IPR

56

INSTITUTE
FOR
POLICY
REFORM

[redacted]

Working Paper Series

The objective of the Institute for Policy Reform is to enhance the foundation for broad based economic growth in developing countries. Through its research, education and training activities the Institute encourages active participation in the dialogue on policy reform, focusing on changes that stimulate and sustain economic development. At the core of these activities is the search for creative ideas that can be used to design constitutional, institutional and policy reforms. Research fellows and policy practitioners are engaged by IPR to expand the analytical core of the reform process. This includes all elements of comprehensive and customized reforms packages, recognizing cultural, political, economic and environmental elements as crucial dimensions of societies.

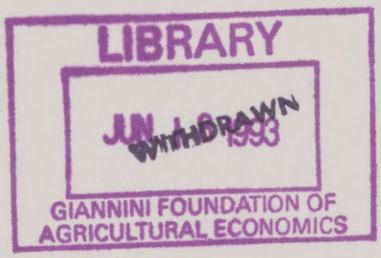
1400 16th Street, NW / Suite 350
Washington, DC 20036
(202) 939 - 3450

INSTITUTE
FOR
POLICY
REFORM

IPR56

The Role of the State in Financial Markets

Joseph E. Stiglitz



Working Paper Series

The objective of the Institute for Policy Reform is to enhance the foundation for broad based economic growth in developing countries. Through its research, education and training activities the Institute encourages active participation in the dialogue on policy reform, focusing on changes that stimulate and sustain economic development. At the core of these activities is the search for creative ideas that can be used to design constitutional, institutional and policy reforms. Research fellows and policy practitioners are engaged by IPR to expand the analytical core of the reform process. This includes all elements of comprehensive and customized reforms packages, recognizing cultural, political, economic and environmental elements as crucial dimensions of societies.

1400 16th Street, NW / Suite 350
Washington, DC 20036
(202) 939 - 3450

INSTITUTE
FOR
POLICY
REFORM

IPR56

The Role of the State in Financial Markets

Joseph E. Stiglitz

Department of Economics
Stanford University

and

Senior Research Fellow
Institute for Policy Reform

October, 1992

This paper re-examines, from a theoretical perspective, the role of the State in financial markets. After observing the ubiquity of government intervention and the frequency of debacles in the financial market (such as the U.S. S&L debacle), it identifies ten market failures that arise in financial markets. Most of these are related to problems of imperfect and costly information. It then proposes two alternative taxonomies of government intervention, focusing respectively on the instruments employed and the public policy objectives pursued. Government intervention faces information problems as well. The paper develops a set of principles for government regulation which take cognizance of limitations on government (including limitations on the information it has at its disposal). These principles are then applied to the analysis of prudential standards for banks.

The Role of the State in Financial Markets

Joseph E. Stiglitz

Executive Summary

This paper re-examines the role of the State in financial markets. It identifies a set of market failures, examines the instruments and roles that government has played in financial markets, develops a set of principles for government regulation, and illustrates the application of these principles through analysis of prudential standards for banks.

Among the great economic debates around the world is that concerning the role of government in financial markets. The history of modern capitalism has been marked by the closely interlinked phenomena of financial panics and economic recessions. While bank runs are not so prevalent as they were in the nineteenth century, the economic costs of financial debacles--such as that associated with the collapse of the Savings and Loan Associations in the United States--are no smaller. And while the precise extent of the economic consequences remains hotly debated, there is a general consensus that the crisis in the American financial institutions contributed to the major economic downturn of the early 1990s, to the length of that downturn, and to the ineffectiveness of the monetary policy in enabling the economy to recover.

Other factors, besides the problems facing financial institutions not only in the United States but in many other countries, developed and less developed, have motivated a re-examination of the role of financial markets: (i) The past decade has been marked by important financial innovations: new technologies have enabled transactions to be recorded at record speed; partly aided by these new technologies, new instruments and institutions (such as the CMA accounts and a wider range of futures markets) have been created. Well developed and sophisticated capital markets have become the hallmark of a more developed economy. Not surprisingly, as the less developed countries strive to enter the ranks of the more developed, they have sought to identify what are the essential features of the more developed economies, and to develop the requisite institutions. Seeing the seemingly large role played by bond and equity markets, they have sought to develop those markets. (ii) The spirit of deregulation that has characterized the past two decades has also spread to financial markets, both in developed and less developed countries.

This paper explains why financial markets are markedly different from other markets; it shows that market failures are likely to be more pervasive in these markets; and that there exist forms of government intervention which will not only make these markets function better, but which will improve the overall performance of the economy.

Much of the impetus for liberalization of financial markets does not seem based on a sound economic understanding either of how financial markets work or of the potential scope for government interventions; nor is it based on an understanding of the historical events and political forces which have led to the government assuming the roles which it presently undertakes. This paper provides the theoretical underpinnings from which a rational analysis of the appropriate design of government interventions in financial markets can be based.

The paper begins by observing some salient aspects of capital markets: (i) Government interventions appear to be ubiquitous, even in highly developed financial markets, such as that of the U.S. (ii) There has been a long history of financial debacles, and there are large costs associated with these debacles. (iii) In spite of the attention paid to the stock market, even in more advanced countries such as the United States, relatively little new investment is financed by the issue of equities. (iv) Many of the innovations in financial markets are not welfare enhancing; they can be viewed as rent seeking expenditures.

Recent research has emphasized that financial markets play a far more important role in the

economy than just mobilizing savings. In particular, they play an important role in screening and monitoring investment. These activities entail the acquisition and processing of information. The paper then identifies ten market failures associated with financial markets, most of which are information related. Information has many properties of public goods; differential information often gives rise to imperfections of competition; and because of difficulties in appropriating the returns to information, there are often externalities associated with the acquisition of information. Accordingly, it is not surprising that market failures arise in financial markets. Among the market failures are the following: (i) Monitoring solvency is a public good. (ii) Monitoring management is a public good. (iii) There are externalities of monitoring, selecting, and lending within and across financial markets. (iv) There are large externalities associated with disruptions in financial markets. (v) Risk markets are, in general, incomplete. Moreover, government often serves as a residual bearer of risk; it cannot commit itself not to provide insurance; and as an implicit insurer, it needs to take actions (impose regulations) which reduce its exposure. Finally, there is a quite general theorem establishing that, in the presence of imperfect and costly information and incomplete markets, competitive equilibrium is, in general, not constrained Pareto efficient.

While government intervention in financial markets is pervasive, the policies are formulated not so much as to address directly these market failures, as to advance a broad set of social objectives: (i) protecting consumers; (ii) enhancing the solvency of banks; (iii) ensuring competition; (iv) directing resource allocation; (v) enhancing macroeconomic stability; and (vi) stimulating growth. The paper describes government interventions directed at each of these objectives, and relates them to underlying market failures.

Many of the interventions take the form of regulations. The paper proceeds to derive a set of principles which should govern these regulations. It emphasizes limitations on the regulators' enforcement capacity. As a result, it is important that regulations be designed to provide the regulated with incentives to behave in the desired way. This will imply that often regulators will have to rely on indirect rather than direct control. In setting regulatory standards, regulators must recognize both the imperfections of information, and the asymmetries of information which they face, as well as limitations in their risk assessment capacities. Regulatory structures need to be designed to provide government and regulators with strong incentives, for instance, to enforce the regulations in a timely way.

These general principles are illustrated through an analysis of the design of bank prudential standards. The S & L debacle in the United States is attributed, in part, to the failure to design appropriate prudential standards, contrary to much popular discussion, which has placed the blame either on incompetent regulators or deposit insurance. It argues that the two major principles of sound prudential regulation are: (i) maintaining high net worth and capital requirements; and (ii) restricting interest rates paid on insured deposits.

THE ROLE OF THE

STATE IN FINANCIAL MARKETS[1]

Joseph E. Stiglitz

I. INTRODUCTION

Among the great--longstanding but ongoing--economic debates around the world is that concerning the role of government in financial markets. There are certain recurrent themes in this debate. The history of modern capitalism has been marked by the closely interlinked phenomena of financial panics and economic recessions. While bank runs are no so prevalent as they were in the nineteenth century, the economic costs of financial debacles--such as that associated with the collapse of the Savings and Loan Associations in the United States--are no smaller. And while the precise extent of the economic consequences remain hotly debated, there is a general consensus that the crisis in the American financial

---

[1]Senior Research Fellow, Institute for Policy Reform and Professor of Economics, Stanford University. Financial support from the IPR is gratefully acknowledged.

This paper represents a continuation and extension of on-going work on financial markets which has also received the support from the National Science Foundation, the Hoover Institution, the Sloan Foundation, through a grant to the Center for Economic Policy Research, and the World Bank. In writing this paper, I have especially benefitted from extensive discussions with officials in the central banks, governments, and commercial banks in Japan, Korea, Thailand, Hong Kong, Singapore, and Malaysia, as well as discussions with individuals from Chung-Hua Institution in Taipei, Taiwan; Institute for Public Policy, Seoul, Korea; and Hong Kong Economic Association, Hong Kong, during a series of visits sponsored by the World Bank and the Japanese government. Needless to say, all views represent those of the author alone, and not of any of the organizations which have supported this research.

In preparing this version of the paper, I have benefitted greatly from the helpful comments of David P. Dod, of the Bureau for Europe, office of program development and planning, economic analysis, AID, and from the suggestions of the participants at seminars at Korea, Taiwan, Malaysia, Bank of Japan at which earlier versions of this paper were presented. Research assistance from Thomas Hellmann is also gratefully acknowledged.

Earlier papers in which I have set forth versions of some of the ideas contained in this paper include Stiglitz [1990a, 1991, 1992a, 1992b].

The views presented in this paper are solely those of the author, and do not represent the views of any organization with which he is affiliated.

institutions contributed to the major economic downturn of the early 1990s, to the length of that downturn, and to the ineffectiveness of the monetary policy in enabling the economy to recover.

Nor is the United States alone in being beset by problems in its financial institutions. During recent years, governments in several European countries, in numerous less developed countries, and in Japan have had to intervene to prop up their systems.

The past decade has been marked by important financial innovations: new technologies have enabled transactions to be recorded at record speed; partly aided by these new technologies, new instruments (such as "cash management accounts"[2] and a wider range of futures markets) and institutions have been created. Well developed and sophisticated capital markets have become the hallmark of a more developed economy. Nor surprisingly, as the less developed countries strive to enter the ranks of the more developed, they have sought to identify what are the essential features of the more developed economies, and to develop the requisite institutions. Seeing the seemingly large role played by bond and equity markets, they have sought to develop those markets.

The spirit of deregulation that has characterized the past two decades has also spread to financial markets. The claim is that the problems that are observed in financial markets are a result of regulation, and financial market liberalization will cure those ills. Moreover, it is suggested that liberalizing financial markets will enable them to perform their main function of allocating scarce capital more efficiently, and thus liberalizing financial markets will confer benefits on the rest of the economy as well. This call for liberalization has spread to less developed countries, aided and abetted by two other factors. First, the United States, interested in promoting business interests in which it believes it may have a competitive advantage, has been putting pressure on a number of countries to liberalize, in the belief that in doing

---

[2]CMA is the registered trademark of the first such accounts set up by Merrill Lynch. These enable investors to consolidate into one account their money market funds, stocks, and bonds. Individuals have, in effect, a line of credit; when there is a zero balance left in their money market funds, they can borrow, at reasonably low interest rates, using the stocks and bonds in their account as collateral.

so, American financial institutions would make significant inroads. Secondly, there has been a long standing view that financial market repression has impeded the growth process (see McKinnon [1973]).[3] The basic thesis of this essay is that financial markets are markedly different from other markets; that market failures are likely to be more pervasive in these markets; and that there exists forms of government intervention which will not only make these markets function better, but which will improve the overall performance of the economy. I will attempt not only to set out the pervasive market failures which provide the rationale for government intervention, but also to clarify the basic principles governing government regulatory intervention. I will illustrate these basic principles and premises by examining a range of concrete policy issues which are currently under discussion in a number of countries, focusing particularly on those pertinent to less developed economies.

I contend that much of the impetus for liberalization of financial markets is not based on a sound economic understanding either of how financial markets work or of the potential scope for government interventions. Nor is it based on an understanding of the historical events and political forces which have led to the government assuming the roles which it presently undertakes. Rather, it is based on an ideological commitment to markets, grounded neither in economic theory or fact.

Because government intervention is so pervasive, one might argue that it is difficult to tell what institutions might eventually evolve to provide some of the same services and protections that government currently provides, and whether these newly created institutions would perform these functions better. To be sure, markets may not currently provide certain key services. Proponents of "free markets" might contend that it is only the impatience with the speed with which market institutions solve their own problems, not their capacity to solve those problems, which accounts for the large role of government. I am suspect: though we have few pieces of evidence, those that we do have do not lend support to this

---

[3]Our later discussion will question this presumption. There is little evidence of a significant interest elasticity of savings. Indeed, we shall argue that under certain circumstances, financial repression may increase the level of savings.

argument. Thus, Chile had an experiment with relatively unregulated banking, and the results were disastrous. The United States has had long periods in its history of relatively lax regulation, and private institutions did not evolve to self-regulate the industry; financial panics were a regular feature of these periods of lax regulation. In the recent troubles confronting several major insurance companies within the United States, the rating agencies, whose sole economic role is to track the financial viability of these insurance companies, simply did not foresee the problems until they were all too visible for *all* to see, and customers cashed in their policies in droves. To be sure, badly designed government policies may exacerbate some problems (the extent of defaults within the S & L industry can be traced to a badly designed set of regulations and provisions)--but there is no evidence that the elimination of *all* regulations would make matters better. Several European countries do[4] seem to function well without government provided deposit insurance; this may be an example where government actions have "crowded out" private actions which would have provided comparable services. But the fact that this is true for one particular government provided service hardly provides a convincing case that it is true for all government services and regulatory activities. There are fundamental market failures underlying these government activities.

General Approach

Let me say a word at the onset about the general approach that will be taken in this essay. I begin by delineating the market failures which characterize financial markets.

It is now widely recognized that the existence of market failures need not, by itself, constitute justification for government intervention: government regulation, no less than markets, are beset by problems. Some see the recent S & L debacle as a manifestation not of market failure, but of regulatory

---

[4]Perhaps I should, more accurately, say "did." One clear case is Norway. Recent financial crises have led to strong government intervention (see Vittas [1992]).

(or government) failure. To some extent, these critics are correct, but the conclusion that they draw, that there should be on that account less government regulation is incorrect: I argue that the problem arise from the incorrect design of government regulations.

To address the question of the appropriate design of government regulations, we must begin by asking, what are the distinct properties of government. In what way is *government* different from other organizations in our society?[5] An understanding of the sources of market failure and of regulatory failure--an appreciation of the limits as well as strengths of government interventions--is necessary if well designed government regulatory interventions are to be designed. The precise role that government should take will naturally change as the *balance* of strengths and weaknesses of government and the private sector, respectively change, both in the course of economic development, with the ensuing changes in economic circumstances, and as technology changes. In particular, there is no reason to believe that the regulatory structure which is appropriate for the United States is the same one which is appropriate for a country at a much earlier stage of development; while the self-regulating market institutions may be weaker, so too may be the government's capacity to implement effective regulations. Though the outcome of this careful balancing will differ from country to country, there are certain general principles which I try to identify. In particular, I argue that well designed regulations must recognize (i) regulations are costly to enforce (and one must take into account both the costs of the regulator and the regulated financial institutions); (ii) information is always imperfect; (iii) government is often at an informational disadvantage relative to the regulated financial institution; (iv) some variables are less costly to monitor, or can be monitored with greater accuracy; and (v) given the limitations on regulations, government must rely primarily on ensuring that financial institutions have incentives to behave well. In short, regulations must be designed which take account of the limitations facing government, focusing often on indirect controls, that is, imposing regulations on the more easily and

[5]This is a question which I addressed, in broader terms, in my essay, Stiglitz [1990a].

accurately observed variables, in such a way that the financial institutions have incentives to act (in the wide range of areas in which they have effective discretion) in a prudent manner.

This paper is organized into six sections. After setting out some preliminary observations in the remainder of this section, I turn, in section II, to a brief description of the roles performed by modern financial markets, which go well beyond the simple task of mobilizing savings emphasized in much of the earlier development literature. Section III. sets forth a comprehensive list of market failures affecting the financial sector. Section IV. describes the primary roles of government. We provide two alternative taxonomies, one focusing on the actions of government, the other on its objectives. Section V. sets forth a general set of principles of regulation, while Section VI. applies these principles to the issue of the design of prudential regulations.

Prelude

Before beginning the formal analysis, I want to make four preliminary observations which will set the tone for much of what follows.

1. Ubiquity of Government Interventions

First, it should be observed that in almost all countries, no matter how developed, there exists massive interventions in financial markets. In the United States, these not only take the form of banking and securities regulations, but also more direct government involvement in lending activities. Indeed, throughout the 1980s around 25% of all funds loaned on the market were either loaned by government agencies or carried government guarantees (see Schwarz [1992]). There are government loan programs for students, for small businesses, for housing, to promote exports, and a host of other worthy causes. Indeed, so large and important have these credit activities become that the government has a separate "credit budget."

Of course, the fact that the U.S. government is engaged in such massive intervention in the credit market does not make it either right or wrong: it does, however, raise questions about U.S. policies aimed at reducing other countries' involvement in credit markets, when the U.S. seems to find it difficult to get its own house in order.

Nor does the fact that the U.S. government is involved, through guarantees or lending, provide a quantitative assessment of the magnitude of the subsidies or distortions associated with that intervention. There are two ways of measuring the magnitude of the government intervention--focusing on the benefits to those who receive credit or credit guarantees, or focusing on the cost to government. The fact that there may be such a large discrepancy between the two is itself evidence of an important market failure. Assessing either turns out to be a difficult matter. Assessing the cost to government involves an assessment of the risk of default; but as difficult as this may seem, a requirement to do so was incorporated into the recently enacted Credit Reform Act.

But this massive government involvement does serve to remind us of the political attractiveness of credit interventions, the widespread perception of market failures, and the political pitfalls that arise with government intervention. Many of the government credit programs arose because certain groups believed that they could not get credit, or that they could not get credit at "fair terms." The market seemed to overestimate the chance of default. There was a perception of market failure. We will argue below that there are indeed many market failures in the markets' allocation of credit; but at the same time, some of the perceived market failures may only be partly so. The failure of markets to provide student loans was a result of high default rates--a fact that U.S. government itself learned only too painfully.

Credit subsidies are political attractive partially because it is hard to assess exactly how large they are, partly because it is hard to ascertain who pays, and partly because the fiscal bill arrives only randomly, and then often far in the future. The subsidy is the difference between the "government fair"

risk premium (risk of default) and that charged; but it is hard to assess what the government fair risk premium is. The real cost is the diversion of funds that would have been lent (allocated) somewhere else; this cost occurs at the time the funds are lent, but this cost is a far less apparent cost than a direct budgetary outlay. The *budgetary* outlays arise only when the government is called upon to honor the guarantee. This happens usually years after the loan has been made, and by then, a host of excuses--unforeseen and unforeseeable events--can be called upon to explain the default.

Credit subsidies are politically dangerous for exactly the same reason that they are politically attractive; like tariffs, they provide a means by which the government can provide special treatment to some individuals or groups, without the costs being directly or at least immediately apparent.

2. Financial Debacles

The second observation is to reiterate the point made earlier: the financial debacle in the Savings and Loan Associations in the United States is only the most recent and most massive of the failures which have plagued financial institutions around the world. The U.S. banking system is in a precarious position. The government of Japan is worried that the huge decreases in the value of stocks and real estate in 1992 placed many of their leading financial institutions in similarly precarious positions. In recent years, crises in financial institutions rocked Hong Kong, Malaysia, Chile, and many other countries.

The costs of these debacles has been enormous.[6] The undiscounted budgetary outlays associated with the S & L debacle have been estimated to be as much as $500 billion, or more than $2,000 for every man, woman, and child in the country. While the Bush administration was claiming that it could not spend money to provide unemployment compensation, it was spending billions to bail out financial institutions; and indeed, many of those being bailed out had deposits far in excess of the amount covered

[6]See CBO [1992] for a fuller discussion of these costs.

by deposit insurance, for which the government had an explicit obligation.[7] It is hard to get a feeling for a magnitude as large as $500 billion: it represents, for instance, five times annual expenditures on welfare.

But these budgetary costs are only a part of the problem. They reflect the fact that the financial institutions made massive mistakes in their lending activity. They lent money on projects, the returns to which were insufficient to pay for the money lent. A central function of financial institutions is to allocate resources, to ensure that they go where returns are highest. Evidently, they failed to do this: returns in many cases were not only negative, but massively so. If the government had misallocated magnitudes of this size, it would have been expected: one envisions ineptness in government, undirected by the profit motive. But here, the private sector, presumably directed by the profit motive, seemingly made massive mistakes. As I argue below, to a large extent, the problem is one of misplaced incentives--free markets provide inappropriate incentives--but in this case, there were further distortions resulting from inappropriate government policies. Thus, the real resource cost of the S & L debacle is that, in a period in which the United States was suffering from a deficiency of funds (savings rates were low, and the government was borrowing at a massive scale), the available funds were being misallocated, directed away from their most productive uses.

3. The Exaggerated Importance of Equity and Bond Markets

The fact that newspapers, TV, and radio devote as much space and time to reporting on activities in the stock and bond markets leads many to believe that these are central institutions of capitalism. But

---

[7]They did this for several reasons, beyond simply succumbing to political pressures. As we emphasize below, in many cases, there may be large economic costs to allowing financial institutions to go bankrupt. In many cases, a "reorganization" of the failed institution--which includes assuming *all* assets and liabilities (including the uninsured deposits)--appeared to be less expensive to the government than allowing the institution to die, selling off the assets, and paying off on deposit insurance to those who were covered.

recent studies have questioned the importance of their role.

In particular, even in more advanced developed countries, a relatively small fraction of total investment is financed by new equity or bond issues. (See Table 1). There are good theoretical reasons for this, which I shall discuss at greater length below.

For now, I simply note that were raising funds the primary function of equity markets, we would have to judge them to be an extremely costly way of doing so. As Summers as pointed out, the ratio of transactions costs (resources involved in running the equity market) to all new investment (not just new investment financed through the equity market) is approximately .25.

The stock market is, first and foremost, a forum in which individuals can exchange risks. The fact that there is an easy way by which such risks can be exchanged does undoubtedly affect the raising of capital (though it may have negative effects as well as positive, e.g. in contributing to the short sightedness of management). But in the end, most of the activity on the stock market is perhaps more akin to the rich man's gambling casino than it is to a forum in which funds are being raised to finance new ventures and to expand on-going ventures. Indeed, new ventures typically must look elsewhere. (While in the United States, in certain areas of high technology, they may look to venture capital firms, in other countries, and even within the United States, in other areas, they may have nowhere to turn.)

4. The Questionable Efficiency Enhancement of Financial Innovations

In the previous paragraphs we have raised questions concerning the extent to which certain financial markets perform a vital role in raising and allocating capital. It should come as no surprise, then, that many of the widely touted financial innovations contribute little to economic efficiency; indeed, they may be welfare decreasing. For instance, some of these financial innovations allow the faster recording of transactions; but it is dubious whether there are significant efficiency gains from such faster recordings, and to the extent that greater resources are required, welfare may actually be decreased.

The point is illustrated by a simple parable (see Summers and Summers [1989]). Assume that we are engaged in a productive activity, say listening to a lecture on the consequences of financial market liberalization. By some fluke, a hundred dollar bill falls at the foot of each of us. We have a choice: we can stop paying attention and grab the bill at once, or we can wait until the end of the lecture, and then each of us bends down to pick up our $100 dollar bill. The latter is more efficient, since it does not entail the disturbance of our productive activity. Yet, the latter is not a Nash equilibrium. Given that everyone else is waiting, it pays each individual to bend down, to gather up not only his $100 dollar bill, but also that of his neighbor. There is no real social gain from picking up the dollar bill a few minutes earlier; there is a real social cost. We can think of many of the financial innovations, entailing faster recording of transactions, as doing little more than allowing some individuals to pick up $100 bills faster.[8]

It is sometimes argued that better financial markets allow them to perform the price discovery function better. But again, the fundamental question is, what are the *real* consequences: discovering the "correct" price of some equity a minute or two earlier has essentially no effect on resource allocation decisions; indeed, there are serious questions about whether the information provided by the stock market has much to do with the allocation of investment in the first place.[9] The information provided by the stock market is simply too coarse to be of much use to firm managers in making their investment decision. The manager of a steel firm needs to know what kind of factory to construct, not just that some factory should be constructed; the stock market simply cannot provide that kind of information. Moreover, there is little reason to believe that the dentists in Peoria or the retired real estate broker living

---

[8]See Stiglitz and Weiss [1990] for a simple, formal model showing that such innovations are welfare decreasing. They use resources, yet they lead to no improvement in society's resource allocations.

[9]In fact, information may be welfare decreasing. The existence of asymmetric information--the fact that some individuals can obtain information about a risk before others--can lead, for instance, to the destruction of insurance markets; the insurer worries that the reason the insured wants to buy insurance is that he knows the insured against event is likely to occur.

in Florida--the investors and speculators who gamble on the stock market and who help determine prices[10]--will be better informed concerning future prospects of the steel industry, future demands and future innovations--than are the firms' managers, who specialize in obtaining this information and whose job it is to make investment decisions. (The observed correlations between investment and stock market price[11] in no way establishes a causal link; as Greenwald and Stiglitz [1992] have argued, it is more plausible that the correlation is a result of the fact that both managers and investors are responding to some of the same signals concerning future prospects of the firm or industry.)[12]

These actions--as so many other actions within the financial market--are nothing more than rent seeking. An individual who discovers that an event which is going to increase the value of an asset before others make that discovery can gain, by acquiring the asset before the market price has increased; but his gains are at the expense of others; they are simply redistributive in nature (see Hirshleifer [1971], Stiglitz [1975]).

Some of the "financial innovations" represent a shift from financial institutions, like banks, to markets, such as bond markets. These innovations, too, we argue are of questionable value (see Stiglitz,

---

[10]Supporters of the stock market claim that it is the informed traders who determine prices, and hence these uninformed speculators have no effect. This conclusion is not supported either by theory or evidence. Indeed, it is the existence of the uninformed traders, and the fact that prices do not fully reveal the information of the informed traders, which allows the informed traders to capture some returns from their expenditures on information. See Grossman and Stiglitz [1976, 1980].

