not pose problems since banks, as well as other firms, would be indifferent to the mix of equity and debt financing. But that is not the state of the world; if it were, there probably would be no role for banks as intermediaries.

It seems likely that the economic contribution of banks as integrated providers of transaction and intermediation services would be affected adversely by a complete regulatory abolishment of par-value deposit accounts. Even before the Glass-Steagal Act, banks offered par-value deposit contracts. In part, this practice likely is due to the problem of determining the market value of many bank assets. In addition, the public may have a preference for par-value bank accounts for transactions needs since there may be some advantage to having a predictable account balance when planning purchases.

It is difficult to evaluate the importance of par-value liquid deposits to banking. The shift of many money market mutual funds from marked-to-market to amortized cost accounting, which results in quasi-par value accounts, suggests that there may be a demand for predictable balances for certain types of accounts. Nevertheless, the use of nonpar-value accounts for liquid deposits by banks would eliminate the incentives for bank runs. To the extent that bank runs are a public policy concern, regulation, at a minimum, should not prevent the development of nonpar-value accounts by banks.

Risk in Banking

Aside from par-value accounts, another condition for bank runs is that banks be exposed to risk. One way of preventing bank runs would to be eliminate risk in banks' portfolios — credit risk as well as interest rate risk. This would mean that bank assets would have to be free of default risk, and asset and liability durations would have to be matched.

To eliminate risk in banking, the structure of banking would have to be radically altered. Banks would not be allowed to hold commercial and industrial loans, consumer loans, mortgage loans, etc; but banks might still be able to originate loans and then sell them. Such stringent regulation would severely narrow the economic function of banks. A policy, for example, that made banks hold only liquid and riskless assets would make it impossible for banks to perform what Diamond and Dybvig argue is a key function — transformation of illiquid assets to liquid assets.

Public policy toward banks as currently structured can be viewed as a compromise between eliminating the riskiness of banks and maintaining their economic functions. Yet much present bank regulation has been justified as necessary to control risk in banking, and thereby to enhance stability. These so-called safety-and-soundness regulations include restrictions on activities, capital requirements and anticompetitive measures, such as limits on entry. Below, we discuss these regulations.

Restrictions on Activities

From a safety-and-soundness perspective, the usual arguments for limiting the economic activities of banks is that some activities, such as insurance underwriting and direct real estate investment, are considered highly risky. Furthermore, gains from diversification are viewed as unable to offset the risks these activities present. Limiting banks' activities, it is argued, would lower the institutions' risk-return positions.

There is considerable debate, however, over whether regulation can lower the risk-return position, and even whether regulation is counterproductive. To increase their return on equity, institutions might simply raise their risk exposure in permitted activities. Alternatively, banks, if allowed, might increase their leverage to re-establish a desired risk-return position. Moreover, regulations that limit the ability of institutions to diversify may exacerbate the problem of instability, by reducing returns without lowering risk.[17]

Capital Requirements

Capital requirements also have been justified on safety-and-soundness grounds. In the absence of regulation, banks could be expected to hold some level of capital, if only to increase the probability

that they could make good on noncontingent deposit claims held against them. The question facing policy makers is whether market-determined capital "requirements" for banks would be adequate.

To the extent that public policy regarding banks is based on the existence of market failures, the amount of capital demanded by the market would not be adequate. Moreover, in the present environment, the subsidized rate on federal insurance distorts the equity-deposit mix that would be demanded by the market by reducing the need for equity. We discuss the issue of federal deposit insurance more fully in the next section.

Anticompetition Regulations

In addition to portfolio constraints, the risk-return position of banks might be affected by anti-competition regulations such as entry restrictions. Entry restrictions are widespread in banking and include prohibitions on *de novo* entry through chartering regulations, as well as restrictions on branching, chain banking and interstate banking, although many of these appear to be breaking down (Keeley, 1985).