[11]Which, in any case, are far weaker than those theories which argue that firms make their investment decisions based on the stock market price (Tobin's q-theory) would suggest

[12]Moreover, it is unlikely that the outside non-specialist speculators obtain much information which is *additional* to that of the managers, though to be sure, there are instances where outsiders do place an important check on the views of insiders, who may be seeking information to justify previous actions. What is at issue, in these cases, is more a problem of incentives and managerial discretion than just a problem of "information." Thus, it is unlikely that GM's managers learned much from the marked decline in their stock prices; they knew that the market did not think well of what they were doing (they could have gleaned that information, in greater depth, from reading one of a myriad of articles written about their mistakes). The Board of Directors were finally goaded into action, probably more by the flow of red ink than the slide in stock market prices.

[1992]). Though there are certain advantages, there are also distinct disadvantages; and the observation that markets have "evolved" later does not, in any way, provide conclusive support to the hypothesis that markets are "better."

II. THE ROLES OF FINANCIAL MARKETS

Before assessing the role of government in financial markets, we need to review briefly the role of financial markets in the economy. Earlier discussions, particularly in the context of less developed countries, focused on the role of financial markets in mobilizing savings, and making it available for industrialization. We now recognize that financial markets do much more; and that how well they perform these other functions may not only affect the extent to which they can mobilize savings, but more broadly, the overall efficiency and rate of growth of the economy. We can identify eight different roles:[13]

1. Transferring resources (capital) from those who have it (savers) to those who can make use of it (borrowers, or investors): in any capitalist economy, there is never a perfect coincidence between those who have funds and those who can make use of those funds.

2. Agglomerating capital: many projects require more capital than that of any one (or any small set of) savers(s).

3. Selecting projects and borrowers: there are always more individuals who claim that they have good uses for resources than there are funds available. Financial institutions must decide on who is likely to use the funds well and which projects are likely to yield the highest returns, or are most likely to yield sufficient returns to enable the borrower to repay the amount lent.

4. Monitoring: ensuring that funds are used in the way promised. For a variety of reasons,

---

[13]For a more extensive discussion of these various functions see, e.g. Stiglitz [1985], Greenwald and Stiglitz [1992], Stiglitz and Weiss [1991], Fama [1980], and the references cited in these papers.

borrowers and lenders interests do not coincide. Lenders are only concerned with getting repaid, and with how much they can recover when the borrower defaults. The latter is of no concern to borrowers; and they are very much concerned with how well they do when they do not go bankrupt--how much they make beyond the amount they have to pay back to the lender, a matter which is of little concern to the lender. The general problem of the misalignment of incentives is often referred to as the moral hazard problem,[14] and will be the focus of much of the discussion later in this essay.

5. Enforcing contracts: making sure that those who have borrowed repay the funds.

6. Transferring, sharing, and pooling risks: capital markets not only raise funds, but the rules which determine repayment determine who bears what risks. Risks are shared quite differently when firms issue bonds, equities, or preferred shares. Much of the activity on capital markets is not involved in raising new funds but in exchanging already existing assets, e.g. the buying and selling of shares.

7. Diversification: By pooling a large number of investment projects together, the total risk is reduced.[15]

8. Recording transactions, or more generally running the medium of exchange. This is the particular responsibility of one of the central financial institutions, the banking system.

In this description, capital markets not only are engaged in *intertemporal trade*, but also in *risk* and *information*. The three are inexorably linked together. That is partly because intertemporal trades involve dollars today for promises of dollars in the future, and there is almost always the chance that those promises will not be fulfilled. And information about the likelihood that they will or will not be fulfilled is clearly critical. Thus, even if we would like to separate the exchange, risk, and information

---

[14]It was first discussed extensively in the insurance literature, where it was observed that insurance reduced the insured's incentives for avoiding the insured against event.

[15]This can be viewed (like some of the other functions) as "economizing on transactions costs, including information costs." Individuals can diversify without using financial intermediaries, but at greater costs.

roles, we cannot. As a practical matter, in all capital markets, the three are combined.

The various functions I have described are linked together, but in ways which are not inevitable. For instance, banks link together the transactions functions and the functions of selecting and monitoring. With modern technologies, the transactions function can easily be separated. In cash management accounts, or CMAs, (run by the various brokerage houses in the United States), money is transferred into and out of "banks" instantaneously. The brokerage house's bank performs the transactions function, but no balances are kept, and accordingly no loan function (such as selecting and monitoring projects) is performed.

Some investment banks perform selection functions; they certify, in effect, bond or equity issues; but they play a very limited role in subsequently monitoring the borrower.

Today, mutual funds provide risk diversification services, with little attention to many of the other services of capital markets.

The array of financial institutions recognizes the advantages that come from specialization, as well as the possibilities of economies of scope. Thus, one of the traditional arguments for the interlinking of the medium of exchange function of banks and their loan functions was that in the process of mediating transactions, they acquired considerable information which might be of value in loan assessment and monitoring. This argument still has considerable validity, though the presence of a large number of alternatives for processing transactions vitiates some of the information content; observing a small fraction of the transactions of a potential borrower may have little if any information value.

While the structure of financial markets is thus affected by economies of scope, and while there may be important complementarities among the functions, there may also be diseconomies of scope and conflicts among the functions. Thus, there may be increasing returns to specialization in information;[16]

---

[16]That is, the acquisition of information may exhibit increasing returns to scale. See Radner and Stiglitz [1984].

funds may be more efficiently allocated if one bank specializes in one region, another in another. But this specialization in information conflicts with the objective of risk diversification.[17]

Some of the interlinkages among functions arise from particular characteristics of information: judgments about whether a particular loan candidate is worthy have a lot more credibility when the persons or organizations making the judgments are willing to put up money, than when they are only willing to make a recommendation. Monitoring is enhanced when there is a likelihood that the borrower will be returning to the lender for additional funds.[18]

At the same time, it is important to bear in mind the distinctions among the various financial institutions and the roles they play. Thus, while the capital market as a whole raises and allocates funds, as we have already noted, much of the activity in bond and stock markets involves trading existing assets.

III. MARKET FAILURES

Some Basic Principles

Of the roles that we have delineated in the previous section, two--the allocation of capital and monitoring its use--are essentially information problems. Financial markets essentially entail the allocation of resources to the process of allocation of resources. In this sense, financial markets can be thought of as at the center of the "brain" of the entire economic system, the central locus of decision making. It is because of this pivotal role that the performance of financial markets is so important: if they fail to perform their role well, it is not just that this industry's profits may be lower than it otherwise would have been; the entire economic system's performance may be impaired.

---

[17]Thus the process of securitization of mortgages, while it has increased the potential for risk diversification, may have adversely affected the "quality" of lending, i.e. the interest rates charged will less accurately reflect the risks associated with different borrowers.

[18]The fact that long term relations are important is only one of the ways in which credit markets differ from standard "anonymous" competitive markets, as the analysis below will make clear.

Information and Market Efficiency

The standard theories of the efficiency of competitive markets are based on the premise that there is perfect information; or more precisely, that whatever information (beliefs) individuals have is not affected by what they observe in the market, and cannot be altered by any action which they can undertake, such as expending time and resources on acquiring information. Thus, the standard theories--the fundamental theorems of welfare economics asserting that every competitive equilibrium is Pareto efficient--provide us simply with no guidance with respect to the question whether financial markets, which are essentially concerned with the production, processing, dissemination, and utilization of information, are efficient. On the contrary, we have learned that, in general, economies with markets in which information is imperfect (and can be affected by the actions of participants) and markets are incomplete (as risk markets surely are) are, in general, not constrained Pareto efficient (see below, and Greenwald and Stiglitz [1986]); there are feasible government interventions which can make all individuals better off. Thus, not only is there no presumption that competitive markets are efficient, but there is a presumption that they are inefficient. Determining whether, or how, government interventions can, in practice, improve matters is a more subtle question, which will be one of the main themes of this essay.

Not only is there a presumption that competitive markets, under these circumstances, are not efficient, there is also a presumption that markets will not, in general, be fully competitive, a point to which I will again return later.

We can delineate seven sets of market failures (some of them closely related) which provide the basis of government intervention in financial markets. Most of these market failures relate to externalities which arise when markets are incomplete, and to the market failures associated with information. One relates to the more familiar market failures associated with imperfect competition. While we describe the various problems in the paragraphs below, it is perhaps useful to begin with a discussion of why, in

general, information gives rise to market failures

Information as a Public Good

It is well known that competitive market economies will provide an insufficient supply of public goods. Information is, in a fundamental sense, a public good.

The two essential features of a *pure* public good are non-rivalrous consumption--the consumption of the good by one individual does not detract from that of another--and non-excludability--it is impossible, or at least very costly, to exclude any one from the enjoyment of the public good. Information possesses both of these attributes. If I tell someone something I know, I still know it; his knowledge of that fact does not subtract from what I know. (To be sure, it may affect the economic returns which I can make of that information, for it may eliminate any market power I might have as a result of any monopoly of information. In product markets, if a single firm has knowledge of a lower cost technology for producing a good, it can obtain some monopoly rents from that knowledge, while when that information becomes widely diffused, it cannot. We shall see important instances of this below in our discussion of financial market failures.)

By the same token, it is often difficult to exclude someone from "enjoying" knowledge which I possess. If I know that it is going to rain, and, if, when it rains, I carry an umbrella, then as soon as someone sees that I am carrying an umbrella, they know that it is going to rain. There is, in this example, no way that I can make use of the information, without at the same time making the information available to others.

Information and Externalities

Because of the difficulties of appropriating the returns to information, there are often externalities associated with its acquisition. Others benefit from the information which an individual acquires. We

will see numerous instances of this below.

Information and Imperfect Competition

Expenditures on information can be viewed as fixed costs; they do not need to increase with the amount of lending (though lenders may indeed decide to spend more in acquiring information when they are lending more). Because of the fixed cost nature of information, markets (in the relevant sense) which are information intensive are likely to be imperfectly competitive. There may, in fact be many firms engaged in *similar* activities, but it will not, in general, pay many firms to obtain exactly the same information. Thus, while there may be many firms engaged in lending, there will not in general be many banks that become informed concerning any particular borrower.[19]

In the previous paragraphs, we have noted several of the important ways in which information differs from conventional commodities, and accordingly why financial markets--whose essential role is to obtain and process information--are likely to differ from markets for conventional goods and services. The list is not meant to be exhaustive; as we shall see in the discussion below, not only do the differences suggest that market failures will be particularly endemic in financial markets, but there are further reasons, related to the peculiar properties of information, that markets for information do not function

---

[19]This can be seen as follows. Assume that there are two groups of borrowers, type G (good risks) and B (bad risks.) Assume that in the absence of information, the government fair interest rate is r_u (for uninformed). Then a lender who ascertained that a borrower was a good borrower could just slightly less than charge r_u, and obtain a return for its expenditures on information acquisition equal to the difference between r_u and r_G, the government fair interest rate for type G. But if two lenders both obtained the information, they would compete for the borrower, driving down the interest rate to r_G, so that neither would obtain any return on its expenditures on information.

Thus, if those who spend money to obtain information are to obtain a return on their information, competition cannot be perfect; there must be some method of obtaining "information rents." The precise mechanism for doing so may differ across markets, but in any case, markets will not be characterized by the standard perfectly competitive model, information cannot be perfectly and instantaneously disseminated, and markets cannot function as if it were. See, e.g. Stiglitz [1975c], and Grossman and Stiglitz [1976, 1980]. For a brief discussion of the implications for credit markets, see Jaffee and Stiglitz [1990].

well.

Seven Market Failures in Financial Markets

We now turn to a more detailed description of market failures in financial markets.

1. Monitoring as a Public Good

Problems of information as a public good arise in at least two distinct contexts in financial markets: information about the *solvency* of financial institutions, which is obviously of great value to investors (depositors) who are considering entrusting--or withdrawing--their funds to a particular financial institution; and information more generally about the *management* of these institutions is relevant, because it affects the risk and returns of investments.

Monitoring Solvency

We can easily see that information about the solvency of financial institutions is a public good, possessing the properties of non-rivalrousness and non-excludability.

The non-rivalrousness of information is obvious: one person knowing about an impending insolvency of a financial institution does not subtract from what another knows. To be sure, as we noted earlier, as is often the case with information, while an additional individual having information about the insolvency of a particular financial institution does not detract from the amount of information which I have, it may adversely affect what I can do with that information. If one person alone obtains information about the insolvency of a bank, he can withdraw his funds. But if many individuals have the information, they may not all be able to recover their funds.

To see the problems of excludability, assume, for instance, that an individual who is known to have good information about bank insolvencies is seen to deposit his funds in some bank, or to withdraw

his money from some bank. Then that action may convey considerable information to others. If that individual does research, to ascertain whether the bank is in fact solvent, others will benefit, simply by watching what he does.

Withdrawing

As in the case of any public good, there is an undersupply. Too little effort is expended monitoring financial institutions. This has two consequences. First, because financial institutions know that they are not being monitored, they may undertake riskier (less prudent) actions, or they may attempt to divert funds to their own use. (It *may* be possible to control the latter activities by having sufficiently high penalties when individuals are caught. Since whether a particular action is or is not "reasonable" or "prudent" is highly subjective--in most cases, investigation only occurs after a large number of loans have turned bad, and then the question is one of Monday morning quarterbacking, that is, did the bank gather the appropriate amount of information, and given the information it did collect, did it operate in an appropriate way--ex post punishments are likely not to be an effective way of regulating this class of actions. The extensive litigation arising from the S & L debacle provides testimony to the difficulties that are encountered. Thus, it has proven hard enough establishing standards of *fraud*; establishing standards for *reasonable prudence* are even more problematic.[20] It does not seem to be good policy to turn over the decision about what banks should have reasonably done to a court system which is ill-equipped to handle the myriad of technical issues which inevitably arise.)

Secondly, because investors can place less reliance on financial institutions, a smaller fraction of society's resources will be allocated through them; as a result they will not be able to perform the functions described earlier as well as they might otherwise. Capital resources will not be allocated as

[20]To be sure, courts have tried to do so, but the process is contentious, the outcome is almost always uncertain, and the standards set by courts often make little if any economic sense.

efficiently.

Mitigating the Public Good Problem

As is often the case with public goods, ways can be devised of excluding, but while such exclusion ameliorates the free rider-incentive problem, there are often high costs associated with exclusion. In the case of the problem of monitoring solvency, the first comer rule (under which those who ask for their money first get fully what they ask, while those who show up at the banks' door step late get nothing) can be thought of as a way of providing partial exclusion: Those who rely on the observation of others actions to withdraw funds risk the possibility that they will arrive too late. Because the information about the solvency of the institution is not communicated to others in a timely way, information has only one of the two properties of a public good (those who have not paid for the information are precluded from its full benefits). In this case, in contrast to the case where the information is communicated perfectly, and there is a pure public good, there may be excessive total expenditures, as each investors spends money to be sure that he does not find out too late about the insolvency of the institution; but most of the expenditures are duplicative, and the effective level of monitoring may accordingly be lower. The rule has the further disadvantage in that it also imposes increased risk[21] on those who do acquire information, for it is always possible that, in spite of expenditures on information, a depositor obtains information on insolvency after others.[22] Moreover, it is this rule itself which gives rise to runs (see Diamond and Dybvig [1983]).

---

[21]The risk is particularly enhanced by the "all or nothing" nature of the pay offs under the first comer rule. Those who make it to the bank before it is shut down get all of their deposits back; those who come a second too late may get nothing.

[22]See Rey and Stiglitz [1992] for an analysis of the incentives for monitoring provided by the first comer ruler.

Private Versus Public Monitoring

Two questions are frequently raised at this juncture. First, aren't there private agencies that can provide the service? And secondly, what advantages does the government have over private services? I will argue that the information provided by private firms is of value, and there are actions which the government can take which enhance the effectiveness of private information. Still, government does have, both in theory and in practice, advantages over the private sector, though, to be sure, the government faces problems of its own. Indeed, a close look at government and the private sector suggests that the differences are actually smaller than is sometimes suggested, and that it perhaps makes sense to think of them as being complementary, rather than as substitutes.

Government has at least three distinct advantages over the private sector. First, the public good problems referred to earlier imply that it is inefficient to rely on private monitoring; there will be too little expenditure on monitoring. Thus, even if there were private agencies, they would not be able to raise enough funds through selling their services to finance the efficient level of monitoring.

Secondly, again because of the nature of information, it is a "natural" monopoly. But that means that there is likely not to be effective competition for these information services. The usual advantages of markets are largely attributed to competition, and in the absence of competition, there is no assurance that the service will be provided in an efficient manner. (In practice, though sometimes there is more than one service, competition remains limited.)[23] [24]

---

[23]If there is more than one firm, concerns about duplication might be raised. To be sure, there will be overlap, but since information is always imperfect, there are always some gains. The same point will be raised later concerning the appropriate design of government regulatory structures.

[24]Some (such as Baumol [1982]) have argued that all that is required is that there be *potential* competition, not actual competition. Markets in which potential competition suffices to drives profits to zero are said to be contestable. It has been shown, however, that so long as there are any sunk costs, markets will not be contestable, that is, potential competition will neither ensure efficiency or zero profits. (See Stiglitz [1987a]). Expenditures on information are, for the most part, sunk; information cannot be easily transferred from one party to another, in the way that a building can be.

If there is a single firm, one has to compare "government as monopoly" with the monopoly firm.[25] There are important problems with government as monopoly, which can be mitigated by the appropriate institutional structures, as we shall see later.[26]

Thirdly, the government *does* have an advantage over the private sector, because of its powers of compulsion.[27] The government can compel firms to disclose information that is relevant for monitoring the bank, and it can punish incomplete and fraudulent disclosures.

To be sure, the government can use its powers to assist a private firm in its monitoring activities. It could punish banks that provided incomplete disclosures. (There are further problems that the government has to worry about in that case: there is the danger that information will be misused. Again, misuse can be punished, but may be hard to detect. In any case, what is clear is that directly or indirectly, some government involvement is likely to be required.)

There is one more subtle problem: Couldn't *markets* effectively force banks to disclose information to the monitoring agency, e.g. those that did not disclose would be presumed to have something to hide? The answer is yes,[28] but without the threat of government "enforcement" (that is, strong fraud laws to ensure the reliability and completeness of the information disclosed)[29] it is possible that not much reliance could be placed on the private monitoring. To be sure, dishonesty can occur both in reporting to private or public agencies. By giving private auditors the same powers that government

---

[25]As we shall comment below, there is, however, no necessity that a single government agency be given the monopoly for monitoring. In that case, the relevant comparison is between an "oligopoly" of public agencies versus a private oligopoly.

[26]This discussion has focused on two reasons that "markets for information" do not work well, and in particular, do not work like markets for conventional commodities: the public good problem and the natural monopoly problem. In the discussion of section III.3. we identify several further reasons.

[27]See Stiglitz [1990a].

[28]See Stiglitz [1975a] or Grossman [1981].

[29]See the earlier discussion for why ex post enforcement may not suffice.

auditors possess, the distinction between public and private auditing is greatly diminished. Similarly, corruption can occur among the private as well as the public auditors: either can be induced not to report "bad" information by offering appropriate bribes. And again, the government's police powers seem required to limit the scope of such corruption.[30]

In theory, private auditors have one distinct advantage over the government: they can be sued if they do not perform their job appropriately. Thus "stick," no less than the "carrot" of maintaining a strong reputation for accurate monitoring, would seem to provide private firms with effective incentives.

In practice, private monitoring has been far from perfect or effective. It did not provide clear signals concerning the financial positions of the S & L's. In several recent instances in the insurance industry, it signalled a problem only days before the regulators closed firm down, and it is plausible that they were reacting as much to information within the industry concerning what the regulators were about do as to information that they had, on their own, uncovered.

There are two other indicators of the extreme difficulties that the private market faces in uncovering problems. One is the stock market. If the private market (including the rating agencies) were able to get information on its own independent of the regulators, then bad economic conditions should have been anticipated by the market; the actions of the regulator would presumably have little additional value. Note that equity investors are not protected by deposit insurance, so that the claim (discussed at greater length below) that deposit insurance attenuates incentives to monitor do not apply. Yet, it appears

---

[30]Advocates of private monitoring point out that a firm that was accused of doing so would lose its reputation, and thus the owners of auditing firms have a strong incentive both to monitor their workers, to ensure that they are not corrupted, and not to be corrupted themselves. (Since a negative report can have such a large effect, firms threatened with a negative report have an incentive to pay large bribes. Thus, auditing firms must make huge profits, if they are to have an incentive to remain honest.) But similar, if not stronger arguments apply to government: a government rocked by corruption scandals risks being thrown out of office. The constraints put on salaries (put there to limit the abuse of government power than can be exercised) limit the extent to which efficiency wages can be paid; and thus there is limited positive financial incentives. On the other hand, public corruption, at least in many countries, seems to be punished more rigorously than is private corruption, and the fear of this may be the most effective way of deterring corruption.

as if not only does the stock market fail to detect quickly and accurately when banks are in financial difficulties; but also, actions of regulators have large and clear effects on the price of bank equity.[31]

A second indicator is provided by the actions of insiders. Insiders, more than others, should have good information concerning the state of the firm. There are regulations which preclude insiders selling shares, and selling shares short, on the basis of inside information that the firm is in bad financial shape. Insiders can, of course, buy shares, but it seems implausible that they would, if they knew that the bank was in dire straits. Yet there are a number of instances where insiders bought shares not long before the regulators took actions against the financial institution.[32]

While the previous discussion suggests that private monitoring by itself does not suffice, I do not want to underestimate the importance of private monitoring. Monitoring is provided both by the external auditors, with standards set by regulators in Europe and by the FASB in the United States, who look at the books and procedures of financial institutions; and by financial analysts, like those at Salomon Brothers or Keefe, Bruyette and Woods.

The multiplicity of audits, while it has its costs in duplication, also has strong advantages; it both increases the probability that troubles are detected, and it makes it less likely that bank officials can "bribe" an auditor into not reporting a problem.

This perspective suggests that private and public monitoring, with their various strengths and weaknesses, may be complements rather than substitutes. Not only do the two provide a check on each other, they may have access to different information. More broadly, we have discussed several ways in which government can act to make private auditing more effective, e.g. by making it a criminal offense

---

[31]There is, of course, another interpretation: bank monitoring has a significant random component, and some banks that are in "good" shape have restrictions imposed on them, and these restrictions decrease market value. Given the extreme caution regulators take in imposing restrictions, this does not seem to be a persuasive explanation.

[32]Again, there are alternative possible explanations of this behavior: insiders are attempting to prop up the price, fearing that a marked decline in price will attract further attention from the regulators.

to misreport information to a private auditing firm.

There are other examples where government actions can enhance the effectiveness of private auditing. For instance, by establishing clear auditing standards with reduced discretion for auditors, the chances of corruption may be reduced.

The rules for choosing auditors (which government regulations can also affect) may affect the credibility and reliability of the information provided. In the United States, auditors can easily be replaced, and firms need not disclose whether or why they have done so. Thus, auditors are under strong pressure to produce as favorable a report consistent with the information as they can. In the United Kingdom, once hired, an auditor cannot be fired for a year, thus providing (limited) insulation against such pressures. (To be sure, this problem is mitigated by setting high standards, but in almost any standard, auditors are left some discretion. One might ask, shouldn't the accounting firms be concerned with their reputation, and won't this ensure the "quality" of auditing? Reputation mechanisms work only imperfectly; the advantages of the immediate profits, from obtaining and retaining large accounts, may more than offset the perceived risk of a future loss of profits from any loss of reputation; this is particularly true because the auditors almost always claim that it was not their fault, that the bank, for instance, misrepresented information to them, they have no way of preventing such fraudulent behavior, and in any case, other accounting firms made similar mistakes under similar circumstances. They are right, of course, about the latter claim--since they are all under the same pressure to provide favorable audits, they all "looked the other way," knowing, in part, that they could appeal to "industry standards" in the event of a problem. The rash of suits against the accounting firms involved in the S & L's in the United States may have some affect on their behavior.)

Monitoring Management as a Pubic Good

In the previous paragraphs, we discussed one information problem, monitoring the solvency of

financial institutions. But this can be viewed as a special case of a more general monitoring problem. We referred earlier to the role of financial institutions in monitoring the usage of capital. How well an economy functions (how fast it grows) depends on the efficiency with which its resources, in particular its capital, is allocated. One of the responsibility of the management of firms is to allocate the resources of the firm efficiently and to monitor the firm's workers. But who monitors the firm's managers? In principle, it is the Board of Directors, but they have limited information. In any case, this only pushes the question back one step: who monitors the Board of Directors? And what incentives do they have to do a good job?

Monitoring, as we noticed in the previous section, can be a public good. And this principle applies to monitoring managers as much as it does to monitoring the particular aspect of financial institutions upon which we focused in the preceding paragraphs--their solvency. If one shareholder takes actions which enhance the value of the shares of the firm, e.g. by improving the quality of management, *all* shareholders benefit. If one lender takes an action which reduces the likelihood of default, for instance by monitoring management more closely, all lenders benefit.

Note, however, that different classes of suppliers of capital to a firm may have either complementary or competing interests; lenders, in an attempt to be sure that the firm remains solvent, will attempt to make sure that firm managers do not abscond with the firm's funds, thus enhancing shareholders' expected return; but they may also attempt to reduce the firms' risk taking, to make defaults less likely, and in doing so, they may reduce shareholders' expected return, though they also reduce the variability of his return at the same time.

Because monitoring management is a public good, there is likely to be an undersupply of expenditures to monitor management. One would expect that this effect would be mitigated if a single shareholder had a substantial interest in the firm, and there is some empirical evidence to support this hypothesis. But such concentrations of ownership may interfere with the ability of capitalists to diversify.

Banks as Monitoring Institutions

The design of financial institutions and regulations may affect the extent and form of monitoring. The close relationships between banks and their borrowers observed in Japan may facilitate monitoring (see, e.g. Aoki [1992)); and the fact that banks may own shares in the firm may reduce the potential scope for conflicts of interests between the banks and shareholders noted earlier. In the United States, not only does the Glass Steagall Act prohibit this,[33] but legal provisions imply that banks that get actively involved in the management of the firms to which they have lent money may lose their seniority status as creditors in the event of bankruptcy. Both of these militate against active bank involvement in the firms to which they have lent funds.

Special Problems of Financial Institutions

The previous paragraphs described the importance of banks as monitoring institutions. A fundamental problem that arises in monitoring is "who monitors the monitors?" We now turn to the special problems associated with, monitoring banks and other financial institutions. We begin by noting that monitoring the *solvency* of financial institutions--which we discussed extensively at the beginning of this section--is only one aspect of monitoring them.