The primary effect of limiting entry is to create rents by restricting competition. The direct effect of entry restrictions (or any other anticompetitive regulation for that matter), then, would be to create a market failure — not to rectify one. By limiting competition, however, bank charters (the right to do business) have a capital value that would not exist in the absence of regulation. Moreover, this capital, unlike most assets, cannot be separated from the bank. It would appear, therefore, from a market-failure point of view, that the only justification for entry restrictions would be their usefulness as an indirect way of enforcing minimum capital requirements.[18] However, while this capital may provide some cushion, particularly for the deposit insurance agencies in the event of a failure, direct capital regulation could achieve the same result without the distorting influence of restricted competition.

To the extent that public policy concerning banks is based on the presence of certain market failures, capital requirements, linked with monitoring of risk-taking might be appropriate in principle. However, absent easily enforced restrictions that allow banks to invest only in riskless assets — a practice that would eliminate most of the economic functions of banks, there remains the question of whether regulation can ensure sufficient stability in financial markets to avoid disruptions to monetary control, the payment system, and credit markets. Depository institutions have incentives to circumvent regulatory constraints to improve their risk-return positions. But perhaps more importantly, much of the instability in banking appears to have stemmed from macroeconomic shocks. As long as banks maintain risky portfolios, it is doubtful that supervision and regulation can insulate banks from such shocks.

Deposit Liquidity

The third component in the bank run problem is deposit liquidity. Without ready access to their funds, depositors would not be able to act on their desire to avoid losses. One innovation that often is argued to neutralize the problems associated with liquid deposits is the existence of a lender-of-last-resort. A central bank, acting as lender-of-last-resort, is said to be able to prevent runs without limiting the liquidity of deposits by providing a market for bank assets.

By acting as a source of liquidity, a lender-of-last-resort could indeed prevent runs if the only source of losses for banks were unexpected asset liquidations, and if the lender-of-last-resort could significantly reduce the cost of such liquidations. As suggested earlier, however, banks are exposed to losses from a variety of sources, not all of which can be controlled by a lender-of-last-resort. If the lender-of-last-resort is required to mark bank assets to market, as is the case for the Federal Reserve, then losses related to, say, credit risk could be sufficient to prompt a run. That is, a lender-of-last-resort that marks-to-market does not fully address the property rights problem of liquid par-value accounts.

Diamond and Dybvig offer another approach for maintaining property rights when deposits are liquid. Their solution suggests that it is not necessary to deny depositors access to their funds to prevent runs. Instead, it is only necessary to prevent depositors from avoiding any liability when they do withdraw their funds. Runs are prevented in their model through the threat of an *ex post* levy on all depositors. This levy would meet deposit obligations at a

bank in the event of greater-than-expected withdrawals. Depositors do not have an incentive to withdraw their funds prematurely since, with the threat of an *ex post* levy, they would be no better off if there were a run, and they would be worse off if there were no run (for example, depositors making withdrawals might forgo interest income and incur other transactions costs).

Under current policy measures related to banking, depositors' claims are secured through the system of federal deposit insurance. The administration of federal deposit insurance parallels the approach suggested by Diamond and Dybvig to some degree. While the insurance agencies maintain funds, the effectiveness of federal deposit insurance lies in the understanding that the full faith and credit of the federal government stands behind the insurance funds. That is, the viability of the insurance funds rests on the taxing authority of the government. The ability to levy taxes to meet deposit withdrawals is similar to the *ex post* fees on depositors in the Diamond and Dybvig model.

Despite this similarity, the current deposit insurance system is quite different from the solution suggested by Diamond and Dybvig. While federal deposit insurance maintains well-defined property rights for insured depositors, it also involves pooling nonsystematic risk in banking.[19] This second aspect of federal deposit insurance raises the concern that the current insurance system generates distortions in the economy by creating incentives for depository institutions to take on nondiversifiable or systemic risk.[20] These incentives for risk-taking arise because the value of the insurance is not reflected in the cost of funds to individual banks.