There is a natural reason why government might be more concerned with the functioning of financial institutions than with firms in other sectors. As we have already noted, if banks and other financial institutions do not do their job well, resources will not be allocated and used well. There is a multiplier effect. (In later sections, we shall discuss these arguments in greater detail.)

Moreover, the possibilities and incentives for abuse are, if anything, greater for financial institutions than for conventional firms. This arises from two distinctive aspects of financial institutions.

---

[33]As the discussion in section VI. makes clear, there may be good reasons for the kinds of restrictions embodied in the Glass Steagall Act. Our concern here is simply the observation of the consequences of that restriction.

First, they tend to be highly leveraged. The ratio of investors' equity to total assets are low. To a large extent, they are gambling with other people's money. This is particularly true because of limited liability. (It is no accident that, until recently, many firms in the financial sector did not exercise the option of limited liability; knowing that the principals of the firm had unlimited liability provided those entrusting their funds to these firms a level of assurance that they could not have otherwise obtained.) There is a general theorem establishing that, with bankruptcy costs and limited liability, there is a threshold of net worth, below which the firm (bank) begins to act in a risk loving manner rather than risk averse manner. It actually prefers high variance, and is willing to accept gambles with lower expected return. Financial institutions which thus experience low levels of net worth, e.g. as a result of defaults on outstanding loans, have incentives not to allocate capital to firms with the highest expected returns.[34]

Secondly, the "exchanges" in which banks are engaged are money today for promises of repayment in the future. The central problem of financial institutions is making judgments about the likelihood that those promises will be fulfilled, and taking actions which make it more likely that they will be. It is difficult for outsiders to know whether the borrower is paying an "government" fair interest rate, one which is commensurate with the risks being borne. Charging an interest rate below the government fair interest rate is equivalent to giving a gift to the borrower. But it is a gift, the presence of which, let alone the magnitude of which, is hard for outsiders to detect. There are thus strong incentives for a bank manager to give such gifts to himself, his family, and his friends; and even when he cannot get gifts directly for himself, he can through reciprocal relationships, capture the benefits of such gifts for himself.

The problems we have discussed have to be confronted head on in an analysis of approaches to government regulation. If we are concerned about banks as monitors, doesn't saying regulators should

---

[34]More precisely, they are willing to accept a project with a lower expected return, if its risk is higher; limited liability turns a risk neutral or risk averse investor into a "risk lover." See Stiglitz and Weiss [1981].

monitor the banks simply beg the question: who then monitors the regulators? Isn't there always a question of who monitors the monitor?

And isn't the problem we have just discussed, that of the difficulty of ascertaining whether borrowers are being charged an government fair interest rate, apply not only to investors trying to monitor the bank, but also to government regulators? Below, we provide a partial resolution of these quandaries.

2. Externalities of Monitoring, Selection, and Lending within and across Markets.

Public goods and externalities are usually at the head of the standard list of market failures. We have described two of the "public goods" problems associated with financial institutions. We now turn to three of the externalities problems. The first, too, is an information problem. One of the most important functions of financial institutions is to *select* among alternative projects and to monitor the usage of the funds once allocated. Other investors know this. Thus, the fact that one bank or financial institution is willing to lend money to a firm conveys valuable information: it implies that the lender has made a positive judgment concerning the borrower. And it also implies that the lender has an incentive to monitor the borrower, as described in the previous section. This information is valuable to others. Whatever information they have collected on the potential borrower is almost surely imperfect and the observation that another lender is willing to supply funds thus conveys information. It confers an externality, the benefit of which is not taken into account when the first lender undertakes his lending activity.

By the same token, the second lender may confer a negative externality on the first lender. The likelihood of default is a function of the total amount borrowed. Lenders' knowing this may attempt to restrict borrowers from borrowing from other sources, but such attempts to enforce "exclusivity" may,

in many cases, prove futile.[35]

There are other "within market" externalities. Investors have imperfect information concerning the financial status of banks. When they observe a failure of several banks, they might rightly reason that there is a higher probability that other banks are in bad financial straits, motivating them to withdraw their funds, and possibly inducing a run.

The same effect has been noted within equity markets. Events like the South Sea Bubble can spoil the equity market for years. The presence of a large number of "bad" firms seeking to raise equity makes it more difficult for good firms to raise capital, because potential investors find it difficult to sort out the two. This is an example of the familiar kind of externality associated with selection problems: the existence of bad firms imposes screening costs, and can even "spoil" a market.[36]

Externalities across Financial Markets

Not only are some borrowers affected by actions of other borrowers, or some lenders affected by actions of other lenders, there are externalities which extend across markets. Actions in the credit market affect the equity market, and vice versa.

We have already mentioned several of these. The fact that a bank is willing to lend money affects the firm's ability to raise equity capital, both because of the signaling effect, and because potential buyers of shares know that it is more likely that the firm will be supervised by the bank.

Recent years have seen equity owners exert strong negative externalities on creditors, as they have restructured the firm, issuing more debt, which has decreased the market value of outstanding debt.

---

[35]See also Arnott and Stiglitz [1991].

[36]See, for instance, Stiglitz [1975a].

3. Externalities of Financial Disruption

Not only are there externalities within a market, and across financial markets: there are externalities which extend beyond financial markets. Indeed, the macro-economic consequences of disruptions to the financial system provide one of the more important sets of rationale for government intervention.

It is widely recognized that financial disruption by one firm has a negative effect on others, e.g. both on suppliers and customers. This would not be true in a perfectly competitive regime, where each firm is infinitesimally small, so that the demise of any single firm has no effect on the price in the market; and any customer can obtain any good and any firm can sell as much of what it produces at the market price. In practice, firms may rely on a limited number of firms for inputs or a limited number of firms to dispose (distribute) their output, so that the demise of any supplier or customer can have a significant effect. There is not an infinite (or possibly *any*) supply of substitutes.

Firms are aware of the costs of these disruptions, and accordingly take actions both to reduce the likelihood that such disruptions occurs and to mitigate the effects when they do. Financial strength is an important characteristic of those with whom a firm deals, and firms in the U.S. can obtain credit information through services such as Dun and Bradstreeet and TRW. But, as always, such information is imperfect. They thus still must face a prospect of bankruptcy of customers and suppliers. They attempt to mitigate the costs by diversification. Often, however, there are large costs associated with doing so.

Firms would like to insure against these risks, but as we note in greater detail below, markets for such insurance are very imperfect.[37]

The possibility that a disruption by one firm has strong effects on other firms, while it arises in all commercial relations, is particularly true of financial institutions, such as banks. The question is, to

---

[37]This is another market failure, which itself can be related to problems of imperfect information.

what extent can one provider of a service be quickly and costlessly substituted for by other providers. Banks have information about their customers which is "localized." This is particularly true for lending to small and medium size enterprises: each firm may have one, or at most two or three, lenders.[38]

It is often argued that the cost of bankruptcy is greatly overestimated; after all, the assets of the firm do not disappear. All that occurs is that there has been a change in ownership. While there may be some truth in this contention, the essential asset of a bank is its information capital, and information capital is not easily transferred, essentially because of the inherent imperfections in the nature of markets for information.

We have already noted a variety of respects--such as the public good properties--in which information differs from other commodities. Markets for information do not function well for reasons that go beyond these public good aspects which we have emphasized (see Arrow [1974]). First, all interesting information being sold by someone must be different from information being sold by others, in contrast to markets for chairs or other objects; there competitive analysis focuses on markets in which homogeneous commodities are being sold. Secondly, the buyer cannot be shown what he is being sold before the transaction. Imagine that the seller says, I have something that you will like--but pay me first. In most markets, buyers are naturally skeptical of such offers. But in the case of information, consider the alternative: the buyer replies, tell me first what this information is that you want to sell me. The buyer can then say, "Oh, I already knew that"[39] or "That information is of no value to me."[40]

---

[38]As our earlier discussion should have made clear, this is a natural consequence of the special properties of information.

[39]Clearly, if the potential buyer could or would be willing to provide a complete "dump" of the information he had, this problem could be alleviated. But one of the aspects of the information that an individual or firm has is that it cannot be completely articulated, coming even close to doing so would be prohibitively expensive, and in the process of providing a complete "dump" the buyer might disclose information that would be valuable to the seller, and there is no way that the seller could provide adequate guarantees either that he would "forget" any information that he did not previously have or would not make use of it.

To be sure, markets for information do exist, in spite of these problems; they depend largely on the reputation of the seller of the information. Because markets for information work so imperfectly, there may be no way in which, in the event of bankruptcy, this information can be sold or otherwise transmitted to other firms; the reputation mechanism which enables information markets (albeit imperfect) to exist is particularly ineffective when the seller is a bankrupt firm. (This problem is compounded by the fact that there is "informational" capital within a firm which does not reside within any single individual, information which cannot be fully articulated and written down, which is at least partially destroyed in the event of a dissolution of a firm.)

There are other externalities associated with a financial institution going bankrupt, besides the *direct* effects of the disruption in the supply of funds to the firms that depend on that particular financial institution for credit. There are *indirect* effects: the borrower may have to curtail its activities, with further repercussions on customers and suppliers that depend on it, a cascading of effects, familiar to students of general equilibrium theory. (It is not only the interlinkages in goods and factor markets that are important, but the interlinkages in financial markets as well. Most firms are both borrowers and lenders; they are not only producers but financial intermediaries, lending to customers and suppliers, partly on the basis of their differential information. Curtailing their supply of funds necessitates their

---

[40]To be sure, there are ways of getting around some of these problems, though the result is still a market far different from that of the standard competitive theory. Markets for information are sustained by reputation mechanisms: sellers of information get a reputation of transmitting information that is valuable to the buyer. Markets in which reputation mechanisms are important are generally far from "perfectly competitive."

An alternative mechanism that is sometimes proposed is that the buyer state what his profits would have been in the absence of the information, and agree to give the increment of profits to the seller of the information. Though this approach can be shown to work in highly simplified models, entailing risk neutral parties in which, but for the information, there is perfect knowledge concerning the profitability of the firm, attributing observed differences in profitability to any single source, such as the information relayed by any particular seller, obviously has its problems.

curtailing their lending activity.)[41]

There are also *signalling* effects. Investors/depositors have imperfect information about the solvency of the institutions in which they have invested/deposited their funds. The events which adversely impact one financial institution are correlated with those which adversely impact another. For instance, if financial institutions have invested heavily in real estate, then a fall in the price of real estate, leading to more defaults on mortgages, may quickly lead the weakest financial institution into distress; but other financial institutions may not be far behind. Accordingly, the bankruptcy of one institution may provide a negative signal concerning the financial state of other financial institutions. Whether the subsequent response of investors/depositors is rational is not the critical issue: the important point is that they respond, and even if a financial panic is not set off, the withdrawal of funds will have an adverse effect on other financial institutions, with the resulting cascading of effects.

When financial institutions make their decisions, they do not take into account these externality effects of the financial disruption; they only look at their private costs and benefits. The public interest in the solvency of each of the financial institutions may thus exceed the private interests of the owners and managers.

Government as a Residual Risk Bearer

One of the consequences of the fact that financial disruptions give rise to such large externalities--the possibility of economic collapse--is that governments cannot sit idly by when faced with an impending collapse of one or more of the major financial institutions; they almost all engage in some kind of rescue or bail-out. Moreover, the private sector (both banks and investors) knows that the government will bail

[41]These credit interlinkages have been emphasized in Stiglitz [1987b], where it has been shown that a disruption in one part of the credit system can lead to cascading effects.

them out. They know that the government cannot commit itself not to intervene.[42]

This problem, the difficulty of government making commitments, is one of the central ways in which government differs from the private sector, noted in Stiglitz [1990]. The reason for this is simple: the private sector relies on government to enforce its contracts. But who can enforce government contracts? To be sure, the government can enact laws saying that it is committed to undertake certain actions, or to provide compensation in the event that it does not. But in a democratic government, there is nothing stopping the government from changing those laws. It can, of course, pass laws saying that if it does change the law, those adversely affected can have recourse to compensation (like breach of contract provisions). But again, the government can change those laws. Such laws are important, because they affect the transactions costs associated with the government changing certain policies, and therefore they affect the credibility of certain government "commitments." Nevertheless, in the last analysis, governments lack the ability to make binding commitments. This is particularly true when it comes to commitments *not* to do something. There, the ones who are "injured" by the breach of contract are the mass of taxpayers, and not only do they not have any recourse, they may have been willing participants in the "breach."

The consequences of the government's inability not to intervene in the effect of a major financial problem should be obvious. The government becomes, in effect (ex post) an insurer.

The provision of insurance alters behavior--this is the well known problem of *moral hazard*. In this case, banks, knowing that they are effectively insured, may undertake greater risks than they otherwise would. And, in particular, they may undertake greater *correlated* risks. While the government might ignore a problem which affects a single bank--it might let that bank go into bankruptcy--it could

---

[42]To be sure, there are some isolated cases where governments have not intervened, for instance, when privately funded deposit insurance schemes failed to have sufficient funds, e.g. the state insurance funds in Ohio, Rhode Island, and Maryland in the early 1980s. But these were, for the most part, small banks, and they posed no threat to the macro-economic stability of the economy.

not let the entire financial system go belly-up. Thus, so long as the bank does whatever other banks are doing, if there is a problem, the probability of a rescue is extremely high.

There is a certain irony in many of the bail-out attempts: while government rescue programs and deposit insurance programs are often justified in terms of concern for poor depositors, in fact it is the large banks, in which large corporations concentrate their deposits, which are the principal beneficiaries of government bail-outs, simply because the financial disruption caused by the failure of these large banks is more significant than that caused by smaller banks.

The S & L Crisis: A Possible Example[43]

The S & L crisis (and the problems facing the banking industry in the United States more generally) may be interpreted (at least partially) as the consequence of a recognition by these institutions that the government would, in the event of a crisis, bail them out.

The problems in which these institutions find themselves are largely a result of "bad" investment policies. The question is, how can we explain these policies? The investment policies of the banks and S & L's during the 1970s and 1980s has been depicted in several alternative ways:

Some depict them as the consequence of their failure to understand two of the basic lessons of economics: the importance of correlated risks (they failed to recognize the high correlation in the risks associated with Third World loans, or with commercial real estate loans), and the fact that prices of assets do decrease (they failed to recognize that, though prices of many assets had not declined for several decades, historically, there had been many periods both of gradual and rapid decline in prices. Perhaps, we as economists are partly to blame for the debacle: for years, students in macro-economic courses were taught about downward wage and price rigidities; and our teaching of economics seldom delved into either the facts of the Great Depression--prices did actually fall--or into the remote past of history before

---

[43]See below, section V. for a more extensive discussion of the S & L debacle.

the Great Depression, when markets evidenced even greater downward price flexibility).

Others depict these policies as the consequence of "herd instinct," or more generally, compensation schemes which are based, implicitly or explicitly, on relative performance, the consequence of which is that managerial risk is minimized when they undertake actions similar to those of other firms in the industry (see, e.g. Nalebuff and Stiglitz [1983a,b]).

Finally, some depict it as the consequence, on the one hand of moral hazard, and on the other hand, of the rapacious (or, perhaps more charitably, risk loving) nature of those who were attracted to the industry by the opportunities afforded by the near-bankruptcy situation (combined with regulatory failure) confronting the industry. (I shall return to this interpretation later.)

But there is another interpretation as well: they may have recognized the risks which they were taking, but knowing that they were all taking similar risks, should any of the disaster scenarios occur--a third world repayment problem, a commercial real estate bust, a fall in energy prices (all of which did occur)--then a government bail-out was inevitable, so that the total risks which *they* were bearing (as opposed to society as a whole) were less than they seemed. (And knowing that their depositors were covered, they were even able to enjoy the luxury of clear consciences and an easy night's sleep.) In other words, their behavior may have been affected by the recognition of *implicit* insurance provided by the government.

Mitigating the Moral Hazard Problem

Most insurance gives rise to moral hazard problems--that is, the insured has a reduced incentive to avoid the insured against event. This is the inevitable consequence of insurance. In spite of this, insurance, both explicit and implicit, is pervasive in our economy: people are risk averse and are willing to pay a price to have the risks which they face reduced.

Insurance firms attempt to mitigate the moral hazard problem by imposing restrictions--we could

as well call them regulations--on those whom they insure. For instance, fire insurance companies typically require that sprinklers be installed in the commercial buildings that they insure. They often set different rates depending on whether you conform to some regulation or not, e.g. houses with sprinklers get lower rates; individuals who do not smoke may get a discount on their health insurance.

Once we recognize the role of the government as an insurer (willing or unwilling) we obtain a new perspective on financial market regulations: they are akin to the regulations that an insurance company imposes on those it insures. Some versions of financial market liberalization would, from this perspective, be akin to an insurance company deciding to abandon fire codes (such as requiring the use of sprinklers in commercial buildings), with similar disastrous consequences.

There is one difference: while an individual who does not like these regulations can *choose* not to buy the insurance, the purchase of government insurance is not voluntary--simply because the government cannot commit itself not to provide it, and the "insured" (the banks depositors or investors) cannot commit themselves not to asking for a bail-out, should one be needed.

One of the roles of government in financial markets is thus akin to the role of the government in providing retirement insurance. One of the arguments for compulsory social security is that, should an individual not save for his retirement, the government finds it impossible to commit itself not to be compassionate. Individuals, knowing this, have diminished incentives to save for their retirement. This necessitates the government forcing individuals to save.[44]

4. Missing and Incomplete Markets

Markets can only provide an efficient allocation of resources when they exist. In fact, there are many markets, particularly financial markets, which are absent. In recent years, much attention has been

---

[44]Indeed, there are further parallels: individuals who do not save cannot really commit themselves not to ask for a "bail-out" should they need it when they turn 85.

focused on the creation of new financial markets. The fact that there has been such scope for the creation of new markets suggests that in the past, markets have been far from complete; but a closer look at these new markets shows how limited they are, and demonstrates even more forcefully how limited capital markets are.

For instance, much of the recent innovation has been concerned with creating new futures markets. Yet, a quick look at the futures markets indicates that there are relatively few commodities for which one can buy and sell forward; and even when one can, one can do so only for a limited number of periods (seldom more than two years). The fact that so many people who economic theory would have suggested ought to be trading in these futures markets do not (e.g. farmers ought to be hedging) at least raises the possibility that even the markets that do exist may not work the way they are suppose to.

Further, most of the risks--including many of the most important ones--which individuals would like to insure against cannot be insured. Businesses cannot insure against most of the risks which they face--such as a rival developing a product which will wipe them out of business.

Earlier, we referred to the observation that most firms do not raise most of their capital through issuing new equity. This is perhaps surprising, since equity provides a mechanism by which risks can be shared. There is considerable evidence that individuals (including owners of firms) are risk averse, and hence there is a presumption that they would like to divest themselves of the risks of ownership (to a greater extent than they do). The fact that they chose not to must imply that these markets are not working well, in some important sense.

Similarly, many individuals seem to face credit rationing: they cannot borrow as much as they would like at the going interest rate, or even at any interest rate.

Table 1 shows the relative unimportance of bond and equity markets as a source of finance even in developed countries. In most less developed countries, equity markets are weak and bonds markets are essentially absent.

It is not only that certain key markets are missing, but also that contracts that would seem to have been desirable were not available until (in a historical sense) relatively recently, and in many countries their existence was directly the result of government actions. Thus, historically banks specialized in short term commercial loans, and did not make long term finance available, of the kind required for industrial development.[45]

Recent theories have provided a single set of explanations of these well known and well documented imperfections in the capital market: the fact that information is imperfect and costly to obtain. More precisely, problems of adverse selection and moral hazard imply that the effective costs of transacting in certain markets may be high, so high that trade is limited, or indeed those markets may even cease to exist, even when, with perfect information, there might be active trade.[46]

---

[45]Recent theoretical research (Stiglitz and Rey [1992]) has provided a rationale for some of these practices.

[46]George Akerlof [1970] showed that with adverse selection, there might not exist trade. Assume at some price, there was an excess supply of used cars. As the price was lowered, owners of the best used cars decide not to sell them, so the quality mix of used cars offered in the market would deteriorate, so much so that the demand for cars decreased faster than the supply. The only "equilibrium" was one in which no trade occurred. This simple analysis has been extended to equity markets (Greenwald, Stiglitz, and Weiss [1984]) and to other financial markets.

Asymmetries of information of the kind to which Akerlof called attention can have further effects. Since outsiders are less informed than insiders, insiders' willing to keep shares serves as a signal concerning insiders' judgements about the expected returns to securities. This too serves to discourage owners from selling shares. (See Stiglitz [1982b], Leland and Pyle [1977].)

Asymmetries of information may partially explain the weakness of futures markets, particularly in cases, such as grain, where there are a few large traders, who have the resources to gather quickly huge amounts of information about the world grain market. Anyone else trading in the market worries that he is at an information disadvantage.

Moral hazard implies that the greater the insurance provided, the less effort individuals will exert to avoid the insured-against event. This is an information problem, because with perfect information, the insurance contract would stipulate what actions would be taken, and the insurance firm could costlessly monitor whether the insured complied, by taking the stipulated accident avoidance actions. The fact that these actions cannot be monitored implies that equilibrium contracts (economic relations) will entail less than complete insurance. When the original owners of firms divest themselves of their shares, their incentives are attenuated; hence equilibrium entails incomplete insurance. This is the essence of the principal agent problem. (See Stiglitz [1974] or Ross [1973]).

How moral hazard and adverse selection lead to credit rationing is discussed at length in Stiglitz and Weiss [1981]. For a simple exposition, see Jaffee and Stiglitz [1990]. For more advanced

There are, however, other imperfections in the capital market for which no such ready explanation seems available. For instance, the form of mortgages prevalent in the United Kingdom, where interest rates are variables and payments fixed (with the impact of interest rate fluctuations being absorbed in the maturity of the debt) are still not available in the United States, in spite of the obvious risk sharing and transactions costs advantages.[47] The failure *may* be attributable to another class of information related market failures: the costs of introducing new "products," and the inability to appropriate the returns from successful innovations (since such innovations are not protected by patents).[48]

The Advantages of Government in Risk Bearing: Adverse Selection

Government has a marked advantage in forcing compulsory membership in insurance programs, thereby being able to avoid adverse selection problems which plague insurance/risk markets in general.

The selection problem generally is that each of these private institutions attempts to select the best risks for itself, leaving the worse risks for others. What it thereby gains, others may lose. The adverse selection problem focuses on the fact that as an insurance firm raises its premiums, those who are least likely to have an accident--who have the least need for insurance--drop out of the market, adversely affecting the mix of those who remain in the market. Exactly the same problem arises in the context of loan markets; as each bank tries to select for itself the borrowers with the lowest default probability, it

---

expositions, see Stiglitz and Weiss [1983, 1986, 1987].

[47]The absence, until recently, of indexed mortgages is another seeming anomaly, though some (Vittas [1991]) attribute the absence to the regulatory structure, if not to explicit regulations.

[48]Thus, Merrill Lynch, after it successfully demonstrated the value of Cash Management Accounts, was quickly imitated by all of its major rivals. Had the new product been a failure, it would have had to bear the costs, but the competition from its rivals meant that it could reap only limited profits from the success.

confers a negative externality on other lenders.[49]

The social cost of what I have referred to as the selection problem is that insurance firms may spend large amounts of resources in order to improve the quality of *their* pool of insured, and they may employ self-selection mechanisms which impose high costs on all groups except the worst.[50] To the extent that, as a result, insurance premiums reflect true actuarial risks, or interest rates reflect true risks, and to the extent that those "correct" prices have allocative effects (e.g. car drivers who are more accident prone are discouraged from driving) there are efficiency gains from these expenditures; on the other hand, much of the expenditure can be thought of as simply "rent seeking"; allocative effects are weak, and the primary consequences of these expenditures is simply redistributive, with prices (premiums, interest rates) for some individuals going up, and others going down.

While the adverse selection problems are particularly acute in insurance markets, they arise in virtually all financial markets, partly because there is an element of insurance (or risk sharing) in virtually any financial market. Even in credit markets, in which the borrower has a fixed obligation, there is some chance that the borrower may not repay the loan; lenders spend considerable resources to screen out the good borrowers from bad borrowers.[51] Adverse selection problem impair the ability of equity markets,[52] in spite of their risk sharing advantages, to raise funds. As a result, government has a

---

[49]As a result, there may in fact not exist any competitive equilibrium. See Rothschild and Stiglitz [1976] and Wilson [1977].

[50]In insurance markets, the cost of self-selection is that individuals obtain less than complete insurance. In financial markets, owners of firms may be forced to bear more risks (to diversify their portfolio) than they otherwise would have.

[51]In this case, the return to the screening activity has a social as well as a private return: it is important that funds be allocated to those who can most effectively use them.

[52]See Greenwald, Stiglitz, and Weiss [1984] or Myers and Majluf [1984].

distinct advantage in risk sharing.[53]

Advantages of Government: Moral Hazard

Government may also be in an advantageous position in mitigating moral hazard, because of its greater powers of compelling disclosure of information and the wider range of its indirect instruments of control, e.g. through taxes and subsidies and regulations.[54]

Advantages of Government: Enforcement

In recent years, there has been some discussion of governments' greater ability, in principle, to force repayment of, e.g. student loans and to implement student "equity loans." (Australia has a system of government loans for higher education, with repayment collected through the tax system.) Information that the government has as part of its income tax system can be used to reduce the risks of loan default and to design loan programs where repayments are contingent on incomes. Recent literature in credit markets in LDCs has, in particular, focused on the importance of the "enforcement problem" (see Hoff and Stiglitz [1992]).

The government's advantage in enforcement can be put another way: there are economies of scope between tax collections and collections for other purposes. Thus, there may be significant savings in transactions costs from, say, government run loan programs.

---

[53]This provides one of the arguments for government run income contingent loan programs with compulsory participation.

[54]For the latter, see, e.g. Arnott and Stiglitz [1986], where we show how government can use its tax policies to mitigate the effects of moral hazard.

Moral hazard effects can also be mitigated by having intertemporally interlinked contracts (where payments in one period depend on performance in previous periods). The extent and form of interlinkage is limited, however, in competitive markets, by standard provisions which specify limits on payments in the event of a breach. The government may have greater scope for implementing such contracts, though an argument can be made that an alternative remedy is to change the legal provisions affecting breach. See Stiglitz and Weiss [1983].