The *ex post* levy in the Diamond and Dybvig model does not distort incentives for risk-taking even if bank assets are risky. In their model, there is only one bank and depositors know they must ultimately bear a *pro rata* share of losses that might result from the bank's risk-taking. There is no risk-pooling, only the enforcement of property rights. Depositors would consider risk-exposure in determining their expected rate of return on deposits, so the cost of deposits to the bank would be positively related to the risk of its portfolio. As a result, the cost of bank risk-taking would be internalized.

A system for preventing runs more in keeping with the solution suggested by Diamond and Dybvig would enforce property rights without government-provided insurance. With many banks in the system, one way to accomplish this would be to hold depositors, both past and present, liable for the losses of a failed bank and not the insurance funds and the general public. For past depositors to remain at risk, depositor liability would have to extend beyond the time when funds are withdrawn.

As a practical matter, a working definition of what constitutes a "past depositor" would be necessary and probably only the government could enforce an *ex post* levy on such depositors. Nevertheless, such an alternative to the current deposit insurance would have the effect of making depositors sensitive to bank risk. This is similar to the goal of deposit insurance reforms that stress increasing market discipline, but unlike them, it would still prevent bank runs.[21]

Such a system would take the government out of the deposit insurance business but keep it in the property rights enforcement business. At the same time, depositors would have an added incentive to optimally diversify their portfolios. Moreover, the program suggested to prevent runs would not preclude, and could even facilitate, the provision of private deposit insurance that took advantage of pooling nonsystemic risk in banking. If private insurance were not available, it would even be possible to have some nominal federal coverage for small depositors considered unable to take advantage of diversification. Such protection would not distort bank behavior.

III. Summary and Conclusion

The debate over the role of government in regulating depository institutions undoubtedly will continue. Although the debate in the political arena is partly about the distributive effects of regulation, regulation's social benefits and costs also can be important considerations from even a purely private interest perspective. We have therefore examined how banking regulation might be related to social welfare. This would seem to be a necessary first step in a more complete study that would also look at regulation from the viewpoint of private interests. Examining the distributive effects of banking regulation is, however, left for future research.

Our approach has been to determine whether there is a potential for market failures in banking as it relates to the monetary and credit systems. With regard to the monetary system, an unrestricted, competitive, private fiat system is not viable. A fiat monetary system requires control over the supply of money (the numeraire) and a demand for the fiat money. One way to ensure a demand is by imposing reserve requirements, although, if there were a stable demand for a fiat currency for transaction purposes, reserve requirements would not be necessary. Reserve requirements, however, make possible the social control of the degree of financial intermediation, but at a cost of restricting it to be less than it would be under a reserve-free system. In a monetary system where reserve requirements are used, it may be necessary to limit the types of privately issued assets used as media of exchange to enforce reserve requirements.

In providing credit, banks hold a large volume of nontraded assets (loans). The asymmetry in information of banks and the public concerning the quality of bank assets could inhibit the intermediation process. This situation, however, is not unique to depositories, but is shared by other private placers of credit, such as finance companies and life insurers. The problem of deficient information would seem to imply, at most, a need to collect and disseminate information — services the market might not be able to supply.

Where there may be a public policy concern regarding the credit system is the stability of banking. The stability question is also important to banks' role in the monetary system. For example, to the extent that the demand for fiat money is derived from reserve requirements, the stability of the institutions on which the requirements are imposed becomes important. Moreover, even in a system without reserve requirements, the stability (predictability) of the demand for money (demand for the numeraire) is related to the stability of the demand for bank-produced payment services. For banks (all depository institutions), the issue of stability is particularly important given their vulnerability to macroeconomic shocks and runs.

The problem of runs can be traced to banks' reliance on par-valued liquid liabilities which they use to fund risky assets. When the market value of a bank's assets are thought to be less than its liabilities, the poorly defined, or at least unenforceable, property rights of the deposit holders to the pool of assets can cause depositors to run. Property rights can be maintained through the use of nonpar-value or marked-to-market contracts. The full economic implications of "forcing" the use of non-par-value liquid accounts are not clear, but public policy should at least not inhibit their development.

Other public policy measures to ensure bank stability, such as safety-and-soundness regulation and lender-of-last-resort, can play roles in reducing the probability of a bank run, but they do not fully address the problem of property rights in deposit contracts. Deposit insurance, in contrast, can in principle protect property rights.

To prevent runs, a deposit insurance system does not rely solely on a reserve fund; it also relies on its ability to impose *ex post* levies. The effectiveness of a deposit insurance system depends on depositors' confidence in the ability and willingness of the system to impose such fees. In this regard, a government agency might be viewed as more effective than a private firm. Some government responsibility in the provision of deposit insurance might also have the effect of internalizing within the government sector the cost of macro shocks related to fiscal and monetary policy

The benefits of federal deposit insurance have not come without a price. As it is currently admin-

istered, the system raises a number of regulatory issues regarding the incentives it provides for risk-taking. Indeed, much of the current debate over traditional safety-and-soundness issues is cast in terms of these incentives and the risk exposure of the insurance funds. At best, safety-and-soundness regulation and risk-related deposit insurance premia will be only partially successful in checking bank risk-taking and limiting the inefficiency due to deposit insurance. The insurance itself likely will continue to distort bank behavior because the losses of an individual bank remain liabilities of the insurance funds and the general taxpaying public and *not* the liabilities of the shareholders and depositors of individual banks.

The question of how government intervention in banking relates to the public interest will continue to be a controversial one. Our contribution has been to focus the debate on market failures, partly because economists generally believe that market failures are the only "appropriate" reason for regulation and partly because understanding the nature of these failures is a necessary first step in understanding the possible distributive aspects of regulation.

FOOTNOTES

1. In fact, many analyses of the effects of regulations on the banking industry (see Dothan and Williams, 1980, and Kareken and Wallace, 1978) have used models of banks in which there are no market failures. The conclusion from such models is that no regulation is best. These analyses would seem to be of little practical use, however, because their conclusions follow directly from their assumptions. In contrast, our approach tries to determine first whether there might be market failures associated with banking activities.

2. There is now a literature in economics that at least partially validates this private interest view. A large number of regulations in the airline, automotive, steel, financial, trucking, agricultural, and communication industries have been shown to be primarily attempts to restrict competition. Although these sorts of anticompetitive regulations did not serve any discernible public interest goal in terms of rectifying market failures, they probably did redistribute income.

3. Becker's model also relates to the impact of deadweight losses stemming from regulations that are primarily intended to redistribute wealth. He shows that an increase in the deadweight cost of a subsidy reduces political pressure from the subsidized group because a given expenditure results in a smaller net benefit to them. Similarly, an increase in the deadweight cost of a tax leads to greater pressure by taxpayers to reduce taxes because a given reduction in their tax rates has a smaller effect on the revenues produced.

4. One reason is that in a pure commodity system the monetary demand for the commodity (to effect trade) will lead to more production of the numeraire commodity compared to a system in which the commodity is not held for purposes of monetary exchange. Even if the commodity is in fixed supply, so that production of the commodity money is not affected, the monetary demand for the commodity will lead to its diversion from productive nonmonetary uses for monetary uses. Thus, a commodity system in which the commodity itself serves as the sole medium of exchange wastes real resources compared to a system in which the costs of holding the commodity for a monetary purpose are reduced by using other less costly mechanisms to effect exchange. Moreover, physical transfers of the commodity needed to carry out trade may be very costly compared to the use of financial assets to effect trade through an accounting system of exchange or through the use of banknotes. It might be noted that a banking system with 100 percent required reserves thus could be very costly. Such a system could be more efficient than a commodity system since it might reduce the costs of physically transporting the commodity during exchange, but it would be less efficient than a system in which the commodity was relatively freed from monetary uses.