The Disadvantage of Government in Assessing Risks and Determining Appropriate (Government Fair) Interest Rates

But while government has some marked advantages, it has some disadvantages in risk bearing. In particular, government is in a marked disadvantage in assessing risks and charging premiums based on risk differences. The reason for this is partly that risk assessments are, to a large extent, subjective. Economic situations are always changing, and, no matter how "rational" the risk assessor, there is a subjective element in deciding the relevant "base" for making the risk assessments. Is the bank's default ratio of the last six months, or the last six years the appropriate base? One may be too shortsighted; the other may be weighed down by historical experiences that are no longer relevant. Government is at a marked disadvantage in making these subjective "discriminations." Is it plausible to believe that the government could charge banks in Texas a higher premium for insurance than banks in Idaho? Or banks in Houston higher than those in Dallas? Any such differentiation will be quickly labelled as "unfair."

The market makes such differentiations all the time. The market converts the subjective judgments of a large number of participants into an objective standard. If some Houston bank should complain about the risk premium charged by the market (in the form of a higher rate it must pay to attract uninsured depositors), there is a simple answer: show the market the evidence that they have overestimated the risk. The jury of the market renders a verdict. If the information is credible, the risk premium will reflect that information.[55]

In short, the government inevitably has to employ relatively simple rules in risk assessments, rules which almost surely do not capture all of the relevant information for risk assessment, and political considerations will not allow it to differentiate on bases which the market would almost surely employ. Thus, the recently adopted risk based capital requirements, while clearly superior to capital requirements which make no adjustment for risk, only imperfectly reflect the true differences in risks facing different

---

[55]This argument only suggests that markets *may* be useful. But as we have also emphasized, there are good reasons to believe that information in these markets may not always be perfect.

financial institutions. (Later, we shall discuss how the government can, in its operations, use market generated information as the basis of determining differential risk premia.)

Disadvantages of Government: Rent Seeking and Opportunities for Hidden Subsidies

The difficulties that the government has in making risk assessments, and that the citizenry has in assessing the government's risk assessments, provides the government with the opportunity for huge hidden subsidies, e.g. charging interest rates at a rate below that which reflects the actuarial risk of non-repayment. Students in the United States or larger farmers in Brazil, for example, have been the beneficiaries of such hidden subsidies. The temptation that the potential of such hidden subsidies provide has been almost irresistible for many governments, particularly in periods of financial stringency, when outright subsidies are harder to get away with. The efforts of Michael Boskin, Chairman of the Council of Economic Advisors under President Bush, and the Office of Management and Budget (OMB) to reform the budgetary process--culminating in new financial regulations in 1991--at least to try to account for the actuarial value of the losses when the implicitly subsidized loans or insurance is provided, is to be commended, but there remain questions about the accuracy with which actuarial values can be calculated.

Proponents of loan guarantees argue that normally it costs the government little--the loan is repaid--so the borrower is better off as a result of the loan guarantee, and the government is no worse off. This misses the basic point: in providing loan guarantees, the government is interfering in the markets' allocation of resources. The capital market has provided a judgment concerning the likelihood that the project will not pay off.[56] On the basis of that judgment, funds are not forthcoming. When the government provides a guarantee, funds are diverted away from some other project. While it may be difficult to ascertain what the marginal project was--which project which otherwise would have been

[56]Though, to be sure, we need to bear in mind that the suppliers of capital only care about the returns which they can appropriate, not the total returns to the project. As a result, social and private returns may differ markedly.

funded is now not being funded--it is clear that *some* project was not funded, or not funded as well as it otherwise would have been.

While the market may indeed not be efficient in its allocation of investment funds, the interventions of government, while frequently justified in terms of market misperceptions of risk, are more often simply motivated by political concerns.

Government as the Source of Risk and Government Risk Bearing

While the previous paragraphs have explained the strengths and weakness of government in risk-bearing, there is another perspective that emphasizes government *responsibility* for bearing risks associated with the insolvency of financial institutions.

If the government has set an appropriate regulatory structure and enforced the regulations in an appropriate way, one would expect insolvencies to be relatively rare. In practice, a major cause of insolvencies are macro-economic downturns. Avoiding such downturns is a major responsibility of the government. Making government bear the costs of a failure to live up to those responsibilities provides a natural incentive system for government to do its job well.

Beyond that, private markets are not really able to handle effectively the kinds of *social risks* associated with macro economic disturbances. Markets are good at divesting idiosyncratic risks associated with particular firms and individuals, e.g. in insuring individuals against accidents. But if all individuals are similar, who is to "absorb" these social risks? They can be spread across generations, but the government is the only one that can effectively engage in such intertemporal transfers of risks across many generations. (After all, there is no "market" in which those alive today can meet with those who will be alive in future years (see Stiglitz [1983]).)

5. Imperfect Competition

In earlier sections, we described how essential properties of information gave rise to market failures; we noted, for instance, that monitoring was a public good. These information problems are particularly important within the financial sector, because some of the essential functions of that sector are information related. In this section, I want to argue that information naturally gives rise to imperfections of competition. This is important, because the underlying belief in the efficiency of market economies is based on the premise that there is competition.

In most countries that have not taken very strong pro-competition stances, competition in the banking sector is limited. Thus, in Germany, three banks dominate, in the U.K., four dominate. Even in the United States, while there are thousands of banks, a closer look reveals that in an important sense, competition may be very limited, in the most relevant market, that for loans. That is, while depositors may find many alternative establishments that are willing to take their funds, borrowers may face a very limited number of suppliers of funds. The essential reason for this is that information about whether a particular potential borrower is a good risk is costly to obtain, and different lenders are likely to face different costs, with a borrower's existing lender being in an advantageous position. Moreover, many of the costs of information are in the nature of fixed costs--they do not vary with the size of the loans--implying again that, in a relevant sense, there is a natural monopoly at least with respect to any particular borrower.[57]

The distinguishing characteristic of most markets is that any seller is willing to sell to any buyer, at the pre-announced price. This is true in deposit markets, one of the services provided by banks. Any depository institution is willing to accept virtually any depositors funds. The different depository

---

[57]Whether the natural monopolist can exercise his monopoly power depends on whether the market is "contestable." This, in turn, depends on whether the expenditures are sunk costs, i.e. they can be recovered in the event of exit. (Even small sunk costs result in markets not being contestable (see Stiglitz 1987b]).) By their nature, expenditures on information acquisition are sunk costs, so that they *cannot* be recovered. The market is not contestable.

institutions are imperfect substitutes, from the perspective of any depositor, as a result of differences in locations and services provided. But in developed urban areas, these differences are likely to be small.[58]

But in loan markets, one of the vital services provided by banks, customers cannot easily switch from one provider to another. A borrower cannot simply go from one bank to another. Each bank has specialized information about its customer base. A customer that has a long track record with one bank, and therefore is viewed as a good loan prospect by that bank, may be viewed as an "unknown" by another bank, and therefore a riskier prospect. To compensate for that risk, the bank has to charge a higher interest rate; alternatively, the bank may simply refuse to lend.[59] There are, in addition, adverse selection problems: the "new" bank wonders why is the customer wishing to switch banks. Is it because the old bank, on the basis of its superior knowledge, is restricting credit to this customer, and therefore views this customer as no longer as credit worthy as previously? Though in many cases, customers can persuade the new bank that there are "good" reasons for the switch, in other cases it cannot.[60] Thus the fact that there are ten lenders supplying loans in a market does not mean that each customer has a choice of ten suppliers. The market for those willing to supply loans to a particular borrower may consist

---

[58]Depository institutions may differ in one other important respect: the likelihood of insolvency. When the government does an effective job of monitoring and/or provides deposit insurance, then these differences too are likely to be small.

[59]The reason that banks might ration credit, rather than simply increase the interest rate, have been extensively discussed in recent literature, and are noted briefly below. See Stiglitz and Weiss [1981].

[60]This problem is just another manifestation of Akerlof's lemons problem [1970]. Greenwald [1986] showed that it implied that there might be limited mobility in labor markets. This analysis suggests that there is limited "mobility" (and hence competition) in credit markets.

The problems are actually more severe than this analysis, focusing on adverse selection problems, suggests. There are also moral hazard problems. Optimally designed credit contracts have the property that good performance in one period is linked with the availability of credit in later periods, i.e. banks that establish a long term customer relationship can do better, in mitigating moral hazard problems, than banks that deal with customers on a period by period basis. Such intertemporally interlinked contracts interfere with mobility and competition. See Stiglitz and Weiss [1983].

of only one or two lenders.[61]

Recent work on the theory of credit rationing and, more generally, on the allocation of credit by banks, has reinforced this view. Traditionally competitive markets are viewed in terms of auction processes, in which those willing to bid the most for a resource acquire it; even when there does not exist a formal auction process, the outcomes are the same as would emerge if there were one. Loan markets do not work that way. Borrowers differ from each other in ways which are crucial from the lenders' perspective. They do not simply lend to the borrower willing to pay the highest interest rate. For a loan is simply a *promise* to pay, and these promises (like many others) are often broken. Lenders must make judgments about the likelihood of repayment. Those promising to pay the most may include those least likely to repay, so that the expected repayment may be lower than from a potential borrower promising to pay less. As a result, credit rationing and non-price credit allocation mechanisms are pervasive in credit markets.

Ascertaining whether a particular "market" is competitive requires defining the relevant "product" and geographical area. Even when there are many banks and financial institutions in a country, effective competition may be limited, at least in certain geographical areas and within certain niches in the market.

Because of the differences among borrowers, a central aspect in defining the relevant product market must include a statement about *to whom the service is provided.*[62]

---

[61]This analysis has strong implications for standard measures of competition. It implies that in loan markets, the standard measures of competition overstate the true level of competition. It is for this reason that a higher standard should be used as threshold tests for allowing mergers.

[62]Traditional competitive analysis of the banking sector in the United States has focused on banks as providing a "cluster of services."

While many of the services provided by banks (such as loans) are provided by other financial institutions, what distinguishes banks is the "cluster of services" they provide. From the point of view of consumers, this cluster of services is important. To use modern parlance, there may be economies of scope (savings in transactions costs) in obtaining the services from a common provider. There may also be (from the perspective of the seller) informational advantages: the provider of loans has more information on which to judge the credit worthiness of a borrower if the borrower has his deposit account with the lender. (We return to this point elsewhere.) But for whatever the reason, there is a strong

Each of the major categories of loans represents a different product market. The essential problem facing lenders is ascertaining who are good loan applicants, quantifying differences in risks so that appropriate interest rates can be charged, and monitoring loans. There are marked differences in the information relevant for each major loan category, and relatively few economies of scope across loan categories. That is, the skills and information required to be able to be an efficient provider of automobile loans may be quite different from those required to be an efficient provider of loans to medium size businesses.

Patterns of specialization in loans as well as the institutional arrangements under which the financial system in the United States and other countries confirms this view. There are financial intermediaries that specialize in making commercial loans, while other financial intermediaries focus on making home mortgages. Still others specialize in personal loans. There do not appear to be sufficient economies of scope across these lending categories to overcome the advantages that arise from specialization.[63]

Once it is recognized that attention has to be focused on the category of those to whom the services is provided, it also becomes apparent that the relevant cluster of activities provided by financial institutions may differ from one customer group to another. The relevant cluster of services desired by small, local businesses, with one establishment (or a few establishments within a small local area) may be different from the cluster of services desired by medium size firms, operating with many establishments, throughout, say a State or a region. By the same token, the number of banks that can

---

tendency for customers to obtain the cluster of services together, and in shopping for a bank, they look for the provision of such a cluster of services. Providers of single financial services do not provide sufficient competition that it is reasonable to include them within the product market.

We are arguing here that while the cluster of services is an important component of the definition of the product market, it is only one component.

[63]Specialized knowledge pertains not only to the information required to make good loans, but also to the laws pertaining to default, which may differ across states, as well as between households and corporations.

meet those needs may be smaller. Transactions costs, for instance, may be reduced if all the deposits can be made into different branches of the same bank. A larger bank, operating throughout a region, may be able to form a more accurate picture of how the firm is doing, than a bank operating in only one locale. The financial needs of a medium size firm may go beyond that which a small, local bank can provide. But just as small, local firms cannot obtain funds from large money center banks, and find themselves effectively limited to local banks, so too medium size firms, operating within a single region, may find themselves essentially limited to the large banks operating within the region.

This perspective leads us to the conclusion that one wants to differentiate between markets for different categories of loans--between commercial and non-commercial loans (and the associated cluster of services demanded by business and non-business users of banks), and between loans to large, medium size, and small firms. One should differentiate between borrowers operating in only one locale, and those operating throughout a region and those operating on a national scale. The fact that these different categories of commercial borrowers have different needs (and go to different financial institutions to satisfy those needs) seems well documented.

Financial markets are not only effectively fragmented by the nature of the product market, but also geographically. As we have already noted, recent theories have emphasized the importance of information in lending activity. The localized nature of information implies that, at least some important aspects of lending markets may be effectively localized. Outsiders are less likely to know the particular, localized information which affects both prospects of a loan being repaid or the value of the collateral declining to less than the loan value in the event of a default. For instance, detailed knowledge about plans for road construction are relevant for assessing the riskiness of real estate collateral; detailed knowledge concerning local plant closings are relevant for assessing the riskiness of a new small business. Such information is costly to obtain for those outside the local area, while it is often acquired as a by-product of other activities within a local area. Indeed, information obtained in the course of making a

loan to one applicant in a small town may be relevant for assessing the desirability of another loan.[64]

Local lenders not only have more information on which to judge the riskiness of the loan, they are also in a better position to monitor the uses to which the funds provided are being put, and to ascertain changes in economic circumstances.

Because of the interdependence of activities, e.g. lending and deposit activities, if there are economic forces resulting in one part of the cluster of services provided by banks being localized, there will be a tendency for the entire cluster to be localized.

Summary

Thus, a closer look at financial markets suggests that (a) in economies in which governments do not take an active pro-competition stance, there are a limited number of firms in the banking sector;[65] (b) even when there are a large number of banks, or a large number of institutions providing services competing with banks, effective competition is likely to be limited.[66]

6. Pareto Inefficiency of Competitive Markets

We noted in the previous section that the presumption that market economies provide an efficient allocation of resources is based on the hypothesis that markets are competitive. But the result requires

---

[64]For a discussion of the role of localized information in credit markets, see Greenwald and Stiglitz [1992a].

[65]This presumably reflects a mixture of economies of scale (though the evidence seems to suggest that these taper off at a scale well below that of most of the major banks) and strategic business policies designed to deter entry from potential competitors.

[66]Recent detailed studies of loan markets in the States of Washington and Arizona, prepared in conjunction with anti-trust actions associated with the merger of Bank of America and Security Pacific Bank have provided evidence concerning how limited the extent of competition is, suggesting HHI indices (a measure of concentration) in small business loans of in excess of 3000 in certain geographical areas (HHI indices in excess of 1800 are indicative of very limited competition.)

more than that. In the proof of the Fundamental Theorem of Welfare Economics, the theorem which underlies economists' faith in markets (as in the proof of many theorems) a large number of assumptions are employed, some of them essential, some of them simplifying. In the last fifteen years, we have become aware that two of the assumptions underlying the Fundamental Theorem of Welfare Economics are absolutely crucial, that is, in their absence, the theorem is not in general true. There must be a complete set of markets and, as we noted in the beginning of this section, information must be *exogenous*, that is, unaffected by any action which any participant in the market can make. As should by now be clear, these assumptions are particularly disturbing when it comes to examining financial markets: one of the essential functions of financial markets is gathering information. And while another major function of financial markets is the sharing and transferring of risks, we argued above that it does so imperfectly, that there are many risks which remain uninsured, so that financial markets are incomplete.

Greenwald and Stiglitz [1986] established that essentially *whenever* information was endogenous or markets incomplete, the economy was not constrained Pareto optimal:[67] there exist government interventions which take into account the costs of information and of establishing markets, and which can make all individuals better off. Indeed, they show that such interventions can frequently be designed based on easily observable empirical estimates of certain behavioral responses.

The market failures with which we are concerned in this section go beyond the imperfections of competition, and the public good properties of information to which we earlier called attention. Even when there exist markets, and when they are competitive, private returns diverge from social returns.

The failure of the standard results on the efficiency of markets can be approached in two ways: either by looking at the reasons why the standard *arguments* fail or by examining how government interventions might improve matters.

---

[67]The term "constrained" is added simply to remind that the costs of information, or of establishing markets, have been taken into account.

The standard argument is based on the assumption of market clearing prices; prices then measure the marginal benefit of a good to a buyer and the marginal cost to the seller. With imperfect information, however, markets may not clear.

This can be seen most easily in the context of loan markets in which there may be credit rationing. Let us review for a moment the standard arguments for why the price system results in demand equalling supply. In equilibrium, demand must equal supply; for if there is, say, excess demand, those who are more than willing to buy the good at the going price bid more for it, driving the price up. Those who value the good the most (that is, *given* their resource constraints, those who are willing to pay the most for the good) get it. This ensures that the good is allocated to its highest value in use.

As we commented earlier, credit is different from other exchanges, because one party gives up dollars today in exchange for the *promise* of dollars in the future. The expected return to the lender may actually decrease as the interest rate charged increases, either because as the interest rate charged increased, the mix of those borrowing changes adversely, or because those who borrow undertake more risky actions. In either case, the probability of default may increase, so that the expected return may decrease. That is why credit markets cannot be run like ordinary auction markets, with the funds going to the highest bidder. Those who are willing to pay the most may not be those for whom the expected return to the lender is the highest; they may have a higher probability of default. As a result, there may be credit rationing: even when there is an excess demand for credit, lenders may not increase the interest rate (they may turn down bids from unsatisfied borrowers willing to pay higher interest rates) because they believe the expected return of those borrowers is actually lower than the expected return from those to whom they are currently lending at the below-market-clearing interest rate. In that case, the interest rate charged will be that which maximizes the lenders' expected return; at that rate, there may be an excess demand for credit, but still lenders will not increase the interest rate charged, for to do so would decrease the expected return.

Moreover, social returns may differ from private returns. Lenders focus only on the expected return that *they* receive, not the total expected return. The private expected return to the lender is simply the interest rate paid times the probability that it is paid. The total return to the project includes the (incremental) surplus (profit) accruing to the entrepreneur. Projects with the highest expected return to the lender may not be the projects with the highest total expected return; but it is the projects with the highest expected return which get funded. Thus, good projects may be rationed out of the market. (This argument provides part of the rationale for directed credit schemes.)

(There are, particularly in the context of development, a variety of other reasons that private and social returns to investment may differ, for example as a result of learning spill-overs. Here, we are focusing only on the discrepancies between social and private returns that arise from imperfections of information (see below, Part IV.)

Several government programs reflect this perception of a discrepancy between social and private returns, though in some cases, the view is that the market is excessively conservative, and in other cases, that it undertakes excessive risks (particularly in the presence of deposit insurance).

Banks traditionally have responded to the uncertainty of default by focusing on trade credit. In the Real Bills Doctrine, there was the view that banks should only lend when there was, in effect, collateral, a traded, marketable object which could be seized in the event of default. As we noted earlier, banks were reluctant to provide long term credit, even though the social return to such investment was high. Banks only focused on the return to themselves, not the expected return to the borrower. This provided part of the rationale for government actions helping to create long term credit banks.

While banks have traditionally been faulted for being excessively conservative, more recently they have been faulted for being excessively risk taking, particularly in real estate loans. Many countries have financial crises as a result of collapses in the real estate market, leading to high rates of default. And, of course, it is precisely in such circumstances that the collateral standing behind the loans is insufficient

to cover the indebtedness. Thus, the collapse of the real estate market leads to a weakening of the entire financial system. Earlier, we discussed the large social costs of this kind of disruption.

But even short of these systemic effects, social returns may differ from private returns. This can be seen most clearly in a situation where banks fail to ration credit, but instead offer it to those willing to pay the highest interest rate. Let us contrast speculative real estate loans with loans for manufacturing. Typically, the maximum returns that can be obtained in manufacturing are limited, simply because of the presence of competitive pressures. Returns in excess of 30% or 40% are truly highly unusual. And since the maximum returns is limited, there is a limit to the amount that borrowers would be willing to pay. By contrast, the return on real estate prices is highly variable; prices can, and frequently do, rise by more than 40% in a year--and in any case, what matters is investors perceptions about the possible returns, and these indeed may be high. So long as there is limited liability, and so long as lenders are willing to lend with real estate as collateral, and with only limited direct capital from the "investor," it pays real estate speculators to take out loans even at seemingly exorbitant interest rates, in excess of 30%; for they are in a heads I win-tails you lose situation: if their hopes are realized, they walk off with huge gains (particularly when viewed as a percentage of their invested equity), while if their hopes are not realized, the lender is left holding the bag.

The important point is that *even if there were no externalities associated with investing in manufacturing--no linkages outside the investment itself*--social returns to manufacturing may exceed that to real estate speculation even when real estate speculators are willing to pay higher interest rates. The interest rate charged does not reflect the social returns to investment.

The same conclusion holds when credit is rationed. The risk facing the lender is the risk that the borrower defaults and that the collateral is insufficient to cover his indebtedness. Assume it were the case that real estate prices never fell by more than 20%; then a loan of up to 80% of the market price would be fully collateralized, and the bank would perceive itself as facing no risk. By contrast, even if a

manufacturer only borrowed to buy machines, the product which the machines are designed to manufacturer might have no market; more generally, in the event that the firm is a failure, the used value of the machines may be but a small fraction of the value when new.[68] Thus, the down side risk to lending to manufacturing may appear to be far higher for lending to manufacturing than to real estate; but because of the moral hazard problem (which may itself be greater in manufacturing)[69] lenders cannot offset this by charging a higher interest rate. Thus, *even with rational expectations* concerning returns to real estate and manufacturing, banks may make real estate loans, even when the social returns to manufacturing are larger.

My own suspicion, however, is that much of the "excessive" real estate lending has been based on irrational expectations, where lenders have failed to take into account the *correlated* risk of downward movements in real estate prices (and, to be sure, they have failed to take into account the full social costs of the disruptions generated by the speculative booms to which real estate lending may give rise).

These arguments establish that markets may not allocate capital to the uses with the highest return, that there may be systematic deviations between social and private returns which direct government intervention--restricting some classes of loans and encouraging other classes--may partially address. Critics of government actions often suggest that these interventions require government having more detailed knowledge than it in fact has. While it may be true that the ratio of social and private returns in real estate loans and manufacturing loans may differ, restricting real estate loans may not result in the real estate loans with the lowest social returns being eliminated.

Still, there may be government interventions which ensure that *on average* the social returns of

---

[68]Asymmetries of information may be important here: these depress used capital goods prices, but may have a negligible effect on used real estate.

[69]That is, in manufacturing, the owner has more discretion over the usage of funds, and therefore more opportunity to take "excessive risk" when faced with high interest rates. It is often easier to monitor what is done with real estate, and thus loans can embody restrictions, e.g. on the usage and maintenance of the real estate.

the projects finance are increased. For instance, the quality of the mix of applicants to loan programs depends in part on the amount of equity of loan applicants. When borrowers have more at stake, they are more likely to apply for a loan only if its expected return is high. Lowering the interest rates charged on loans will, in general, lead firms (in subsequent periods) to have more equity. Thus, financial repression may be, on this account, welfare enhancing. (Note that this problem simply would not arise if there were perfect information; the sole gain here from financial repression is the improved mix of loan applicants; this matters only if the lenders cannot perfectly sort out good borrowers from bad borrowers.)[70] More generally, there are, at least in principle, a variety of ways that the government can affect the mix of borrowers and the actions which they take, which will increase the social returns to the economy's scarce capital.[71]

8. Uninformed Investors

There is one more category of problems with the market, which has motivated considerable government intervention, but which, in a formal sense, is not really a market failure. We have stressed problems of lack information. What happens, however, if individuals have information, but do not process it correctly. For instance, what happens if a lender discloses the terms of the contract accurately, but consumers cannot distinguish effectively between compound and simple interest, do not understand well provisions concerning indexing, etc. ?

Indeed, there is a more general problem: decisions concerning investments are based on probability judgments. Modern economic analysis is based on subjective probability judgments. Just as individuals' judgments concerning the relative merits of apples and oranges are outside the "province"

---

[70]This point is developed more fully in Stiglitz [1992]. For a fuller discussion of the benefits and costs of financial repression, see Murdock, Rodriguez, and Stiglitz [1993].

[71]For a general discussion of how government can use tax policy to reduce moral hazard problems, see Arnott and Stiglitz [1986].

of economic analysis--we make no judgment about whether those tastes are, in some sense, right or wrong--so too for judgments concerning the relative probabilities of different events. This is part of the general doctrine of consumer sovereignty. But there is a difference: for some of the probability judgments, there may be objective data concerning relative frequencies. Of course, there is always a judgment call concerning whether past experience is applicable for inferring future likelihoods. Still, the work of Tversky and others has drawn attention to the fact that there are systematic biases in most individuals' probability judgments.

In that case, are we to make judgments about resource allocations based on individuals (misperceived) subjective probabilities, or on the basis of the seeming more relevant relative frequencies (where these can be obtained)? Should the government intervene to make subjective judgments more in accord with relative frequencies?

Some of the disclosure requirements imposed by government seem addressed to these problems, which, in terms of more conventional terminology, more rightly fall under the rubric of "merit goods and bads" than outright market failures.[72]

To be sure, problems of uninformed consumers arise in all markets. There are several

---

[72]To be sure, problems of uninformed consumers arise in all markets. There are several arguments, however, for why these problems should be more serious within financial markets, related to the particular features of financial markets that we have already discussed. For conventional objects, like chairs, the buyer can easily observe the characteristics, or at least can quickly learn the characteristics after purchasing the object. Those who "cheat" will lose their reputation, and will not be able to stay in business. In financial markets, as we have noted, individuals exchange cash today for a promise to pay funds in the future. In some cases, as in the case of permanent life insurance, that future is quite distant. Thus, the firm can cheat the individual, and he will not know about it for years, perhaps decades. Moreover, financial markets are complex. Making judgments about whether the financial institution is able to fulfill its promises may not be easy. Thus, the individual will simply not have the information on the basis of which to make "rational" decisions. It is expensive to become informed, even about general principles like compound interest, let alone more subtle concepts like correlated risks. How is the individual to know what information is worthwhile to obtain? With costly information, the rationality model faces problems of internal consistency: how is one to decide on what information is required to make a "rational" decision about what information is required to make a "rational" decision about....(see Winter [1964]).

arguments, however, for why these problems should be more serious within financial markets, related to the particular features of financial markets that we have already discussed. For conventional objects, like chairs, the buyer can easily observe the characteristics, or at least can quickly learn the characteristics after purchasing the object. Those who "cheat" will lose their reputation, and will not be able to stay in business. In financial markets, as we have noted, individuals exchange cash today for a promise to pay funds in the future. In some cases, as in the case of permanent life insurance, that future is quite distant. Thus, the firm can cheat the individual, and he will not know about it for years, perhaps decades. Moreover, financial markets are complex. Making judgments about whether the financial institution is able to fulfill its promises may not be easy. Thus, the individual will simply not have the information on the basis of which to make "rational" decisions. It is expensive to become informed, even about general principles like compound interest, let alone more subtle concepts like correlated risks. How is the individual to know what information is worthwhile to obtain? With costly information, the rationality model faces problems of internal consistency: how is one to decide on what information is required to make a "rational" decision about what information is required to make a "rational" decision about...and so on.

More broadly, it has become fashionable to talk of a "level playing field." We have noted that governments pass laws to make sure that firms do not take advantage of uninformed consumers. In product markets, manufacturers cannot claim something for their products which is not true. But *information* is at the heart of capital markets. Much of the trading which occurs in the market is based on *differences* in information or beliefs. When someone sells his shares to another, the buyer is probably more optimistic than the seller concerning his prospects. Does he need to disclose that information? Or is it implicit in the very act of selling? What would it mean, in any case, if he were forced to disclose his "information"?

Thus, full disclosure of even relevant information is clearly not called for in transactions in the

capital market. But most governments have taken the view that there are certain actions which are "beyond the pale": there are a host of unfair trading practices, such as insiders cannot take unfair advantage of their information; individuals cannot try to corner the market.

There is a general consensus that by prohibiting these unfair practices, not only is the playing field made more level, but markets are made to function better; if there is a widespread view that markets are rigged, then trade will be thin and markets will not function well. Still, there is controversy over whether there are benefits which accrue from these practices, whether principles of "caveat emptor" should apply, and whether the regulations attempting to restrict these practices may actually make matters worse. In a sequel we discuss these controversies at greater length.

IV. PRIMARY ROLES OF GOVERNMENT ACTIONS

The previous section outlined the major market failures which provide a rationale for government intervention the financial markets. In this and the next sections, we survey the various *roles* that government has actually undertaken, the commonly observed forms of intervention. We attempt to relate these to the market failures discussed in the previous section, but we group the interventions around categories that relate to how these interventions are commonly discussed in the public policy arena, rather than the specific market failures which they address--categories which are of more use to economists.

There are two alternative taxonomies, one focusing on *actions*, the other on *objectives*.

Actions

Government actions take five forms:

1. Creating market institutions
2. Regulating market institutions
3. Intervening in market institutions through other than regulatory mechanisms

4. Direct interventions in the capital market

5. Other interventions

The second and third set of interventions can be thought of as *improving financial markets* and *using financial markets to accomplish other objectives*; while the fourth category can be thought of as *government actions substituting for financial markets.*

Creating Market Institutions

One of the most important tasks in less developed countries has been the creation of financial institutions to fill gaps in the kinds of credit being provided by private institutions. Thus, traditionally, banks provided funds for working capital (indeed the Real Bills Doctrine noted earlier suggested that these were the appropriate policies for banks). Firms wanting funds for long term investment simply could not get them, or had to borrow short, facing a constant problem of rolling over their debt. In several European countries in the nineteenth century, governments took an active role in creating long term credit institutions. The Japanese government helped establish the Industrial Bank of Japan in the Pre-war period, and the Japan Development Bank in the Post War period.

Governments have often felt that private mortgage markets leave something to be desired. Thus, the United States established the Federal National Mortgage Association, which facilitated the securitization of mortgages.

Governments in other countries have established (or helped establish) institutions specializing in lending to particular groups (e.g. Malaysia, they helped developed a bank consistent with Islamic precepts, and a bank that would specialize in making loans available to Malays), to particular categories of firms (in Japan and other countries, there are government established banks providing funds to small and medium size enterprises); and for particular purposes (such as export-import banks, or banks specializing in making funds available for shipping).

In some cases, the reason that the private market has not provided a particular category of loans may be clear: default rates are high, and at an interest rate high enough to cover these defaults, the market is simply not viable. Viability requires subsidization. This may be the case, for instance, for the education loans.

Often, the market's failure to create appropriate institutions may be due to a lack of entrepreneurship in the private sector, a lack of creativity or an unwillingness to bear risks; or to the fact that the expected private returns to institution creation often is markedly less than the social returns--because successes are quickly imitated, it may be difficult to appropriate the returns from good ideas. (Patents do not protect novel institutions. Thus Merrill Lynch was able to appropriate only a small fraction of the returns from their innovative Cash Management Account.)

In some cases, there may be ambiguity about the explanation. There may be questions about whether a particular innovation is "legal," and an unwillingness to bear the costs and risks of finding out. Thus, variable rate mortgages, with fixed payments (where the maturity of the debt changes with changes in the interest rate) which have the advantage to borrowers of providing certain payments and the advantage to lenders of eliminating risks arising from differences in the maturity structure of deposits and liabilities, have been a prevalent form of mortgage in the U.K., and still, in spite of the obvious advantages, have yet to become widespread in the United States. Even variable rate mortgages, which by reducing the variability of real interest rates[73] have decided advantages for those borrowers who are not liquidity constrained, were not common until the 1980s.

We have noted several instances where the government takes primary responsibility for creating new financial institutions or institutional arrangements. There are a broader range of circumstances in which the government takes actions which make the establishment of certain financial institutions viable

---

[73]According to Fisher's Law, nominal short interest rates move in tandem with the inflation rate, so that there is little variability in real interest rates. In recent years, there has perhaps been more variability in real short term interest rates than the so-called Fisher's Law would have suggested.

or more likely. Let me mention three instances.

Viable equity markets require fraud laws and accounting standards which ensure that non-controlling shareholders get their share of the profits of the firm (see Greenwald and Stiglitz [1992]). The absence of these laws and accounting standards was an impediment to the development of equity markets in many Western countries, and remains an impediment in many less developed countries.

Beyond fraud lies the gray area where governments have attempted to create a "level" playing field, where investors are less likely to be taken advantage of by smart operators who have not committed outright fraud. Regulations on insider trading and on cornering the market fall within this rubric. Establishing "Securities and Exchange Commissions" are viewed to be important for creating confidence in the stock market, which is necessary if there is to be widespread participation.

The "thickness" of a market is important; bid-asked spreads are typically larger in thin markets, and thin markets are more subjective to manipulation, short squeezes, and high volatility. Governments can take actions which increase the thickness of equity markets. For instance, the kind of action taken by the Korean government, restricting the debt equity ratio of large firms, substantially increased the magnitude of equity issues (and because the share issues were associated with a legal change, the usual asymmetric information concerns, which impede the effectiveness of equity markets, were less operative).

In bond markets, investors face two kinds of uncertainties: determining the appropriate interest rate for the maturity of the debt and determining what adjustment in the interest rate charged should be made to reflect default risk. Much of the uncertainty associated with the first type of risk is resolved when there exists a well developed government bond market, which provides a yield curve, i.e. interest rates corresponding to different maturities. In many countries, there are not thick government bond markets. Governments may create these markets, even when they have no immediate need for the funds, simply for the information which it yields. The Hong Kong government is currently in the process of doing exactly that.

Regulating Market Institutions

Government imposes a variety of regulations on financial institutions, such as net worth and capital requirements. Government restricts the fraction of the banks total lending to any single borrower; in restricts lending to insiders; in some countries, there are restrictions on certain categories of "risky" loans; there are restrictions on the kinds of non-banking activities in which banks may engage, etc. These regulations can be related either to a correction of one of the market failures discussed in the previous section, or to one of the broader social objectives described below.

Intervening in Market Institutions through other than Regulatory Mechanisms

The government has a variety of ways of providing *incentives* for financial institutions to take actions which it deems desirable.

The most obvious of these are financial incentives, e.g. subsidies to certain categories of loans financed out of the government treasury.

But there are a variety of more subtle ways in which government attempts to direct the actions of financial institutions, and because these other ways are subtle, it is often difficult to ascertain whether, and to what extent, government is intervening.

The most widely discussed of these interventions is "window guidance," often implemented through informal understandings concerning access to the Central Bank's rediscount facilities. A bank which complies with the Central Bank (or, more broadly, the government) concerning either the level or form of lending may find that it has easier access to the rediscounting window; those that refuse to comply may find that access is denied.

There are other discretionary actions which the government or the Central Bank have at their disposal which provide incentives for bank compliance with the more general wishes of the Government. Thus, in many countries (Japan, Thailand) opening branches requires government approval, and failure

to "cooperate" may result in the denial of applications for branches. In Japan, in interviews this power was repeatedly cited as one of the instruments by which government "enforced" its wishes.

Governments can not only provide institutional motivations for cooperative behavior; they can also provide motivations directly to bank officials. Thus, the possibility of an appointment as a high official of the central bank, a high paying high prestige position, may induce cooperative behavior among the officials of commercial banks.

Korea illustrates a more direct channel of influence: though the banks were privatized more than a decade ago, the government, through the Ministry of Finance, still continues to appoint the Chairman of the Board of the private banks, who is typically a former Ministry of Finance official. This power is not exercised through any formal set of rules or regulations. Similarly, even in countries where the Central Bank is independent, the government typically appoints the top officials, and these are frequently chosen from among government officials (particularly of the Ministry of Finance) who have performed well. Their close connections with their former employers makes them particularly cooperative in carrying out the wishes of the Ministry of Finance or, more generally, the Government.

Beyond the formal and informal structures of incentives and networks of personal relations is (in many countries) a desire for cooperation. Banks and bankers do not necessarily see their primary role as maximizing return to their shareholders, or view that role in a very long term perspective in which that goal is consistent with, indeed necessitates, cooperating with the government. This perspective may be particularly strong in banks that were at one time public institutions but were subsequently privatized; the process of privatization may itself not change the "mental attitude" of its officials, or the culture of the Bank. This perspective was illustrated by an interview with a high official of the Industrial Bank of Japan in the years after World War II. The IBJ had been nationalized during the war years, and was subsequently privatized (under orders of the General Headquarters (GHQ)). I tried to elicit from him in what ways did privatization affect the behavior of the bank, e.g. the criterion by which loans were

evaluated. He described the objectives of the bank as what we would refer to as social or national building objectives, as building up the country in the aftermath of the War. He went on to say, in effect, that only recently did the bank take seriously its shareholders as (what might be referred to in current parlance) as an important stakeholder, and indeed, that it may have gone too far, paying out too much to its shareholders, though perhaps it should have paid more attention to its shareholders in earlier days.

Direct Interventions in the Capital Market

These include direct lending programs. We referred in the first section of this essay to the myriad of direct lending programs of the United States, such as small business loans. In many countries, governments get involved in loans to promote exports, or to shore up failing businesses, or to support newly established businesses, like shipbuilding or steel.

The distinction among the categories, and the precise role or importance of the financial market interventions we have described may often be vague and hard to determine. Thus, at one time, the government may make loans directly; it may later decide to convert (corporatize) the department of the government (the ministry of finance) which is responsible for administering the government's loan program, (making the decisions concerning who gets the loans) into a (government owned) bank. It may then subsequently decide to "privatize" the bank, but the shares may be largely held by other public corporations. There may not be much of a difference between a government decision to allocate certain funds to a project (to be repaid to the government with interest), and between a government order to a government owned bank to lend money for a project.

In any case, the decision about what activities to support, or even what borrower should get funds, may not be a standard financial decision; the financial institution simply provides the funds associated with a government "planning" decision. The distinction I am making here is seen most clearly in the case of banks under Soviet Style socialism. In the Soviet Union "banks" provided finance required

for investment. Banks provided a kind of accounting service, keeping track of flows of funds.[74] But they did not make the allocation decisions. The central issues with which capitalist banks are concerned, which relate to the prospects of the industry or the enterprise were either of concern elsewhere, or irrelevant. Thus, whether steel should be expanded was a matter of concern for the central planners, and perhaps for the steel ministry, but not for the state banks. And since the State owned all enterprises, the issue of solvency simply did not arise.

If the government has made a commitment to a certain industry (i.e. the government has decided to build a steel industry), and indicates that it will insure any loans made to that industry, then while banks are "officially" providing funds, they are not really "allocating resources." The government is making decisions concerning how resources should be allocated, and because of the guarantee, the issue of solvency of the borrower becomes irrelevant. In some cases, the precise nature of the government guarantees may not be clear (the guarantees are implicit rather than explicit), and in these circumstances, ascertaining exactly the role of the financial institutions becomes difficult.

Other Interventions

There are a variety of other interventions in markets which are either an intentional or unintentional by product of more general aspects of government policy, which we note only briefly.

Discussions of the role of the government often begin by referring obliquely to the government's role in setting the basic "rules of the game." We have, on several occasions in this essay, referred to the importance of fraud laws and the importance of accounting. Slight variations in laws or customs can have large consequences. For instance, in the United States, accountants can be dismissed at will, while in the United Kingdom, once hired, they enjoy a year's tenure. Thus, there appear to be greater

[74]Though because interest rates were not charged (at least interest rates commensurate with the opportunity cost of funds), the accounts did not provide an accurate depiction of the resource costs.

incentives for American accountants to produce reports that are in accord with their clients' interest; and the information value of reports is reduced, since it is not disclosed whether the given accountant was the first or nth accountant hired to produce an "appropriate" report. On the other hand, the stricter liability laws (the effects of which are now confronting many of the major accounting firms in the context of the S & L debacle) in the United States have effects that go in precisely the opposite direction, leading (other things being equal) to higher standards.

By the same token, the laws affecting limited liability and bankruptcy have major effects both on financial institutions and risk bearing: bankruptcy law and limited liability define who bears what risks when one party, say to a financial contract, cannot pay what is owed. Many of the problems which have confronted the S & L's in the United States are a consequence of government policies which have allowed, or even encouraged, limited liability. Limited liability has distinct advantages: it is hard to imagine the evolution of modern capitalist economies without it.[75] Yet there are some distinct disadvantages, in particular, the moral hazard problems which arise as firms approach bankruptcy--problems which were all too manifest in the case of S & L's.[76] Whenever there is limited liability, firms (or more accurately, the agents who take actions within the context of firms protected by limited liability) may not bear the full consequences of their actions: their creditors may suffer, even though the firms' *expected* returns increase. There is a classic externality. The contractual arrangements between the firm and its creditors may attempt to mitigate these externalities, but contracts are always incomplete (see, e.g. Grossman and Hart [1986]); and, in any case, there are public good problems in monitoring and enforcing contract provisions, to which we have already referred. Again, seemingly minor variations in rules and institutions may have major consequences. The rule that says that a lender that becomes

---

[75]For a fuller articulation of this view, see Greenwald and Stiglitz [1992a].

[76]The general theory of why markets where moral hazard problems arise are not in general constrained Pareto efficient is set out in Arnott and Stiglitz [1989].

actively involved in the management of a debtor may lose his seniority status in the event of bankruptcy may result in banks taking a far less active role in corporate governance than in Japan.

Government, through its tax system and its insurance functions, has a large stake in the performance of any enterprise, and in particular on the financial system. Inevitably, government bears much of the risk. This was brought home forcefully by the Chrysler bail-out. While there were a variety of political pressures that were brought to bear, some claim that the government bail-out made sense (ex ante--ex post, it obviously turned out to be a good deal), since a Chrysler failure would have cost the government upwards of a billion dollars through its guarantee of the pension fund.

This example illustrates a general problem that arises in lending and risk bearing programs in general. Once a party (here, the government) has made a loan or insured a risk, it may effectively be committed to providing further loans or further funds (guarantees), in order to recover its original funds or to reduce the losses under its original commitment.[77] In effect, the government (or any lender or insurer) cannot effectively commit itself not to providing further support; and indeed, the original loan or insurance may induce the borrower/insured to act in such a way that it is more likely to call upon the lender/insurer to provide the additional support.

Many of the examples cited in the last few paragraphs are instances where the government's role in the financial market was not entirely intentional: its actions have major effects on financial markets and how they function, but the consequences are more a byproduct of decisions made for other reasons.

The tax system provides another case where government policy has major effects on the financial system, and many, if most of the effects are not intentional. For instance, as Musgrave and Domar have pointed out, the government through the corporate tax system acts as a silent "equity" partner. It may thus displace other (private) forms of equity. On the other hand, the limited loss offset provisions mean

---

[77]For earlier discussions of this problem in the context of loan markets, see Hellwig [1977] and Stiglitz and Weiss [1983].

that the government does not share some of the most important risks, particularly the down side risks. This may induce firms to undertake much less risk-taking than they otherwise would. A variety of provisions of the tax code affect the relative costs of debt and equity;[78] they thus have an effect on the relative mix of the two; and as we note elsewhere, shifts in the financial structure towards debt may result in less risk taking (other things being equal).[79]

More recently, there have been discussions in the United States of changes in tax laws aimed directly at affecting financial markets. For instance, there have been proposals to limit the tax deductibility of interest paid on debt incurred in the context of hostile take-overs, a proviso intended to discourage take-overs. Discussions lowering the tax on capital gains are intended both to encourage equity and to lower the cost of capital facing firms. We will have little to say about these policy instruments in the subsequent discussion, but their importance should not be underestimated.

Policy Objectives

There is another way we can categorize the activities of government in financial markets, grouping them around a broad set of "social" objectives. We group government interventions into six categories: (i) consumer protection; (ii) enhancing the solvency of banks; (iii) ensuring competition; (iv) directing resource allocation; and (v) enhancing macroeconomic stability; and (vi) stimulating growth.

---

[78]The fact that debt is tax deductible encourages the usage of debt. The fact that capital gains receive a variety of forms of favorable treatment provides some advantages to retained earnings. Balancing these effects turns out to be a fairly complicated matter. See Stiglitz [1973].

[79]We need to emphasize the ceteris paribus assumption, because the higher indebtedness of Japanese firms does not seem to have resulted in less risk taking. There may be several reasons for this. First, there are a variety of private risk sharing institutions, e.g. the greater reliance on bonus wages. Secondly, the greater reliance on banks as a source of finance, and the closer relationships between the banks and the corporations, may make debt are more flexible instrument. Thirdly, the government may be more effective in reducing the magnitude of macro-economic fluctuations. Fourthly, the "recession cartels" may provide firms with a further insulation from some of the extreme risks faced by firms in other capitalist economies.

Consumer Protection

The government is concerned that investors not be deceived. Thus, if a bank promises to repay a certain amount upon demand, the government wants it to be likely that it will repay that amount. As we have seen, there is a public good--information--which merits government intervention: information about the financial position of the firm is a public good.[80] Again, as we have noted, there are private incentives for disclosure (at least by the better firms); and in many areas, private rating agencies, such as Best for insurance, Moody's and Standard and Poor's for bonds, and Dun and Bradstreet for other investments, do play a role. The question is whether they are adequate; most governments have decided that they are not.

Government attempts to protect consumers have taken four forms:[81]

(a) By ensuring the solvency of financial institutions,[82] governments make it more likely that financial institutions keep the promises they have made (e.g. banks will return the capital of depositors upon demand, insurers will pay the promised benefits when the insured against accident occurs).

(b) Deposit insurance and government run guaranty funds protect consumers in the event of insolvency. (We noted earlier that markets do not do a good job of insuring against social risks. Since runs on banks are highly correlated, private insurance firms simply do not have the deep pocket that is required to make this kind of insurance effective. To be sure, there have been private insurance funds, but these have typically been unable to honor their commitments in periods of crisis.)

(c) Disclosure laws make it more likely that investors know what they are getting when they

---

[80]In addition, there may be an economy of scope between the enforcement of fraud laws and this kind of regulation. It is easier to enforce fraud if there are clear (and compulsory) standards of disclosure.

[81]Beyond fraud laws, which prohibit outright deception.

[82]We will discuss below how the government attempts to do this.

make an investment.[83]

(d) The market is regulated in such a way as to ensure that certain individuals (insiders) do not take advantage of others. In the United States, there are a variety of such regulations, from those prohibiting insider trading to those that regulate the operation of the specialists (market makers) to those that attempt to prohibit unsavory practices, like cornering a market.

The government's interest in consumer protection in this area goes beyond looking after the interests of investors. It is concerned that without such protection, capital markets might not work effectively. If investors believe that the stock market is not fair, then they will be not be willing to invest their money; the market will be thin, and firms may have greater trouble raising capital. Episodes when investors have been cheated--from the South Sea Bubbles of the eighteenth century on--have been followed by a drying up of equity markets. Honest firms trying to raise capital are hurt by the potential presence of scoundrels; there is an externality. Government policies, in protecting investors, are thus aimed at making capital markets function better.

Government Enhancing the Solvency of Banks

The United States has periodically been plagued with bank runs, perhaps more frequently than have other countries. There are three sets of instruments that the government has employed to enhance the solvency of banks.[84]

---

[83]Again, as we have noted, in the United States, there are laws intended to make sure that borrowers know the true rate of interest they pay on loans, and that purchasers of equity know the true risks which they are undertaking in making an investment. Several governments (e.g. Thailand) in less developed countries have recently set up (or are currently thinking about setting up--e.g. Hong Kong) agencies modelled on the Securities and Exchange Commission or similar European laws, in some cases, in some cases after scandals have rocked their equity markets.

[84]The government takes a less active role in ensuring the solvency of most other financial institutions, with the possible exception of insurance. Insurance firms are highly regulated, and the government in most states has established a guaranty fund, to protect those who purchase insurance against the consequences of insolvency of insurance firms.

(i) ***Insurance.*** Government insurance for depositors was one way of trying to restore confidence in banks, and thus prevent bank runs. We have explained earlier why the private sector is unlikely to provide effective deposit insurance. The government has undertaken this insurance role for two different reasons.

One is to enhance the viability of the banking institutions, by increasing consumer confidence, making runs less likely. In this role, the insurance reduces the likelihood of illiquidity causing a bank default of a basically solvent firm. Here, the question is whether the other mechanisms (to be described below) suffice; whether there is much value added by government insurance. The second role is consumer protection. Today, it is hard *in principle* to see a justification for the latter role, as individuals can put their money in money market funds, investing in Treasury bills, for which there is no default risk (apart from that which might arise as a result of fraud). By the same token, in many countries (such as Japan), the government runs postal savings funds, which provide a safe depository for individual funds. While postal savings banks often do not provide the full range of transactions services (such as checking accounts), there is no reason why they could not provide that service, were it is deemed important.

Given that the government does provide insurance, the government, like any other insurer, has a vested interest in making sure that the insured-against event does not occur--that is, the government in its capacity as insurer, has a vital interest in insuring the solvency of those that it has insured. This provides one (but only one) of the rationale for government intervention.

(ii) ***The Lender of Last Resort.*** Another mechanism for preventing bank runs was provided with the establishment of the Federal Reserve, a lender of last resort, ensuring that banks could obtain funds if they had a short run liquidity problem. With this assurance, it was hoped, bank runs would be less likely. Obviously, this does not resolve problems where the bank is truly insolvent; its only intent is to prevent short run liquidity problems from bringing down a bank. Though many discussions emphasize the distinction between illiquidity and insolvency, in practice the distinction often appears

murky. Illiquidity is easy to ascertain: if the bank has insufficient funds to meet its obligations, it is illiquid. Insolvency is more difficult to determine: it requires a judgment of the value of the banks assets (including its "good will") or the present discounted value of its future profit streams. If a bank were clearly solvent, it would presumably not be illiquid, for others would be willing to lend to it the required funds at reasonable rates of interest. It is only because others believe that there is a high probability that the liabilities exceed the value of the assets (including the Present Discounted Value of Future income streams) that others are not willing to supply the required funds. (The matter is actually slightly more subtle than the above discussion suggests: for what potential lenders care about is not a comparison of the assets including the present discounted value of future income with the liabilities, but only what they can expect to get in return for supplying funds; what they can get depends, of course, on the nature of the contract--in the case of a loan contract, it is easy to see that they may not be able to appropriate a sufficient amount to compensate them for supplying fund; in the case of equity, the problems of information asymmetries to which we alluded earlier arise.)

In the last few years, there have been discussions about how the provision of deposit insurance interferes with the Central Banks incentives to distinguish more clearly between cases of insolvency and illiquidity. If the government typically responds to bank defaults by bailing out all creditors--including the Central Bank--then the Central Bank has no incentive not to lend; it has no incentive not to say that a particular bank faces a problem of illiquidity rather than insolvency.

(iii) ***Regulations***. A variety of regulations are designed to prevent banks from becoming insolvent, or at least to make it less likely that insolvency occurs, by ensuring that they have appropriate incentives to act in a prudent manner, and that they do not have opportunities to act in imprudent manners. As we shall discuss at greater length below, requirements that the bank have substantial net worth--so that it has much to lose in the event of losses--reduce the likelihood that banks will undertake "unreasonable" risks; and restrictions on the kinds of loans and investments which the bank may make,

e.g. insider lending restrictions as well as restrictions on purchases of junk bonds, reduce the possibility of actions imprudent actions. It is not just that bank officials will use the bank to "cheat" depositors, by making loans to themselves at below actuarially fair interest rates; it is also the case that bank officials may make "honest" misjudgments; they are naturally more optimistic about the projects in which they are involved.

Competition Policy

In the United States, perhaps more than in other countries, there is (or least has been) a concern that without government intervention, the banks would be able to exercise undue concentration of economic power. Many of the restrictions imposed on banks, such as those relating to interstate banking (American banks are allowed to have branches only within a state), and those relating to what activities banks can engage in) are intended to limit their ability to exercise economic power.

Allocation Policies

The policies described so far are concerned with what may be called the internal structure and functioning of the financial sector: with issues such as prudential regulation, competition within the sector, and the role of the Central Bank. But as we noted in the first section, many governments have taken an active and more direct role in attempting to alter the allocation of credit and capital provided by private markets. These interventions are based both on several objectives:

a. ***Solvency oriented interventions***. There may be a belief that the banks do not pay sufficient attention to their own solvency, and to the economic consequences that follow from insolvency. We described these market failures at length in earlier sections of this essay. Attempts to restrict banks' allocating too much of their resources to one lender, or one set of correlated risks, or to highly risky activities such as real estate loans, fall within this category.

b. ***Industrial policy***. There may be a belief that there are large discrepancies between social and private returns to investment, either because of one of the reasons for financial market failure described in earlier parts of this essay, or because of one of a variety of reasons for non-financial market failure, such as those commonly associated with industrial policies, e.g. supporting industries with learning externalities. Elsewhere, we plan to provide a more complete analysis of these industrial policies. In this essay, however, focusing on the role of government in financial markets, which wish to emphasize the linkage between some of the commonly discussed industrial policies and financial market imperfections.