5. We do not use the term "medium of exchange" necessarily to denote an actual physical circulating medium such as currency or banknotes. Instead, we use it to refer to all bank-provided payment services including checks, wire transfers, credit cards as well as private banknotes.

6. Although the economics of a commodity-based monetary system with bank debt as one medium of exchange were discussed by Adam Smith (1776), this part of the monetary economics literature seems to have been neglected until recently as exemplified in the work of Fama (1980, 1983), Laidler (1981), Sargent and Wallace (1982), Hall (1983), and White (1984).

7. However, there still might be a question of whether regulation would be required to limit the private issuance of media of exchange to ensure their continued usefulness. One would expect that in such a commodity-based system, competitive private market forces would require that bank debt be redeemable in the numeraire commodity to prevent banks from issuing too much debt. Without redeemability, banks might be tempted to engage in Ponzi schemes, redeeming old debt in terms of new debt. Creditors of banks (for example, depositors) might not be able to ascertain the actual financial condition of such banks because of high information costs and incentives of banks to overstate their true financial conditions. Currently, to our knowledge, all debt is redeemable for the numeraire, although not necessarily on demand.

Competition also would force banks to charge the marginal costs of operating such a system and to pay a market rate of interest on debt, points often neglected by writers on this subject. The payment of interest on and redeemability of

bank debt would limit its issuance just as the payment of interest on and redeemability of other forms of debt limit its issuance.

8. Note that privately issued banknotes under a commodity system are not fiat money because they are not the numeraire. In fact, unlike fiat money, privately issued banknotes are redeemable for the numeraire commodity and are financial assets (that is, bank liabilities).

9. This is not to say that some assets would not be used more often than others to effect transactions. For example, the transaction costs of trading with assets whose prices are uncertain might be very high and thus limit their use in most trades.

10. A fiat system may eliminate the holding of commodities for monetary purposes and thus free real resources for other uses. Even with a fiat system, however, persons may hold commodities for monetary purposes. Today, large quantities of gold appear to be held for such purposes.

Moreover, a fiat system implicitly taxes the holders of fiat money in proportion to their holdings. (The tax is the foregone nominal interest associated with holding fiat money.) This tax distorts behavior and leads persons to hold less fiat money than is socially optimal. To achieve a socially optimal quantity of fiat money holdings (see Friedman, 1969), interest must be paid on fiat (base) money either directly or indirectly through deflation, and these interest payments must be financed by a nondistorting tax such as a head tax. Since private entities do not have the power to tax, this is another reason the private sector cannot produce a socially optimal fiat money system.

Furthermore, a private monopoly supplier would have no incentive to provide the socially optimal quantity of fiat money and would be likely to maximize the real revenue from printing money instead. Thus, government regulation of such a supplier could enhance efficiency.

11. This argument could apply to all private placers of credit such as insurance companies and finance companies.

12. Another reason for a decline in the level of financial intermediation in the second half of the 1930s would be the increase in reserve requirements that occurred in 1936 and 1937.

13. Information may not be made public because it is believed that, with deposit insurance, which has effectively covered all depositors, the public would not use the information to monitor banks. Most recently, with the FDIC looking for an increased role for market discipline, consideration has been given to greater public disclosure of information on banks.

14. As mentioned earlier, in a commodity-based monetary system, a bank panic might also be a concern since it could affect indirectly the demand for the numeraire and thus, prices.

15. Even under an interest rate targeting procedure, a loss of confidence in the banking system and a "flight to quality" can pose problems for monetary policy. In the 1930s, for example, low rates on safe assets do not appear to have sent the proper signal regarding whether the Federal Reserve was providing sufficient liquidity (reserves) to the economy. Also, with federal funds rate targeting, that rate could be affected by concerns over the stability of the banking system.