The potential importance of this linkages is illustrated by the standard infant industry argument, which argues that by protecting a firm, it can expand sales; the learning it thereby gathers lowers its marginal costs of production, enabling the firm eventually to compete with the more established firms. A standard criticism of that argument is that if it were really true that costs would be lowered, lowered sufficiently to compete effectively against established firms, then it would pay the firm to undertake the learning on its own account. This may necessitate the firm selling below marginal costs initially (see Dasgupta and Stiglitz [1988]), incurring losses; but the profits which it would eventually get would more than offset these initial losses. Thus, there is no reason for government intervention. The critical assumption in this argument[85] is that of perfect capital markets: the firm can borrow against the future profits. In fact, however, this is a form of non-collaterizable borrowing, and as in other areas of non-collaterizable borrowing, financial market limitations are pervasive.

The same argument applies for firm borrowing to finance R & D, another area of concern for industrial policy.

A rather different argument is provided by government interventions to mitigate the consequences

---

[85]Besides the obvious one, that there are no external benefits from the learning, i.e. all of the learning is captured by the firm itself.

of excess capacity. For a variety of reasons, industries may wind up with excess capacity.[86] In fully competitive market economies, say with Bertrand (fierce price) competition, price gets driven down to marginal costs; and if marginal costs are low, as they are in many industries with large capital costs, the industry makes large losses. (Price exceeds average variable cost, but is less that total average costs.) There is, in effect, a transfer of income from the corporate sector to the household sector. If financial markets were perfect, this transfer would have no further consequences. But if financial markets are imperfect--as they in fact are--this transfer can have important further repercussions.

Consider the situation, such as prevailed in the airline industry recently, where there was a temporary excess capacity arising out of a macro-economic slowdown. Airline capacity is designed for "normal" levels of aggregate demand, not that associated with a major slump. The long run vitality of the industry requires making investment commitments years into the future. In a perfect capital market, funds transferred out of the industry could easily be transferred back into the industry, and in the same form. (Recall the importance of the distinction between equity and credit emphasized earlier; equity allows the firm to undertake more risk taking; low prices resulting from excess capacity have the effect of depleting the firm's equity.) Investors would simply look at the long run returns from these investments. But we emphasized earlier that equity markets (and even credit markets) are very imperfect. Firms find it very costly to raise new equity. To put it another way, outsiders will not necessarily find it credible when the firm announces that the reason it is seeking additional outside equity financing is to

---

[86]For our purposes, it does not matter what those reasons are: it may be because in the absence of a complete set of futures markets, there is no market coordinating mechanism to ensure that excess capacity does not arise (indeed, the absence of such a coordinating mechanism has provided a standard argument for government allocations of investment, or at least for government indicative planning.)(In the absence of planning coordination with lumpy investment, one can show that equilibrium may entail mixed strategies which will result in excess capacity with a certain probability.) Alternatively, it may be because of unforeseen circumstances, such as a rise in the price of oil or the development of a product which is a substitute for the given product for many purposes, shifting the demand curve for the product down. Even if such an occurrence was anticipated as a *possibility*, when it actually occurs, there will be excess capacity; i.e. in the presence of uncertainty, equilibrium (and efficiency) entails a certain probability of excess capacity. Thus, excess capacity does not necessarily imply a market failure.

compensate for the losses of funds from the recent price war, and that the long run prospects of the firm are still good, and merit the further investment that the equity would allow.

This provides a rationale for the kinds of interventions practiced by the Japanese government in situations of excess capacity. (There are other objectives as well: the weakening of the firms in the industry as a result of a price war makes it more likely that one or more of the firms in the industry will go bankrupt, and this has further repercussions on the solvency of the financial institutions which have lent money to these firms.)

They intervened to stabilize the markets, i.e. an orderly reduction in excess capacity, with a limited reduction in price. There are two inefficiencies associated with these policies, upon which traditional neoclassical analysis has focused. First, because prices exceed marginal costs, there is underproduction. Resources are not used to the extent that they should.[87]

The second inefficiency is associated with instances in which the excess capacity is viewed to be a long run phenomenon; some of the firms in the industry should exit. The market mechanism provides a selection mechanism: it is presumed that the least efficient firms exit.

This "evolutionary" argument has been criticized on several grounds. First, it may result not in the least efficient firm exiting, but only the firm with the shallowest pockets. Again, if financial markets were perfect, an efficient firm with shallow pockets would survive. But financial markets are imperfect. Indeed, a standard view of price wars is that survival depends as much on the depth of the pockets of the competitors as on their technical efficiency.

Of course, the issues are not completely independent. If it were apparent which firm was the most efficient, then that firm might have more access to capital. But there is always some uncertainty about the relative efficiencies. Moreover, the availability of finance may itself affect technical efficiency, e.g. by allowing some firms to buy more modern machines than others.

---

[87]Note that the airline price wars did increase capacity utilization somewhat.

Imperfections in equity markets imply that firms act in a risk averse manner. The magnitude of the "equity" base of different firms will lead them to have different levels of risk aversion. (See Greenwald and Stiglitz, 1990). Firms with less equity will act in a more risk averse manner, and therefore may exit from a price war earlier, even if (in expected value terms) their technical efficiency is higher.

In fact, in the absence of uncertainty, we would not expect price wars to occur at all, since it would be perfectly clear who would survive; there would be no use dissipating resources--the loser should simply sell his assets to the eventual survivor.

In any case, there are certainly many instances where price wars seem to have driven out of business the more efficient firm (e.g. Laker Airlines).

Secondly, in those cases where the excess capacity is temporary, there may be no good (efficiency based) reason for the firm to exit. If the firm could only get the capital to carry it over the short term difficulties caused by the economic recession, then it would be an efficient producer.[88] The price war exacerbates the problems of these short term fluctuations.

We have thus argued that the "selection" gains from price wars are at least exaggerated--there may even be losses associated with it;[89] at the same time, the gains from the more efficient use of resources may be small relative to the long run costs resulting from the reduced equity (the impairment of long run investment programs).

Another important class of allocative interventions concern restrictions on loans for real estate and consumer durables. These interventions can be justified on several grounds. First, on standard

---

[88]Again, we should emphasize the importance of uncertainty: if there were absolutely no doubt about the long run viability of the firm, presumably it could obtain the requisite capital. The problem arises precisely because of these uncertainties.

[89]Without even mentioning the losses resulting from the long run reduction in competition. This is becoming particular apparent--and a source of concern--in the U.S. airline industry.

industrial policy terms, there are fewer positive externalities associated with these investments than with manufacturing investment. Secondly, real estate loans are often highly speculative, and thus may lead to increased financial fragility: there are negative externalities. Thirdly, loans for consumer durables (and to a lesser extent, real estate) may reduce the aggregate savings rate, and thus have a deleterious effect on overall growth performance.

c. ***Social policies***. A third broad set of objectives of government interventions in the market allocation has to do with what might be referred to more broadly as social objectives, rather than more narrow economic objectives. Some, perhaps many, important interventions have dual purposes.

Thus, the United States government (as well as some others) have instituted student loan programs. To the extent that the imperfections of human capital markets result in underinvestment in human capital, such programs increase the efficiency of resource allocation. But these programs serve a broader social purpose, of increasing equality of opportunity.

Many governments have interventions aimed to promote commercial activity among minority groups, or even majority groups which are underrepresented in commercial activities. Both the government of the United States and of Malaysia have interventions of this sort.

Some governments have programs to support small and medium sized businesses. These policies may be part of social programs: the nature of society may be altered when the economy is dominated by large enterprises; the importance of small propertied interests for the viability of democracy is often associated with the notion of Jeffersonian democracy. Moreover, the provision of funds for small businesses is often thought to be an important part of upward mobility. If those with limited wealth cannot get loans, they will never have the opportunity to be among the wealthier.

But these programs also may be justified in terms of economic efficiency. First, entry of small businesses provides an important check on large enterprises, increasing the competitiveness and efficiency of the overall economy. The story of Apple Computer and IBM is sufficiently well known that it does

not need retelling.

Secondly, the inability of small businesses to provide collateral and the lack of information concerning their prospects[90] puts them at a disadvantage both in credit and equity markets. Earlier, we emphasized the important difference between private and social returns, e.g. in credit markets, and how that difference can differ across sectors, firms, and projects, resulting in an inefficient allocation of resources. This may provide one important set of instances.[91]

Government policies often have more than one objective. They may try to change the allocation of resources because there is a market failure and because that market failure has particularly serious consequences for particular disadvantaged groups. But often, government policies are justified in terms of one set of objectives, when their real purposes are another. Thus, credit programs to farmers may be justified in terms of helping the small farmer; passing reference may be made to credit market imperfections, which inhibit the ability of small farmers to get credit. Yet the design of the program may be such that the benefits accrue mostly to large farmers, raising questions about the validity of the purported rationale. As we have noted elsewhere in this essay, credit market interventions are a particularly attractive way of providing *hidden* subsidies, because it is so difficult to ascertain what an actuarially fair interest rate would be, and because the budget costs are often not fully felt until years later, when defaults rise. The fact that those with government guarantees or government subsidies get credit implies that someone else does not; but it is not obvious who was denied credit at account of these subsidies or guarantees, and thus, it is not clear at whose expense the guarantees or subsidies were

---

[90]Increasing the potential scope of problems arising from information asymmetries.

[91]These perspectives are reinforced by agency problems which may arise in the case of lending. It is not only the bank which perceives less risk in lending to a large firm. Lending officers feel more secure lending to a large firm. Even if it goes bankrupt, the lending officer is less likely to be held to blame, since similar mistakes of judgment will have been made by many others. Besides, the "bother" of making many small loans is much greater than that associated with making one large loan. (To the extent that this "bother" reflects real resource costs, this is not a market failure.)

provided.

Government Attempting to Enhance Macroeconomic Stability

The interventions discussed so far have been "micro-economic"--interventions intended either to affect the functioning of the financial system itself, or the micro-economic allocation of resources. Government interventions are also aimed at macro-economic objectives, affecting either macroeconomic stability or growth. We discuss these policies in this and the following section.

One of the reasons that the government has been concerned about bank runs is that the collapse of the banking system has severe macroeconomic consequences. Banks (and other financial institutions) are a repository of specialized information concerning their borrowers; when these banks fail, there is a concomitant decline in the economy's information-organizational capital. This translates into a decrease in loan availability. Note that this would not be a problem if capital markets were just auction markets. But they are not. A decrease in information impairs not only the efficiency with which funds get allocated; it may also lead to more extensive credit rationing, so that the effective cost of capital is greatly increased.

One of the functions that banks (and other financial institutions) are engaged in is certifying who is likely to repay loans, i.e. whose promises to pay should be believed. If too many people are so certified--if there are too many who can get funds, and they decide to exercise that option--then the demand for goods can easily exceed the supply. Since the price system (interest rate) is not functioning to clear the capital market, there is, within the market system, no automatic market clearing mechanism. This provides an important role for a central bank.

Macro-economic stability has one further benefit. We have repeatedly emphasized the imperfections of risk markets in all economies. These imperfections are particularly strong in LDCs, and can have particularly strong effects. Thus, the inability for owners to divest themselves of risk through

an equity market and the fact that they must rely on retained earnings and debt to finance expansion mean that the greater the macroeconomic volatility of the market, the less risk taking (including the lower the amount of debt, and accordingly investment) that firms will be willing to undertake. Macroeconomic policy has strong micro-economic consequences.

Moreover, in economic downturns, with credit and equity rationing, firms will be forced to cut back their investment (including their acquisition of new technology). Macro-economic instability, combined with finance constraints impair the economy's future growth prospects.[92]

Government Policies Aimed at Stimulating Growth

For LDCs, a major objective of government policy is enhancing the rate of growth. Financial market interventions to do this take on a number of forms.

Traditional discussions have focused on the role of the Central Bank in lowering the rate of interest, and shifting the composition of full employment output towards investment. There is less agreement about the importance of this mechanism today: in an open capital market, real interest rates are determined internationally. While imperfections in the capital market provide the government with some discretion in altering short term real interest rates in secondary (bond) markets, its ability over the long run to make real interest rates differ from international real interest rates is more problematic. (Certainly, a necessary condition for it being able to do so is that it must be possible for the government to close off the economy from the outside. The circumstances under which it can,[93] and whether it is desirable for it to do so, are questions which we take up in a sequel to this essay.)

---

[92]There is now a large and growing literature documenting the relationship between finance constraints and investment and productivity. See, for instance, Greenwald, Salinger and Stiglitz [1992], Greenwald, Kohn, and Stiglitz [1990], Hubbard [1990] and the papers cited there.

[93]While the Korean government was successful in regulating capital flows, many Latin American governments have been far less successful in doing so.

But there are other instruments at the government's disposal. One important, and controversial, set of instruments are referred to as "financial repression," government policies aimed at lowering the interest rate below the "equilibrium" level, a policy which many LDCs have extensively employed (e.g. Korea), and which has been extensively criticized on standard neoclassical lines. Financial repression interferes with the efficient allocation of capital. Lower interest rates result in lower levels of savings.

More recent theories have questioned both of these conclusions, and suggested mechanisms by which financial repression may both increase the aggregate level of savings and economic efficiency.

First, there is little evidence of significant interest elasticity of savings. Indeed, while the postal savings banks of Japan have paid low interest rates, they have been able to garner for themselves a substantial fraction of household savings. Evidently, the safety provided by government savings institutions, and the convenience of postal savings bank, more than offset the lower interest rates.

Lower deposit interest rates can be viewed as a transfer from the household sector to the banking sector. The full consequences of this depend on what then happens. Assume that the lower interest rates are passed on in the form of lower loan rates. This will have two effects. First, for those who get loans, their cost of funds will have been reduced. There is, in effect, a transfer from the household sector to the corporate sector. If the marginal propensity to save (and invest) of the corporate sector exceeds that of the household sector, then this transfer of funds will increase aggregate savings.[94]

Equally important, it will have increased the amount of equity in the economy. Earlier, we described the problems confronting equity markets as a source of funding, largely arising out of information asymmetries. Equity markets are particularly weak in LDCs. Lowering interest rates

---

[94]This argument requires that households do not fully pierce the corporate veil, i.e. higher corporate savings is not offset, on a dollar for dollar bases, by reduced household savings. There is considerable evidence that household savings offsets corporate savings only to a very limited extent.

charged on loans (as lowering any factor price) increases the profits of the firm,[95] and thus firm equity. The form of capital is important, because the risk associated with equity is quite different from that associated with debt, i.e. there is not a fixed obligation. More equity allows the firm to undertake more risk taking. Indeed, it may allow the firm to undertake more borrowing, and still maintain the probability of bankruptcy at a tolerable level. Accordingly, equity is sometimes referred to as "high powered capital."

Secondly, there will be an excess demand for funds. The negative consequences of this, however, are limited, and there may even be positive consequences. The view that there are negative consequences is based on the misguided perception that credit markets are like goods markets (see our earlier discussion). Credit is allocated, in this view, by giving funds to those willing to pay the highest interest rate. The interest rate which borrowers are willing to pay provides the critical information to lenders to know to whom to provide funds. In the absence of this essential piece of information, banks simply allocate funds randomly, with an almost certainty that some of those for whom funds are most valuable will not get them.

By contrast, we have argued that the process of allocating funds is not well described as an auction process. Lenders must screen applicants, to determine the likelihood that they will repay. Indeed, statements about willingness to pay may convey, in this context, very little information. In every loan market, there are many more applicants for loans at the going interest rate than there are funds available (although, to be sure, many of these will be judged to be "qualified" borrowers).

Thus, *given* that there has to be an active screening process in any case, the loss of information from not using market clearing prices may be minimal.

Moreover, since there may be marked differences between social and private returns, government

---

[95]This is particularly true in two circumstances: prices are set internationally, or internal markets are imperfectly competitive. In either case, the lowering of the costs of production does not simply lead to lower consumer prices, with the gains being passed on to consumers in that form.

would not want to provide funds to the highest bidders, even were there to be an auction process.

Equally important, access to credit can be treated as a "prize," a reward for good past performance. Since the shadow value for the access of capital can be quite high, this prize may be highly valued by the recipient firms; yet it is a prize that can be awarded by the government with little budgetary cost. Moreover, by appropriately designing the terms on which credit is allocated, the government can design incentive structures with high marginal returns. For instance, if the government awards credit on the basis of relative performance, one can obtain high marginal returns to greater effort, and at the same time impose relatively little risk on the contest participants (see Nalebuff and Stiglitz [1983a, 1983b]).

If the government uses as one of the criteria for allocating credit the relative amount of equity that the firm provides, then it can provide high incentives for firms to retain earnings, thus increasing the overall savings rate.

Both aspects of these incentive structures may have played a role in the Korean success story.

So far, we have focused our attention on the case where the benefits of lower interest rates are passed on to firms. Similar effects arise if they are not passed. Now the extra profits accrue to banks. Their increased net worth enables them to lend more, and makes them more willing to undertake more risks, thus providing the finance to sustain further economic growth.

The importance of banks, as opposed to "bond markets" in providing finance needs to be stressed. Table 1 cited earlier provided data showing how important banks were as a source of finance. There are two simple reasons for this. First, banks have localized information, which allows them both to screen loan applicants and to monitor loan usage, essential functions for an effective capital market. Secondly, because banks have this essential information, they can behave more flexibly, in response to changes in economic circumstances. Thus, if the firm needs more funds, they can more effectively identify whether it is worth while providing those additional funds. It is difficult (read: extremely costly) for a firm, particularly any but the very largest of firms, to turn to the capital market any time it needs an additional

infusion of funds. Indeed, recent studies have examined the effect of this on those Japanese firms which have switched to bond finance from bank finance: there has been an increased volatility in their investment; it has become more sensitive to the firms' cash flow.

V. PRINCIPLES OF REGULATION

Previous sections have detailed the nature of the market failure in financial markets and described the roles that the government performs. But neither is fully informative concerning the normative question about what *should* the role of government be. Government might actually be making matters worse. Even when there is a market failure rationale, government interventions may be motivated by other considerations: an attempt, for instance, by some special interest group to transfer funds to itself, in a disguised way, or to limit competition, so that its profits will be enhanced. The fact that the magnitude of the effective subsidy is often not apparent in credit markets (just as it is often not apparent when support is provided through trade restrictions) implies that credit market interventions are often favored by special interest groups, and makes most economists particularly suspect. (Recent discussions of the appropriate design of government policy has emphasized *transparency*--the ability of citizens to see clearly and understand the full import of a government action; government interventions in credit markets often lack transparency.)

Moreover, the public sector may face "public failures" no less important that the market failures confronting the private sector. (See Wolf [1988] and Stiglitz [1990a] and the large literature of the Public Choice school.)

As I have already commented, the government does have powers (arising from its powers of compulsion and proscription) which mean that it can, in fact, do things that the private sector cannot. At the same time, it has constraints and limitations (such as limitations on the ability to make commitments, and equity constraints) which make the government often less effective than private sector

enterprises. The essential problem of public policy is ascertaining those situations, those forms of intervention, where the strengths of government can most directly be brought to bear, to improve the workings of the market. The essential message here (and the large related literature) is to show that there exist a wide range of such interventions, and to describe what forms of government interventions are most likely to be welfare enhancing.

In this section, I will focus only on the principles of government regulatory interventions, but most of my remarks will apply as well to other forms of interventions.

Such regulations are (or should) be based on the recognition of the fact that monitoring banks is costly and necessarily imperfect; that the monitoring agencies face severe information problems; that there are incentive problems facing the government bureaucrats; and that the government bureaucrats may be at a further disadvantage relative to those in the private sector as a result of the limitations in the salaries which the government can pay. The extent of these problems may vary from country to country, so that a regulatory structure which is appropriate in one may not be in another. We explain below some of the more salient aspects of these issues.

1. Detection Problems and the Use of Indirect Control Mechanisms: Incentives

Not all variables are as easily observable. The variables in which we are most interested may not be. Thus, government regulators are interested in ensuring that the banks take "prudent actions" and exercise faithfully their fiduciary responsibilities. But ascertaining whether a particular loan is or is not prudent is difficult. Having government regulators appraise every piece of property, to see whether the collateral is in fact adequate is feasible, but costly. Similarly, reviewing every action to see whether there might be a conflict of interest, or a violation of a fiduciary responsibility, would be prohibitively costly.

Accordingly, regulators must rely heaving on indirect control mechanisms. These take two forms, incentives and restrictions.

Incentive based regulators are designed to provide the regulated with an environment in which his incentives are more appropriately aligned with that of the regulators.

Insurance firms use incentive mechanisms: co-insurance provisions, provisions which make premiums depend on past accident history, and retrospective rating provisions all make the insured bear some of the costs of the accident, and provide him with an incentive to avoid the insured against event.

In the context of banks, adequate net worth requirements provide banks with more of an incentive to take prudent actions. If the bank goes bankrupt, the owners have more to lose: it is as simple as that. There is a general theorem showing that when net worth goes below a certain critical threshold, banks switch from acting in a risk averse manner (trying to avoid risks), to a risk loving manner. That is, of two investments with equal total mean returns, banks would actually prefer the riskier loan. We shall return to this point later.

Making deposit insurance premiums depend on the riskiness of the banks' portfolio is another mechanism for *improving* bank's incentives, though for reasons explained below, we do not think that this is as important as many commentators have suggested.

2. Detection Problems and the Use of Indirect Control Mechanisms: Restraints

As we have already noted, insurance firms attempt to mitigate the moral hazard problem by imposing restrictions--we could as well call them regulations--on those who they insure. Or they set different rates depending on whether you conform to some regulation or not, e.g. houses with sprinklers get lower rates; individuals who do not smoke may get a discount on their health insurance. They thus try to mitigate the moral hazard problem by providing incentives for taking actions which will result in a lower accident probability.

Similarly, employers may find it difficult ensuring that there employees put adequate efforts on their job; monitoring them on a continuous basis is extremely costly. But they know that if the employee

has a second job, it is more likely that he will provide inadequate levels of effort at his primary job. Accordingly, restrictions on secondary jobs are not uncommon. (Universities typically restrict professors to consulting one day a week.)

Many banks make bad loans to their officers and relatives of their officers. This may be a matter of fraud and deception: the bank officers may be attempting to transfer wealth to themselves by charging interest rates below the actuarially fair interest rates (which, in the case of many projects, might be astronomically high). But it also may be no more than a matter of bad judgment: the bank officers may indeed by extremely enthusiastic about their project. They may believe that its probability of success is very high. They do not look at their own ideas with the cool headedness that they look at those of others. Because such judgmental errors are so common, since monitoring whether in any particular project judgmental errors have been made is so difficult, and since the opportunities for fraud as well as misjudgment are so rife, it is not unreasonable for regulators to restrict loans to insiders. If the project really is a good project, the insiders should be able to get loans from others.

This does not completely address the problem, however, because of the problem of "reciprocity." The owners of bank A may make loans to the owners of bank B, and conversely, at rates that do not reflect the true actuarial risk of default. These problems are exacerbated when the owner of a bank is an industrial firm. Then, the bank may be inclined to give favorable treatment to the suppliers and customers of the industrial firm. Again, the central problem is that the cost of detecting such abuses is very high. It is far easier to simply impose a restriction that an industrial firm may not own a bank. (And an argument can be made that there is little cost to such a restriction: the shareholders of the company may, of course, buy shares in the bank. The only advantage of having the firm purchase the bank on behalf of its shareholders is (i) if the firm were to take advantage of its ownership position; or (ii) if the management of the firm (say an automobile company) had some managerial comparative advantage in running a bank. The former is an argument *against* having industrial firms own banks; the

latter seems unpersuasive.)

The problem we have just examined can be looked at from another perspective: banks provide their owners with a strong incentive for misjudgments which benefit themselves, and regulators need to correct such incentive problems.

There are other instances: a financial institution which owns a substantial amount of equity in a firm may have an incentive to make a loan which will "tide it over" a short run shortage of cash. It will be more inclined to interpret the problem the firm faces as minor, as a problem of liquidity rather than insolvency. Accordingly, it is natural that regulators restrict banks from owning equity in firms.

Similarly consider a financial institution that has "sponsored" an equity issue, recommending that its customers buy it. Assume, a short time later, that that firm faces a cash shortfall. The financial institution has an incentive to provide funds to "shore it up." It has an incentive to maintain its reputation as an issuer of equity, and its incentives in that direction may conflict with its incentives to make prudent loans. There are, of course, many ways that a bank can aid a firm. It may give it a loan. Or it could give a loan to a major customer of the firm, to enable that firm to buy more of the firms' products. It may be difficult for the regulator to monitor all of the possible forms of aid. It may make sense, then, for regulators to restrict banks (institutions which make loans with government deposit insurance, either implicit or explicit) from undertaking certain other financial services.[96]

---

[96]We will discuss this issue more thoroughly below. There are, to be sure, arguments on the other side: there may be economies of scope, that is the information collected in the role of bank has value in the role of equity owner. We have noted elsewhere (Stiglitz [1985]} that there may be conflicts of interest between equity owners and bondholders. Neither is directly interested in maximizing the total market value of the enterprise. Were the bank to own a proportionate share of the equity as it holds of the debt, then the bank would be interested in ensuring that the firm maximized its market value. More generally, share ownership will help align bank incentives in monitoring with the broader interests of value maximization.

3. Setting the Regulatory Standard: Recognizing Imperfect Information

The regulatory standard that is appropriate will depend on how well the variable in question can be measured. Consider the problem of the net worth requirement. If net worth could be measured continuously and perfectly, then a relatively low standard might be chosen; but if it is measured only sporadically and very imperfectly, a higher standard needs to be set, to ensure that the probability that the true value of the variable in question is above the desired level.[97]

The amount of net worth required to ensure that the bank does not become insolvent depends, of course, on the variability of the asset portfolio as well as the frequency with which net worth is monitored. If net worth is monitored continuously, then as soon as the bank's assets decrease in value, the decline in its net worth is registered, and any bank which fell below a threshold would be instantaneously closed down. In practice, however, there are lags in detection and enforcement. The greater the variability of the value of the assets, the higher the probability that a problem will arise, given any particular set of lags.

That is why it makes sense to have risk based capital standards of the kind that were developed and introduced during the 1980s. These standards (referred to as the Bank for International Settlements (BIS) standards) have been introduced for commercial banks in almost all major Western countries and a number of LDCs. These standards recognize that there is less risk associated with a government T bill than with a commercial loan. The risk adjustments are, however, far from perfect. Even with some risk adjustment, given the differential lags and quality of information and the different degrees of volatility in asset prices, there should be different net worth and capital requirements in different countries. Thus,

---

[97]To put the matter formally, assume the government wishes to make sure (with probability .95) that a variable x is greater than some threshold level x*. It does not observe x directly, but y, and y is a noisy measurement of x

$$y = x + \epsilon.$$

Then it sets a standard for y, y*, such that if $y > y^*$, the probability that x exceeds x* is .95. The greater the noise (the greater the variance of ϵ), the higher will y* be.

while an argument can be made for a uniform minimum standard, in practice, the BIS standards have become *the* standard. I would argue that in some countries, and during some periods, standards should be higher, perhaps substantially high, than these standards.[98]

4. Setting the Regulatory Standard: Recognizing Asymmetries of Information

The regulations must further be based on the recognition that there are important asymmetries of information between the bank and the bank regulators, that the "books" of the bank are largely in the control of the bank, and that accordingly, the information presented to the bank regulators may quite possibly be "distorted." Thus, banks are in a position to sell undervalued assets, but keep overvalued assets on their books at book value. When banks systematically engage in this practice, then "book" value will systematically overestimate true value.[99]

5. Limitations on Government in Risk Assessment

Government is in a marked disadvantage (as compared to the private sector) in assessing risks and charging premiums based on risk differences. The reason for this is partly that risk assessments are, to a large extent, subjective. Economic situations are always changing, and, no matter how "rational" the risk assessor, there is a subjective element in deciding the relevant "base" for making the risk assessments. Is the bank's default ratio of the last six months, or the last six years the appropriate base? One may be too shortsighted; the other may be weighed down by historical experiences that are no longer relevant. Government is at a marked disadvantage in making these subjective "discriminations," as we

---

[98]There are other problems: the BIS standards do not recognize interest rate risks, only default risk. Thus long term government bonds are viewed to be safe, when in fact that pose considerable risk to the banks portfolio. These risk adjusted standards have contributed to the current U.S. lending problems.

[99]Tax considerations may limit the extent to which they do this. But when a bank is in difficulties, regulatory considerations are likely to dominate tax considerations.

saw earlier in Section III.4.

6. Recognizing Other Limitations of Government

We have already identified several of the important limitations facing government, such as those associated with limited and asymmetric of information, and problems in risk assessment. There are two other broad categories of problems--incentives and resources: government and its employees often lack the incentives and resources with which to do an effective job of regulation. There is no easy "solution," beyond (i) recognizing these limitations in the design of regulations and regulatory structures; and (ii) trying to take advantage of information and incentives within the market place.

Incentive Problems: Designing Regulations

Private insurance firms have an incentive--provided by the profit motive--to look for "cost-effective" regulations, regulations which reduce the occurrence of the insured against accident by enough to warrant the inconvenience imposed on the insured and which are relatively inexpensive to enforce.

The public sector often has no such direct incentive. Our task as public policy analysts is to look for those cost effective regulations.

I perhaps overstated matters when I said that the public sector has no incentives to design efficient and effective regulatory structures. For there is competition among communities and governments. Many businesses are "footloose," and choose to locate where there is a favorable regulatory climate. This does not necessarily mean an environment that minimizes regulations. Singapore has established itself as a regional financial center, partly on the basis of the effectiveness of its regulatory system. Investors can be confident that funds put in financial institutions are relatively safe, because of the strong and effective regulation of the financial institutions. (Regulators in Singapore prided themselves on having suspected B.C.C.I, and not allowing them into their country, while regulators in the more developed countries

failed to see through the scam.)

Incentive Problems: Enforcing Regulations

Just as there may be insufficient incentives within the public sector to design efficient regulatory systems, there may be insufficient incentives to enforce the regulations. There is, by now, a large literature which focuses on the incentive that bureaucrats and politicians have to postpone the strong enforcement of banking regulations, hoping that the problem of the problem banks will disappear, or at least not reappear during their watch at the bridge. The costs of postponement, which have proved to be significant, are borne by others.

But it is not the case that regulators accordingly always provide "underenforcement." A major problem in recent years in the United States in the aftermath of the S & L debacle is that they provide overly zealous performance. Having been criticized for allowing too many banks to fail and waiting too long, they now have taken the opposite tack, and there have been widespread allegations that they have shut down banks prematurely. A particular bank regulator can be disciplined for not detecting a "bad bank." If the bank comes within the regulations as one which should be shut down, he is "forced" to report it; and the political pressures then make it difficult for an exception to be granted, given that so many banks have already been shut down.[100] The full consequences, either for taxpayers or investors, are not taken into account.

Thus, a "solution" to the incentive problem posed by regulatory forbearance is to reduce the discretion available to bureaucrats, establishing clear guidelines when they have to intervene. There are two set of issues associated with such a solution. The first concerns the well known rules versus discretion debate. It is impossible to have rules that fit exactly every particular situation. Hence, with less discretion, there is a greater chance (at least as compared to what would have happened with *perfectly*

[100]This is part of the "equity" requirement associated with democratic governments.

exercised discretion) of an inappropriate action being undertaken, a bank which should not be shut down being closed, or a bank which should be shut down being allowed to remain open. The problem, of course, is not only that discretion is never "perfectly exercised," but that there are systematic biases in how it is exercised (as evidenced by regulatory forbearance).

The second concerns determining standards (in a non-discretionary system) for closing down the bank. With any simple set of rules, there will be two types of mistakes: banks that should not be shut down will; and banks that should not be shut down, will be. Tightening the standards will increase the probability of one type of error, while reducing the other. Which point in the continuum is chosen depends on the costs of the two types of errors and the relative likelihood that each will arise.

Providing Government and Regulators with Stronger Incentives

We emphasized earlier the importance of providing the private sector with an environment in which individuals and firms have appropriate incentives. A similar argument can be made for the public sector. If the public sector has to bear more of the costs of its mistakes, it is perhaps less likely to make mistakes.

There is one problem with this argument: the costs of mistakes made by one administration may be borne by later administrations. As a result, it may be hard to design effective incentive structures where consequences of actions today are realized only years into the future. This is obviously of relevance in the financial sector, not only for decision makers in government regulatory bodies, but also for decision makers in private firms.

Thus, we argued earlier that since one of the major causes of defaults is macro-economic instability, making sure that government bears some of those consequences may provide it with greater incentives for stabilizing the economy. By the same token, making sure that the government bears some of the consequences for failed financial institutions provides it with greater incentives to monitor them

effectively.

Designing appropriate accounting systems, which take into account the costs to government when it undertakes certain risks, at the very least helps attract attention to what the government is doing, and in this way helps provide appropriate incentives. Thus, the incentives to provide loans at below actuarially fair interest rates is mitigated to some extent by requirements that the actuarial value of the loss be included in the budget in the year in which the loan is made.

Resource Problems

Exacerbating these incentive problems are resource problems. During the Reagan years, resources devoted to regulation were reduced.[101] But even more generally, the restraints on salaries of government employees and other budgetary restraints puts government monitors at a marked disadvantage.[102] Is it likely that a $15,000 a year--or even a $45,000 a year--government civil servant will be able to detect the clever machinations of $100,000 accountants?

These regulatory problems, like those of the preceding subsections, argue strongly for *simple* regulatory structures, leaving relatively little scope for discretion. Simplicity has a major disadvantage: simple regulatory structures cannot take fully into account all the various circumstances which might impinge on whether it is or is not appropriate to shut down a particular bank; but the advantages would seem to outweigh the disadvantages. How simple will depend on the particular circumstances, e.g. the sophistication and quality of the bureaucracy.

Thus, net worth and capital requirements, with simple adjustments for risk, can be monitored at

---

[101]This is not to suggest that if more resources had been devoted to regulation, the S & L debacle would have been avoided. As I emphasize in the next section, I suspect that the incentive problems (already discussed briefly above) were paramount: even with twice the number of regulators, given the enormous incentives for regulatory forbearance, it is quite likely that a problem would have occurred.

[102]I am explicitly not addressing myself to the kinds of political economy issues associated with regulation with which, for instance, Stigler [1971] has been concerned.

relatively low cost. Similarly, it is far less costly to monitor who owns a bank, than it is to be sure that every transaction does not violate some fiduciary standard.

Duplicative Monitoring: Avoiding Corruption, Reducing Error, and Monitoring the Monitors

Another standard objection to regulatory structures which provide considerable discretion is that they can breed corruption. It is remarkable in the recent massive U.S. S & L debacle how few have been the charges of regulatory corruption. There may be a simple reason for this: there were many agencies monitoring the banks. If a bank wanted to bribe some officials from not issuing a bad report, it would have to bribe three separate agencies.

Even short of corruption, there are advantages of having more than one agency engage in monitoring. First, all monitoring is fallible: that is the essence of the imperfections of information which we have been stressing. If one believes that there are large costs associated with allowing insolvent institutions continuing to operate, one way of reducing the likelihood that that occur is to have more than one independent monitor.

This is a more general problem: who monitors the monitors? Who ensures that the monitors are doing a good job? In principle, the monitors have supervisors. But often the supervisors are not well informed; they lack the information required to be an effective monitor of the monitors.

With more than one monitoring agency, there can be a system of peer monitoring: each monitoring agency in effect monitors not only the financial institutions, but also each other.[103]

Thus, limitations on the ability of government to monitor the monitors (the regulators) suggests that having duplicative regulatory oversight may have strong advantages, well worth the extra costs. Those ignoring the central importance of information and control, looking at organizational charts showing duplication of services, always like to reorganize them, to end the allegedly wasteful duplication

[103]This is referred to as peer monitoring. See Stiglitz [1990b] and Arnott and Stiglitz [1991b].

(cf. recent proposals for reforming the regulatory structure in the United States). These reform efforts are, from this perspective, fundamentally misguided.

Using the Private Sector

The government can take advantage of resources and incentives in the private sector to make its own monitoring more effective, to "stretch" its own resources further.

Thus, earlier we have emphasized that the government should focus its attention on regulating variables, like net worth or capital, that it can observe at relatively low cost, and which, when maintained at adequate levels, ensure that the private firms have strong incentives to behave prudently. The government is in effect using the force of private incentives; its only role is to ensure that those private incentives are operative, through ensuring that the firm has enough of its own wealth at stake.

The government can go beyond this in making use of the private sector in two ways. The general principle of public use of private law enforcement has been employed elsewhere, most notably in anti-trust enforcement. Thus, we do not rely solely on government to make sure that firms do not engage in practices in restraint of trade. We know that there may be incentives for the government not to enforce the anti-trust laws (government may be unduly influenced by large firms); and that the government is at information disadvantage relative to private firms. The system of triple damages provides an effective incentive device for private firms to monitor each other, augmenting the limited public resources devoted to ensuring that markets behave competitively.

Similar principles might be applied to financial regulation. But beyond that, there are other ways that the government can make use of information provided by the private sector. For instance, share prices and the prices of (uninsured) bonds of financial institutions convey information about the markets confidence in those financial institutions. A fall in those prices may provide important information for government regulators concerning how to direct their attention. Similarly, if the government sells off

some of the deposit insurance risk, through a reinsurance market, the prices it has to pay on that reinsurance market can provide it with valuable information concerning the risk of default.

VI. SETTING PRUDENTIAL STANDARDS FOR BANKS

In this section, we illustrate the basic principles we have set out by examining a critical set of issues facing governments throughout the world: setting the appropriate prudential standards. The S & L debacle in the U.S., and the problems in the banking industries in many other countries has led to a reexamination of the relevant issues. Should standards be tightened? Or does the problem lie elsewhere, for instance in the provision of deposit insurance?

We organize our discussion in this section into several subsections. In the first, to set the stage, we review the ingredients of the S & L debacle in the United States, for an understanding of what went wrong provides us many insights into the appropriate design of prudential standards. We note features that this experience has in common with financial crises in other countries. In the second, we identify a list of six incentive (moral hazard) problems. In the third we discuss why deposit insurance is not the central issue. In the fourth, we discuss why the crisis should not be interpreted as a consequence of regulatory failure, or at least, not so much a failure of regulators, or of too much regulation, as it is a consequence of too little (and inappropriate) regulation. In the fifth, we identify what we see as some of the central ingredients in an appropriate regulatory policy. We conclude, in the sixth, by a review of why it is so important to set appropriate regulatory standards.

A Brief History of the S & L Crisis[104]

The current crisis in the savings and loan industry can be traced back to the high interest rates in the early 1980s. These high interest rates had two effects.

First, with the development of strong competition in the market for deposits, in particular, with the development of money market funds, S & L's faced a drain on their deposits. With ceilings on their deposit rates, they simply could not compete with the high rates being offered by other financial intermediaries. Interest rate ceilings were phased out under the Garn-St. Germain Act of 1982. This did have the effect of stopping the disintermediation, the flood of deposits out of the S & L's, but (together with the other loosening of regulations to be described shortly) helped to set the stage of the debacle which was to emerge in the ensuing years.

The second problem posed by rising interest rates was related to the gap in the maturity structure of the S & L's assets and liabilities, and their narrow asset base. S & L's held their assets in mortgages; though the nominal maturity of the mortgages was often twenty to thirty years, in fact they were typically held for much shorter periods, for an average of around seven years. High interest rates reduced the value of these assets, but left the value of their liabilities relatively unaffected. These institutions were, from an economic perspective, bankrupt; that is, their liabilities exceeded their assets (when assessed at market values).

Even from the narrow regulatory perspective--which did not mark to market the value of assets, and hence overvalued many of the assets whose value had decreased as a result of the rise in interest rates--many S & L's were in trouble.

To save them, three major changes were made in regulations: the capital requirements were

---

[104]The question of "what went wrong" and what should be done about it, has been the subject of an enormous literature. See, for instance, CB0 [1992], Barth and Brumbaugh [1992], Jaffee [1989], White [1989], Kane [1989a, 1989b, 1985], Brumbaugh, 1988; Brumbaugh and Carron [1987], Brumbaugh, Carron, and Litan [1990], Bentson and Kaufman [1988], Mihkin [1992], Carron [1982] and Barth [1991].

reduced (from about 5% of assets in 1980 to 3% of assets in 1982). Secondly, S & L's were allowed to use a more liberal set of rules for determining capital (effectively, they were allowed to include in their capital base some measure of good will), again making it easier for them to satisfy the capital requirements.

Finally, regulations concerning what kinds of investments these institutions could make were loosened. They engaged in more commercial real estate lending and some of them purchased junk bonds. In short, they were allowed to undertake riskier investments. Many S & L's availed themselves of these opportunities. They increased their risk taking. Indeed, individuals who liked taking large risks were attracted to the industry. They could acquire the S & L's (whose net worth was low or negative) at low cost.

There was an important interaction between these various changes in regulations. The ability to pay higher interest rates meant that S & L's that were willing to undertake greater risks (in taking full advantage both of the lower capital requirements and of the greater flexibility in undertaking risky investments) could attract more funds; depositors faced no risk, since their deposits were insured; and the S & L's had the flow of funds with which to pay the higher interest rates, because of the higher earnings on the riskier investment. In effect, these S & L's were taking full advantage of the deposit insurance provided by the government--and of the fact that the insurance premium did not adjust to reflect the greater risk.

The government did one more thing: it engaged in what has been called "regulatory forbearance," that is, it did not act quickly when a S & L failed to meet the regulatory standards. It allowed the financial institution to remain open, as it tried to develop a plan to resolve the problem. The lack of resources by regulators meant that problems were detected more slowly than they otherwise would be, and that the regulators lacked the capacity to quickly resolve problems.

The reduced oil prices in the mid-1980s led to an economic downturn in the South and Southwest;

a variety of factors (including the defense cuts), led to a nationwide economic slowdown, but one which had particularly impact in California and New England (in both locales, defense expenditures were important).

These negative economic events led to a fall of real estate prices; and the fall of real estate prices led to large defaults. The economic downturn also contributed to the collapse of the junk bond market, in which several of the largest S & L's had invested heavily.

There were feedback mechanisms reinforcing each of these effects: the collapse of the S & L's reduced the availability of credit, particularly for mortgages, and made other banks more reluctant to make real estate loans and to take a more conservative approach to appraisal. This led to a decreased demand for real estate, further contributing to the decline in real estate prices. As banks tried to off-load the real estate that they had acquired through default, real estate prices were further depressed.

There decreased real estate prices had spill over effects on other banks, who also had part of their portfolios in real estate. They had already experienced other negative shocks to their net worth, with the crisis in Third World debt, and with the collapse of the price of oil. With a lower net worth, they were less willing to make risky loans for other investment purposes, and this contributed to the economic slowdown. The economic slowdown, of course, led to further defaults, contributing further to a decline in bank net worth.

The low value of bank net worth, and the increased regulatory standards in the aftermath of the rash of failures of S & L's, evidencing that something had been wrong with previously set regulatory standards, had further ramifications: not only did it contribute to the dynamics of the recession, it also meant that monetary policy was relatively impotent. Lowering T-bill rates did not lead to substantially lower lending rates (particularly on longer term loans), or to substantial increases in the availability of

funds, in ways which were entirely predictable.[105]

Blame for the debacle is variously assigned; where one assigns the blame obviously has obvious policy implications:

1. To the regulators, for not doing their job adequately; proposals for reforming the regulatory framework are based on this perspective

2. To the banks,

   (i) for being excessively greedy, sometimes even engaging in fraud; proposals imposing restricted standards on entry into banking (who can be a banker) combined with stricter enforcement of regulations are based on this perspective;

   (ii) for being less foresightful than they should have been;

   (iii) for failing to take into account basic economic principles, such as

      (a) diversify your portfolio

      (b) recognize the high correlation between real estate values within an area, and the negative correlation between the likelihood of default and the value of collateral

      (c) recognize that prices of assets, including real estate can fall

      (d) match the maturity structure of your assets with that of your liabilities

---

[105]The reason for this is set forth in Greenwald and Stiglitz [1992c]. Because of the decreased net worth of banks, they were less willing to undertake the risks associated with lending; and the regulators' perhaps overreaction to the problems of the preceding years led them to be particular zealous in the enforcement of regulations, reducing the banks' capacity to lend. Our theory predicted that conventional open market operations would result in an increase in the spread between short and long rates (as actually occurred). (The increased spread was also related to uncertainty about the long term rate of inflation.) This increased spread had a further effect: it increased the returns to investing in long term government bonds as opposed to loans. The risk adjusted capital requirements (see below) meant that the capital requirements associated with investing in long term government bonds were lower than with investing in loans, further enhancing the attractiveness of government bonds and decreasing the supply of loans. In the longer run, the increased spread had a positive effect: the net worth of financial institutions was quickly restored. The fall in long term interest rates had a further benefit of increasing the net worth of banks and S & L's.

(iv) for responding rationally to the misplaced incentives provided by regulators

(v) for providing their lending officers with inappropriate incentives, such as those which lead to "herd behavior."

3 To the government,

(i) for providing deposit insurance which removed depositors incentives to provide oversight; proposals for removing or limiting deposit insurance are based on this perspective.

(ii) for providing deposit insurance, but not charging banks premia based on the riskiness of their portfolios, leading to incentives for excessive risk taking;

(iii) for providing too much regulation; for instance, restrictions on interstate banking may lead to less diversified portfolios; proposals for liberalization are based on this perspective;

(iv) for providing too little regulation, such as allowing the purchase of junk bonds, too lax capital requirements, and not imposing ceilings on interest rates paid to depositors.

(v) for regulatory forbearance.

So much went wrong, that there is plenty of blame to be shared. Most (but not all) of these factors played a part.

The argument that I find most unpersuasive is that it was excessive regulation that led to the problems. To be sure, as we have noted, government restrictions on interstate banking may have contributed to banks having a less diversified portfolio than they otherwise would have. Many S & L's, in particular, had much of their portfolio concentrated in one particular region. While these government regulations on interstate banking are often given a measure of blame for what happened, I think this is unfair: banks had even more correlated portfolios in the case of Third World Debt; government regulations played no role in this lack of diversification. Moreover, with the securitization of the

mortgage market, banks could have regionally diversified their mortgage portfolios. (This securitization may, itself, have problems, e.g. with reduced quality of the screening of applicants; but that is not what is at issue here.) And the failure to recognize the possibility of significant reductions in the value of real estate assets simply cannot be blamed on regulations.

Similarly, the culprit for the debacle is sometimes placed on the mismatch between the maturity structure of the assets and liabilities, which is particularly acute in real estate. The magnitude of the mismatch is thus blamed on the regulations which forced S & L's to concentrate on real estate lending. Again, in my judgement, the blame is misplaced: variable rate mortgages allow long term loans without the lender bearing a serious risk arising from interest rate changes. The idea was hardly novel: it was the standard form of mortgage in the U.K. There appears to be some debate about whether the S & L's would have been allowed to introduce such mortgages; but there is little doubt that the industry did not agitate strongly for being allowed to do so, if they did in fact perceive themselves from being prohibited from doing so. Moreover, the maturity structure problem is clearly only part of the problem facing the industry; for the banking industry, which was not confined to making real estate loans, also has faced serious problems.[106]

Indeed, the fact that restrictions are not the problem is evidenced by the fact that the problems grew worse when the restrictions on what the S & L's could invest in were reduced.

Incentive problems, to which government regulations did contribute, did play an important role, as we shall see in the next subsection.

Incentive Problems

Discussions of the S & L debacle focus on six moral hazard/incentive issues. Although all are

---

[106]There is even some economic rationale for a mismatch of the maturity structure: the short term nature of liabilities provides an effective monitoring mechanism on financial intermediaries. See Rey and Stiglitz [1992].

present, some are more important than others. We postpone until later a fuller discussion of the relative importance to be assigned to each.

1. Deposit insurance reduces the incentive of investors to monitor banks. They simply are not at risk.

2. Deposit insurance with premiums not related to risk means that the implicit subsidy provided by the government is greater the greater the risk undertaken. In effect, any particular bank has an incentive to undertake greater risk, for the value of the subsidy which it receives is thereby increased.

3. Gresham's Law of banking: with deposit insurance, depositors have the incentive to seek out the bank paying the highest interest rate; and banks that undertake the greatest risks (with the risks being borne by taxpayers through the deposit insurance) are in a position to pay the highest interest rates. Thus risk taking banks drive out prudent banks, as they attract funds away from them.

4. Low net worth (with limited liability) means banks have an incentive to take large risks. This becomes particularly true when net worth becomes negative. They are in a heads-I-win-tails-you-lose situation. If the risks turn out successful, they survive. If they fail, they may indeed go bankrupt. But if net worth is negative, they have nothing to lose: a firm that is dead is dead; it makes little difference "how dead" it is, how far over the brink it went.

Ed Kane has described these negative net worth banks as zombies, because while they are "technically" dead, they remain among the living. And he describes the process we have just been discussing as "gambling on resurrection." If they had invested in a safe loan portfolio, they know they cannot survive. The returns would simply not have been large enough to get them out of the hole, in which they found themselves which the high interest rates in the early 1980s/late 1970s put them.

5. The implicit insurance provided by the government means that even uninsured depositors are not at great risk, so long as they keep their funds at big banks, banks which are "too big to fail." Thus, the same incentive problems which arise from the provision of formal deposit insurance extend to all

depositors in these banks.

6. Finally, there are a variety of incentive problems facing the regulators. As we have already noted, they have an incentive to postpone shutting down banks; and the political process has an incentive to redesign regulations to avoid a crisis. Everyone prefers a crisis, if it is going to occur, occur during someone else's watch at the bridge; this is true even if by postponing the day of reckoning, the eventual cost of the problem is significantly increased.

Thus, it was not so much that the regulators were unaware of the problems, but that Government changed the rules to allow the S & L's, which were clearly in trouble, to keep operating. They were allowed, for instance, to treat goodwill as part of capital, effectively reducing the net worth requirements. They were allowed to undertake greater risks, thus providing them an opportunity to dig themselves out of the hole (providing them, at the same time, with an opportunity to dig themselves in deeper).

Allocating Blame

There is no simple way of determining the relative importance of each of the problems we have identified. In a sense, the question is not even meaningful: with *close enough* regulatory monitoring, perhaps the crisis would have been avoided; but the costs of the requisite monitoring--a team of regulators in every bank--is out of the realm of the reasonable.

Similarly, had banks taken proper interest rate risk management steps, like shifting form fixed to variable rate mortgages, selling off fixed rate mortgages in the secondary market, and utilizing interest rate futures markets, then they might have avoided the huge capital losses which, in our narrative, set off the trail of events that eventually led to the debacle. Was it improper incentives (as suggested in the previous section) or stupidity that was to blame? That is, it is certainly conceivable that even with the best of incentives, they might have made the same mistakes. We already suggested many aspects of bank behavior that can best be "explained" by a failure to comprehend basic economic principles. Many banks

thought they had been burned in previous attempts to "hedge" by using, for example, interest rate futures. In some cases, they *were* burned: those who were assigned the task of hedging did not understand the difference between speculating and hedging; they thought they knew which way interest rates were going to move, and bet the bank's money on it. Inevitably, some made bad guesses. In other cases, their accounting procedures led them astray--they forgot the basic lesson of insurance. When interest rates fell, they lost money on their hedge. They *thought* they had been burned. But this was nothing more than the premium on the implicit insurance. Had interest rates risen, the interest rate hedge would have paid off; they would have been insulated from the disastrous effects of the interest rate rise on the value of their mortgages.

Thus, even with tight regulations--unless those regulations required the S & L's to take appropriate risk management strategies--the S & L's might have been doomed to face problems, given the magnitude of the changes in the interest rates.

There is, perhaps, no set of regulations which can ensure that no crisis will occur, under any circumstance. And there is no way that we can ensure that banks will act "rationally," making good economic decisions. But what we can do is design a set of regulations that make it less likely that problems occur, and that the costs borne by the public, when they do occur, are lower. We can design an environment in which it is more likely that banks and other financial institutions take actions which involve taking "reasonable" risks but not excessive risks.

While it is thus impossible to allocate *quantitatively* the blame among the various contributing factors, there appears little need to do so. It is, however, important to ascertain *qualitatively* on what factors to focus our attention.

There seems to be a widespread consensus on two points: fraud, while it may have played a role, was not the main culprit. The CBO concluded

> Although some analysts believe that fraud could account for as much as 20 percent to 25 percent of the government's losses, most experts assign a much smaller weight to this

factor--on the order of 3 percent to 10 percent.[107]

Secondly, regulatory forbearance greatly increased the cost borne by the government, both because, in the interim, the insolvent S & L's engaged in excessive risk-taking, and because they paid relatively high interest to keep funds enabling them to stay afloat.[108]

Failure to impose *interest rate ceilings* clearly deserves considerable credit for the debacle: with interest rate ceiling, the problem would have been reduced, for the most aggressive S & L's, which were able to raise millions, even billions of dollars, would not have been able to do so.