Finally, the traditional concern over stability in banking and monetary control is that shifts from deposits to currency could lead to a multiple contraction in the measured money supply, such as M1, because of the system of fractional reserves. Given the lessons that have been learned from the past, it is likely that the Federal Reserve would be able to maintain the level (or growth rate) of a predefined aggregate such as M1. However, a constant growth rate of M1 might not ensure financial stability, and the Federal Reserve may be unable to predict accurately just how much money (M1) it should supply to ensure stability.

16. In the Diamond and Dybvig model, banks are mutual organizations in the sense that in the last time period any residual above the guaranteed rate of return is shared by surviving depositors.

17. Given these problems, controlling risk through supervision (monitoring and controlling risks) rather than restricting particular activities is an alternative. That is, to limit risk it is more important to monitor and control how institutions carry out various activities than it is to regulate which activities they may pursue. One caveat is that the ability of regulators to monitor a bank's riskiness may be affected by the variety of activities in which the institution is involved. In addition some risky activities may be more difficult to monitor than others even though they are not inherently more risky. But it is not clear, *a priori,* which activities would involve higher monitoring costs.

18. A similar argument could be made about interest rate ceilings. That is, if they could be enforced by eliminating nonprice competition and disintermediation, they also would represent a restriction on competition that would not appear to address any market failure but instead would create one. Moreover, with nonprice competition, such ceilings have the effect of increasing the marginal cost of deposits while lowering the marginal return compared to the competitive situation, thus creating a further distortion.

A traditional rationale for deposit rate ceilings is that unfettered competition would drive up deposit rates and cause banks to take on riskier portfolios. This view now seems largely discredited because if banks could benefit from riskier portfolios without deposit ceilings, why would they not benefit from such activities with them?

Smith (1984) has argued that because depositors are heterogeneous in terms of withdrawal probabilities and, because the information is private, that bank runs and instability might occur essentially because of adverse selection. That is, while deposit ceilings do not affect the risk of banks' asset portfolios, they can reduce the risk of bank runs. However, his analysis, which views banks as providers of insurance, is far from persuasive and raises more issues than it settles. In particular, his conclusions seem at odds with the wide variety of financial instruments with different liquidities and maturities that are provided by banks and other financial intermediaries. Moreover, it seems possible that ceilings might lead to large deadweight losses for some types of depositors and even a breakdown in intermediation altogether.

19. In the case of systemic risk, the current deposit insurance system still serves to maintain depositors' property rights and, as such, is more in keeping with the Diamond

and Dybvig prototype. One difference between the two systems is that there would be some redistribution of wealth with the current system since taxes would not likely be based on individuals' deposit holdings.

20. See Darby (1986).

21. There are a number of proposals for increasing market discipline in banking to reduce the distortions associated with deposit insurance. These include lowering the statutory maximum insurance limit as well as permitting coinsurance, which would mean that only a fraction of the depositors' balances would be covered.

The modified payout plan is another example of how the deposit insurance agencies might seek to increase market discipline. The modified pay out plan introduced by the FDIC for a short period in 1984 was intended to change formally the practice of paying off all depositors in the event of failure. With the modified payout plan, depositors with balances above the statutory maximum received only a fraction of their deposit balances based on the FDIC evaluation of what it might recover from the liquidation of assets. Such measures for reforming deposit insurance are consistent with the small depositor protection rule of insurance. However, they are not necessarily in keeping with the view that deposit insurance is needed to insure stability because of market failures (see Furlong, 1984).

Approaches to reforming deposit insurance through regulation include risk-related deposit insurance premia and portfolio-adjusted capital guidelines. The usual criticism of the regulatory approach is that it is doubtful that insurance agencies would be successful in assessing risk *ex ante*. Proposals for risk-related premia and capital requirements also have been criticized because they continue the practice of defining regulatory and supervisory guidelines in terms of book value rather than market value. One way of looking at the degree of subsidy provided through deposit insurance is the extent to which it allows the market value of an institution's net worth to go below zero. If all institutions were closed when the market value of their capital reaches zero, there would be no insurance subsidy.

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