The high interest rates had further effects, both direct and indirect. They contributed to the accumulating losses of the failed institutions which the government had to bail-out. Competitive pressures on other financial institutions forced these institutions to pay higher interest rates, thus increasing the number of institutions which eventually got into trouble. And since S & L deposits are insured, they compete directly with other government guaranteed funds, such as T-bills, driving up the interest rate which the government had to pay for short term borrowed funds. In fact, it has been estimated that this indirect cost may actually be as large as the direct cost of the bail-out.[109]

Why Deposit Insurance is Not at the Crux of the Problem

I believe that deposit insurance has been vastly overrated, both in terms of its economic importance, and the role it played in the debacle. This is important, because many governments are now considering whether to institute, or eliminate deposit insurance.

The central criticism of deposit insurance, that it removes depositors incentives to monitor the

---

[107]CBO [1992], citing Barth [1991] and White [1991].

[108]This can be viewed as part of their risk taking strategy. The CBO [1992] study also claimed that these institutions had high administrative costs.

[109]See Shoven et al. [1992].

institutions to which they entrust their funds, is fundamentally misguided. Individuals simply have neither the resources nor the incentives to provide adequate monitoring. We noted earlier that monitoring is a public good, and that the private sector will provide an undersupply of it. The public good nature of monitoring means that it should be a public responsibility.

By the same token, one of the central arguments in favor of deposit insurance, that it is required to protect the small investor, is also a red herring. Today, there are other ways by which small investors can be protected. Many countries provide postal savings accounts. There are institutions which limit themselves to investing in T-bills, and therefore for which depositors face no risk (other than that associated with fraud, a danger against which again the government can and should provide monitoring).

Our earlier analysis provided a third reason that the deposit insurance issue is a red herring: the government may be forced effectively to provide deposit insurance in any case, simply because it cannot allow a financial crisis. Thus, it provided effectively deposit insurance to those who were not insured, and it has provided bail-outs to banks when it was not "legally" obligated to do so. Though without formal deposit insurance, the government is likely to let some small banks fail, and their depositors suffer, it is not likely to allow a whole industry go under.

Deposit insurance does have some positive benefits, in providing depositors assurance against a loss in the event of a run, and by providing this assurance, makes runs less likely. While it is sometimes suggested that so long as the Central Bank is willing to act as a lender of the last resort, runs will not occur; the problem is that the Central Bank is not suppose to lend when the bank is insolvent. If depositors are not sure how the Central Bank will view a particular situation, then there can be a run. The cost of maintaining the liquidity of the banking system may accordingly be greatly increased in the absence of deposit insurance.

(There is a further set of problems with a Central Bank acting as a lender of last resort, in the presence of deposit insurance provided by a separate government agency. The Central Bank, by lending

funds to banks which should be closed, can engage in what is tantamount of forbearance, with the costs borne by the government. There has been some concern about this in the United States.)

Deposit insurance provides a further benefit, in providing government with a strong incentive to do its prudential monitoring/regulation job well. Many would view the problems faced by the Bush administration as the just rewards for the failures of the earlier Reagan-Bush administrations, and an important reminder that it may prove very costly to postpone dealing with problems.

I have argued that not much weight should be assigned to one of the major criticisms of deposit insurance, that it has resulted in too little monitoring. But there is another criticism, which I think is telling: when combined with no regulations on interest rates charged, and no adjustment in the premium charged for the risks undertaken, the deposit insurance leads to Gresham's law, with risk loving banks driving out good, prudential banks. The risk loving banks can offer higher interest rates than can more prudential banks(since they can charge higher interest rates on the risky loans which they make), thus attracting all the funds. Because of deposit insurance, depositors are not at risk.

Thus, I strongly argue that if deposit insurance is provided, a cap must be placed on the interest rate that can be paid to depositors; that premiums ought to be adjusted for the extent of risk taking; and that regulators have to be on guard against this kind of abuse of the system. I shall return to these matters shortly.

Why Regulators are Not to Blame

There is a widespread impression in the press that the problems of the S & L's are the result of regulatory failure combined with the greed of avaricious bankers. It is remarkable how quickly our image of bankers seems to have changed: when I was a youth, banks were depicted as among the more boring, but more steadfast, members of the community. This view, as I have already hinted, is clearly wrong: avaricious bankers play but a minor role in the debacle; to the extent that they did, it was the

incentive structure, the opportunities, provided by our banking system which served to *attract* this type of person.

Moreover, the regulatory structure did not take adequate account of the limitations on regulation, to which I referred in the previous section.

The regulatory failure which has occurred has not, in this view, been so much the failure of regulators, but of the regulatory structure, and of what can be expected of government regulators, given the situation in which they have found themselves. It was, to be put it mildly, an unfair battle.

On the Importance of Prudential Requirements

The costs of the failure to have in place an adequate set of prudential requirements are becoming increasingly clear.

The media paid the most attention to the direct financial costs of the bail out. Variously estimated to run between $100 billion and $500 billion, there is little doubt that the cost is enormous. (In 1991, the Congressional Budget Office estimated that the present discounted value of the costs to be approximately $215 billion. This amounts to about $800 per capita.[110] Since then, costs appears to be somewhat great than anticipated.) At a time when the Federal government was running an enormous deficit, it placed an additional burden on the economy's tax and financial system.[111]

As we have already noted, these numbers may grossly underestimate the budgetary impact, because they ignore the extent to which the competition among the S & L's for deposits (which, because of government insurance, were essentially like T-bills) drove up the T-Bill rate. The interest rates of the 1980s, which were, in historical perspective, so extremely high and which contributed so much to

---

[110]CBO [1992].

[111]I do not want to enter into the discussion of whether the payments should appropriately be viewed as a transfer payment, with, accordingly, smaller macro-economic consequences than if it were an expenditure on, say, defense.

the deficit, may themselves be another unintended consequence of the government insurance programs.

But these budgetary deficits are only a part of the cost. They have further ramifications. Given the restrictions on tax rates, one can view these increased expenditures as having increased the debt. Though there is debate about exactly to what extent government borrowing crowds private borrowing, there is little doubt that there is some crowding out: thus, the capital stock is lower than it otherwise would have been, and hence future income is lower.

But probably more important than this indirect effect on the capital stock is the direct effect: the S & L debacle reflects a misallocation of capital. Resources were allocated to unproductive investments. This is of particular significance, because the 1980s represented a period of unusually low savings in the United States. The Congressional Budget Office estimates that by 1992, the capital stock of the United States was almost $400 billion smaller than it would have been had the S & L's been doing their job of allocating capital efficiently. The lower capital effective stocks imply that output was lower. By the year 2000, the total cumulative loss in foregone GNP is estimated to be almost $500 billion (in 1990 dollars). In 1992, the loss in output was estimated to be $42 billion. These are large numbers, reflecting the importance to be attached to the financial sector doing its job well.

But these costs themselves underestimate the impact, because they do not take into account the costs associated with the disruption to the entire economy to which the S & L and banking crisis contributed. While the costs of the bail-out were large, there is a general consensus that the costs of not bailing out the industry would have been even larger, showing how significant the costs of economic disruption can be.

In LDCs, there is a further argument for establishing strong prudential standards. The safety of financial institutions may be more important than interest rates in mobilizing savings, as we have already noted.

Principles of Prudential Regulations

There are two major principles of sound prudential regulation: maintaining high net worth and capital requirements, and restricting interest rates paid on insured depositions.

We have already explained why high net worth and capital requirements are desirable: they help align incentives. They have a further advantage: they make the other, more complicated aspects of prudential regulation less important.

Consider, for instance, the issue of valuing banks assets. There is a controversy over whether these should be marked to market. There is a general consensus among economists that they should be marked to market. Failing to do so means that a bank may have a negative net worth, though its book value remains positive; but the banks' behavior is driven by its true net worth, not its book value. Banks have responded by claiming that marking to market results in a biased estimate, since some assets are hard to mark to market, and these assets may be undervalued. But, as we have already noted, if there is a bias it goes the other way: banks are always in the position to realize any capital gains. Thus, in the absence of marking to market, by selling assets whose market value has increased and not selling assets whose market value has declined, they can make their "book" value systematically exceed the true net worth.

How important it is, however, to measure net worth accurately depends on the standards that are chosen. When net worth standards are low, then small errors may have big consequences: a bank which is viewed viable may actually have a negative net worth. If the net worth requirement is 20% of deposits, and if banks are shut down when their measured net worth falls below that level, then even if a faulty accounting system is used, it is less likely that the true net worth is negative. Thus it is less likely that the government will be left holding the bag.

By the same token, failing to adjust deposit insurance premiums to reflect risk will be less important, because the premium only needs to reflect the probability that the net worth of the bank is

negative, and this probability (with appropriately high net worth standards) will be quite low.

Those who have a knee-jerk reaction to government regulations oppose restrictions on interest rates charged. As I have repeatedly emphasized, when the government is providing insurance, it has the responsibility of any insurer to ensure that the insured against event does not occur. Limiting the interest rates charged should be viewed in this context.

It makes no sense for the government to allow the private sector to take advantage of its implicit subsidy. If we believe that government insurance is as credible as a government guarantee that it will pay back a T-bill, then there is no justification for paying higher interest rates than on T-bills. Since banks may be providing further services, rates could be lower. To repeat, the regulation on insured deposit rates is not intended to restrict competition, but to restrict the ability of banks to take advantage of any implicit subsidy.

In fact, the subsidy is likely, in any case, to be small, since the risk exposure of the government (given a high capital requirement) is small.

I have not specified a precise net worth and capital requirement standard, for these will depend on some of the factors discussed in the preceding sections: on the ability of the regulators to measure accurately net worth, the speed and reliability with which they take actions, etc.

Nor have I discussed the detailed form in which the capital requirements might be satisfied, and the transition problems encountered in meeting high net worth and capital requirements. These are details which I take up elsewhere (see Stiglitz [1992]).

CONCLUDING REMARKS

In a sequel to this essay, I explore the role of government in other aspects of banks, bond, and equity markets.

Financial markets are rife with market failures. Appeals to simplistic views and mottos, such as

"financial markets need to be liberalized to allow markets to work" do not advance the policy debate. They are based on a model of the market economy which is inappropriate for the analysis of financial markets.

But while we have identified a number of markets failures, we have also taken cognizance of the fact that governments have only limited abilities to intervene to improve matters. But the fact that their powers are limited does not mean that the government does not have a constructive role to play in all of these markets. It does mean that a great deal of thought has to be put into the design of appropriate institutions and interventions.

References

Akerlof, G.A., "The Market for Lemons: Quality Uncertainty and the Market Mechanism," Quarterly Journal of Economics, 84(3), August 1970, pp. 488-500.

Aoki, M., "Ex-post Monitoring of the Main Bank," Stanford University mimeo, 1992.

Arnott, R.J. and Stiglitz, J.E., "Moral Hazard and Optimal Commodity Taxation, Journal of Public Economics, 29, 1986, pp. 1-24.

_____, "The Welfare Economics of Moral Hazard," with R. Arnott, in Risk, Information and Insurance: Essays in the Memory of Karl H. Borch, H. Louberge (ed.), Kluwer Academic Publishers, Norwell, 1989, pp. 91-122.

_____, "Moral Hazard and Non-Market Institutions: Dysfunctional Crowding Out or Peer Monitoring," American Economic Review, 81(1), March 1991, pp. 179-190.

Arrow, K.J., The Limits of Organization, W.W. Norton, New York, 1974.

Barth, J., "The Great Savings and Loan Debacle," American Enterprise Institute Press, Washington, D.C., 1991.

Barth, J. and Brumbaugh, R.D., The Reform of Federal Deposit Insurance: Protecting the Taxpayers and Disciplining the Government, New York, Harper Collins, 1992.

Barth, J., Brumbaugh, R.D. and Litan, R., "The Banking Industry in Turmoil: A Report on the Condition of the U.S. Banking Industry and the Bank Insurance Fund," Report of the Subcommittee on Financial Institution Supervision, Regulation and Insurance of the Committee on Banking, Finance and Urban Affairs, House of Representatives, 101st Congress, Second Session, 1990.

Baumol, W.J., "Contestable Markets: An Uprising in the Theory of Industry Structure," American Economic Review, 72(1), March 1982, pp. 1-15.

Benston, G. and Kaufman, G., "Regulating Bank Safety and Performance," in W. Haraf and R. Kushmeider (eds.), Restructuring Banking and Financial Services in America, American Enterprise Institute, Washington, D.C., 1988, pp. 63-99.

Brumbaugh, R.D., Thrifts Under Siege: Restoring Order to American Banking, Ballinger, Cambridge, 1988.

Brumbaugh, R.D. and Carron, A., "Thrift Industry Crisis: Causes and Solutions," Brookings Papers on Economic Activity, 1987, 2, pp. 349-377.

Carron, A., "The Plight of the Thrift Institutions," Washington, D.C., Brookings Institution, 1982.

Cho, Y. J., "On the Liberalization of Financial System and Efficiency of Capital Allocation under

Uncertainty," Ph.D. dissertation, Stanford University, 1984.

Congressional Budget Office, "The Economic Effect of the Savings and Loan Crisis," January 1992.

_____, Inefficiencies from Financial Liberalization in the Absence of Well-Functioning Equity Markets," Journal of Money, Credit, and Banking, 18(2), May 1986, pp. 191-199.

Dasgupta, P. and Stiglitz, J.E., "Learning by Doing, Market Structure & Industrial & Trade Policies," Oxford Economic Papers, 40, 1988, pp. 246-268.

Diamond, D. and Dybvig, P.H., "Bank Runs, Deposit Insurance, and Liquidity," Journal of Political Economy, 91(3), June 1983, pp. 401-419.

Fama, E., "Banking in the Theory of Finance," Journal of Monetary Economics, 6, 1980, pp. 38-58.

Greenwald, B., "Adverse Selection in the Labour Market," Review of Economic Studies, 53(3), July 1986, pp. 325-347.

Greenwald, B., Kohn, M. and Stiglitz, J.E., "Financial Market Imperfections and Productivity Growth," Journal of Economic Behavior, 13(3), June 1990, pp. 321-345.

Greenwald, B., Levinson, A. and Stiglitz, J.E., "Capital Market Imperfections and Regional Economic Development" paper prepared for CEPR conference on Finance and Development in Europe, Santiago, Spain, December 1991, forthcoming in the proceedings of the conference.

Greenwald, B., Salinger, M. and Stiglitz, J.E., "Imperfect Capital Markets and Productivity Growth," Stanford University mimeo, 1992.

Greenwald, B. and Stiglitz, J.E., "Externalities in Economies with Imperfect Information and Incomplete Markets," Quarterly Journal of Economics, May 1986, pp. 229-264.

_____, "Macroeconomic Models with Equity and Credit Rationing," in Asymmetric Information, Corporate Finance, and Investments, R.G. Hubbard (ed.), University of Chicago Press, 1990, pp. 15-42.

_____, "Information, Finance and Markets: The Architecture of Allocative Mechanisms," Journal of Industrial and Corporate Change, 1(1), 1992; Finance and the Enterprise, Vera Zamagni (ed.), Academic Press, 1992a, pp. 11-36.

_____, "Towards a Reformulation of Monetary Theory: Competitive Banking," NBER Working Paper 4117, 1992c.

_____, "Imperfect Information and Macro-economic Analysis," presented at NBER Annual Conference on Macroeconomics, March 1992b.

Greenwald, B., Stiglitz, J.E. and Weiss, A., "Informational Imperfections in the Capital Markets and Macro-economic Fluctuations," American Economic Review, 74(1), May 1984, pp. 194-199.

Grossman, S., "The Informational Role of Warranties and Private Disclosure about Product Quality, Journal of Law and Economics, 24, 1981, pp. 461-484.

Grossman, S. and Hart, O., "The Cost and Benefits of Ownership: A Theory of Vertical and Lateral Integration," Journal of Political Economy, 94, August 1986, pp. 691-719.

Grossman, S. and Stiglitz, J.E., "Information and Competitive Price Systems," American Economic Review, 66(2), May 1976, pp. 246-253.

_____, "On the Impossibility of Informationally Efficient Markets," American Economic Review, 70(3), June 1980, pp. 393-408.

Hellwig, M.F., "A Model of Borrowing and Lending with Bankruptcy," Econometrica, 45(8), November 1977, pp. 18797-1906.

Hirschleifer, J., "The Private and Social Value of Information and the Reward to Incentive Activity," American Economic Review, 67, 1971, pp. 561-574.

Hoff, K. and Stiglitz, J.E., "A Theory of Rural Credit Markets with Costly Enforcement," Stanford University mimeo, 1992.

Hubbard, R.G., Information, Capital Markets and Investment, University of Chicago Press, 1990.

Jaffee, D., "Symposium on Federal Deposit Insurance for S & L Institutions," Journal of Economic Perspectives, 3(4), Fall 1989, pp. 3-9.

Jaffee, D. and Stiglitz, J.E., "Credit Rationing," Handbook of Monetary Economics, B. Friedman and F. Hahn (eds.), Elsevier Science Publishers, Amsterdam, 1990, pp. 837-888.

Kane, E., The Gathering Crisis in Federal Deposit Insurance, MIT Press, Cambridge, 1985.

_____, The S & L Insurance Crisis: How Did It Happen?, Urban Institute Press, Washington, D.C., 1989a.

_____, "The High Cost of Incompletely Funding the FSLIC's Shortage of Explicit Capital," Journal of Economic Perspectives, 3(4), Fall 1989b, pp. 31-47.

Leland, H.E. and Pyle, D.H., "Informational Asymmetries, Financial Structure, and Financial Intermediation," Journal of Finance, 32(2), May 1977, pp. 371-387.

McKinnon, R.I., Money and Capital in Economic Development, Brookings Institution, 1973.

_____, "The Order of Economic Liberalization: Lessons from Chile and Argentina," Carnegie-Rochester Conference Series on Public Policy, 17, Autumn 1982, pp. 259-186.

Mishkin, F.S., "An Evaluation of the Treasury Plan for Banking Reform," Journal of Economic Perspectives, 6(1), Winter 1992, pp. 133-153.

Murdock, K., Rodríguez, A. and Stiglitz, J.E., "The Effect of Financial Repression in an Economy with Positive Real Interest Rates: Theory and Evidence," Stanford University mimeo, 1993.

Myers, S. and Majluf, N., "Corporate Financing and Investment Decisions When Firms have Information that Investors do not Have," Journal of Financial Economics, 13, 1984, pp. 187-221.

Nalebuff, B. and Stiglitz, J.E., "Prizes and Incentives: Towards a General Theory of Compensation and Competition," Bell Journal, 14(1), Spring 1983a, pp. 21-43.

_____, "Information, Competition and Markets," American Economic Review, 72(2), May 1983b, pp. 278-284.

Radner, R and Stiglitz, J.E., "A Nonconcavity in the Value of Information," Bayesian Models in Economic Theory, 5, M. Boyer and R.E. Kihlstrom (eds.), North-Holland, 1984, pp. 33-52.

Rey, P. and Stiglitz, J.E., "Short Term Contracts as a Monitoring Device," Stanford University mimeo, December 1991.

Ross, S.A., "The Economic Theory of Agency: The Principal's Problem," American Economic Review, 63(2), May 1973, pp. 134-139.

Rothschild, M. and Stiglitz, J.E., "Equilibrium Economics of Imperfect Information," Quarterly Journal of Economics, 90(4), November 1976, pp. 629-649.

Schwarz, A., "Effectiveness of Directed Credit Policies in the U.S.: A Survey of the Literature," World Bank mimeo, CECFP, May 1992.

Shaw, E., Financial Deepening in Economic Development, Oxford University Press, New York, 1973.

Shoven, J., Smart, S. and Waldfogel, J., "Real Interest Rates and the Savings and Loan Crisis: The Moral Hazard Premium," NBER Working Paper 3754, June 1991.

Stigler, G.J., "The Theory of Economic Regulation," The Bell Journal of Economics and Management Science, 2(1), 1971, pp. 3-21.

Stiglitz, J.E., "Taxation, Corporate Financial Policy and the Cost of Capital," Journal of Public Economics, 2, February 1973, pp. 1-34.

_____, "Incentives and Risk Sharing in Sharecropping," Review of Economic Studies, 41, April 1974, pp. 219-255.

_____, "The Theory of Screening, Education and the Distribution of Income," American Economic Review, 65(3), June 1975a, pp. 283-300.

_____,"Incentives, Risk and Information: Notes Towards a Theory of Hierarchy," Bell Journal of Economics, 6(2), Autumn 1975b, pp. 552-579.

_____, "Information and Economic Analysis," in Current Economic Problems, Parkin and Nobay

(eds.), Cambridge University Press, 1975c, pp. 27-52.

_____, "The Inefficiency of the Stock Market Equilibrium," Review of Economic Studies, XLIX, April 1982a, pp. 241-2611.

_____, "Information and Capital Markets," in Financial Economics: Essays in Honor of Paul Cootner, W.F. Sharpe and C. Cootner (eds.), Prentice Hall, 1982b, pp. 118-158.

_____, "On the Relevance or Irrelevance of Public Financial Policy: Indexation, Price Rigidities and Optimal Monetary Policy," in Inflation, Debt and Indexation, R. Dornbusch and M. Simonsen (eds.), MIT Press, 1983, pp. 183-222.

_____, "Credit Markets and the Control of Capital," Journal of Money, Banking and Credit, 17(1), May 1985, pp. 133-152.

_____, "The New Keynesian Economics: Money and Credit," Fisher-Schultz Lecture presented at the Meetings of Econometric Society, Copenhagen, August 1987a.

_____, "Technological Change, Sunk Costs, and Competition," Brookings Papers on Economic Activity, 3, 1987b. (Special issue on Microeconomics, M.N. Baily and C. Winston (eds.), 1988, pp. 883-947.)

_____, "The Causes and Consequences of the Dependence of Quality on Prices," Journal of Economic Literature, XXV, March 1987, pp. 1-48.

_____, "Why Financial Structure Matters," Journal of Economic Perspectives, 2(4), Fall 1988, pp. 121-126.

_____, "On the Economic Role of the State," in The Economic Role of the State, A. Heertje (ed.), Basil Blackwell, Bank Insinger de Beaufort NV, 1990a.

_____, "Peer Monitoring and Credit Markets," World Bank Editorial Review, 4(3), September 1990b, pp. 351-366.

_____, "The Role of Government in Risk Bearing within the Financial Sector," paper prepared for Conference on Government Risk Bearing, Federal Reserve Bank of Cleveland, May 1991.

_____, "Introduction -- S & L Bail-Out," The Reform of Federal Deposit Insurance: Disciplining the Government and Protecting Taxpayers, J.R. Barth and R.D. Brumbaugh, Jr. (eds.), Harper Collins Publishers, Inc., New York, 1992a.

_____, "Banks vs. Markets as Mechanisms for Allocating and Coordinating Investment," The Economics of Cooperation: East Asian Development and the Case for Pro-Market Intervention, J.A. Roumasset and S. Barr (eds.), Westview Press, 1992b, pp. 15-38.

_____, "The Design of Financial Systems for the Newly Emerging Democracies of Eastern Europe," The Emergence of Market Economies in Eastern Europe, C. Clague and G.C. Rausser (eds.), Basil Blackwell, Inc., Cambridge, 1992c, pp. 161-184.

Stiglitz, J.E. and Weiss, A., "Credit Rationing in Markets with Imperfect Information," American Economic Review, 71(3), June 1981, pp. 393-410.

_____, "Incentive Effects of Termination: Applications to the Credit and Labor Markets," American Economic Review, 73(5), December 1983, pp. 912-927.

_____, "Credit Rationing and Collateral," with A. Weiss, Recent Developments in Corporate Finance, Jeremy Edwards, et al. (eds.), Cambridge University Press, New York, 1986, pp. 101-135.

_____,"Macro-economic Equilibrium and Credit Rationing," NBER Working Paper 2164, February, 1987.

_____, "Banks as Social Accountants and Screening Devices and the General Theory of Credit Rationing," Greek Economic Review, 12, Suppl., Autumn 1990; forthcoming in Essays in Monetary Economics in Honor of Sir John Hicks, A. Courakis and C. Goodhart (eds.), Oxford University Press.

Summers, L.H. and Summers, V.P., "When Financial Markets Work Too Well: A Cautious Case for a Securities Transaction Tax," Regulatory Reform of Stock and Futures Markets: A Special Issue of the Journal of Financial Services Research, Kluwer Academic Publishers, 1989, pp. 163-188.

Vittas, D., "The Regulation of the Thrift Industries in the U.K. and the U.S.," World Bank CECFP mimeo, July 1991.

White, L., "The Reform of Federal Deposit Insurance," Journal of Economic Perspectives, 3(4), Fall 1989, pp. 11-29.

_____, The S & L Debacle: Public Policy Lessons from Bank and Thrift Regulation, Oxford University Press, New York, 1991.

_____, "Policy Issues in Financial Regulation," Policy Research Working Papers, WPS 910, The World Bank, May 1992.

Wilson, C., "A Model of Insurance Markets with Incomplete Information," Journal of Economic Theory, 16, 1977, pp. 167-207.

Winter, S., "Economic 'Natural Selection' and the Theory of the Firm," Yale Economic Essays, 4(1), Spring 1964, pp. 225-272.

Wolf, C., Markets and Government: Choosing between Imperfect Alternatives, MIT Press, Cambridge, 1988.

TABLE--NET SOURCES OF FINANCE -- 1970-89

Weighted Average, Undepreciated, Revalued

	France	Germany	Japan	UK	US
Internal	66.3	80.6	71.7	98.0	91.3
Bank Finance	51.5	11.0	28.0	19.8	16.6
Bonds	0.7	-0.6	4.0	2.0	17.1
Equity	-0.4	0.9	2.7	-8.0	-8.8
Trade Credit	-0.7	-1.9	-7.8	-1.6	-3.7
Capital Transfers	2.6	8.5		2.1	
Other	-14.9	1.5	1.3	-4.1	-3.8
Statistical Adj.	-5.1	0.0	0.1	-8.2	-8.7
Notes	1970-85	1970-89	1970-87	1970-89	1970-89

Source: Unpublished flow of funds figures from the CEPR International Study of the Financing of Industry. Data courtesy of Tim Jenkinson and Colin Mayer.