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## CHAPTER EIGHT

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# *Financial Infrastructure and Public Policy*

## A Functional Perspective

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The central theme of this book is that the basic functions performed by the financial system are stable across time and place, but the institutional ways that they are performed are not. Over time, institutional form follows function, as innovation and competition lead to greater efficiency in the performance of the functions. Therefore, an integrated understanding of the changing global financial system is facilitated by using the financial function as the focus of analysis instead of the financial institution. The preceding chapters offered specific analyses and illustrations of this theme.

This chapter begins with highlights of the key points raised in these chapters, and it then explores the changes in financial infrastructure and regulation that may be necessary to support further improvements. It focuses on the need for vastly upgraded accounting systems that results from the cumulative innovations in financial contracting and trading practices developed over the past few decades. It also shows how a functional perspective on regulation can help to address some of the key

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public policy concerns that have arisen regarding these financial innovations. The chapter concludes by applying the functional perspective to take a prospective look at major trends and policy issues that may affect the financial system in the future.

### **Highlights of Preceding Chapters**

Chapter 2 makes the case that the vast majority of payments volume today is related to securities transactions, and that derivative instruments have come to serve as an important extension of the clearing and settlement process for such transactions. A key insight into the increased use of derivatives is that fund transfers are more frequent, but also smaller than in the past, and therefore derivative securities can actually reduce the risk of systemic disruption to the payments system that a single large default would produce.

Chapter 3 shows how pooling is accomplished both through financial intermediaries, such as banks, and through financial contracting, such as issuing securities. It examines how the process of securitization has fostered the growth of new forms of pooling by removing nontraded assets from the balance sheets of financial intermediaries and packaging them in more convenient forms for investors to hold. As illustrated in both the mortgage-backed securities market and the commercial-paper market, securitization has made possible the direct purchase of new financial instruments by households and supported the growth of mutual fund companies.

Chapter 4, which discusses the transfer of economic resources, illustrates how subdividing financial activities along functional lines can enhance efficiency in the performance of the separate functions. Specifically, it shows that by separating the lending activity into a resource transfer function and a credit insurance function, lending can be more efficiently performed in some important instances. This separation of functions has been accomplished through a combination of securitization of debt contracts and new institutional arrangements designed to guarantee contract performance. In this manner, the United States residential mortgage market has been transformed from a highly local market to an international market.

Chapter 5 investigates the essential function of risk management and transfer. It has parallels with the analysis in Chapter 4 when it examines how the development of derivative securities has facilitated the separation of the risk management function from the resource transfer function. It also explores the impact of this development on the stability of the financial system and the possible need for regulation of derivatives trading.



kets during the past two decades has expanded the opportunities to extract useful information from the prices of financial instruments. It shows in particular how information about the volatility of future changes in security, currency, and commodity prices can be extracted from options and option-like securities.

Chapter 7 shows how recent innovations in financial contracting such as the use of derivatives within corporate risk management programs can reduce the costs of dealing with incentive problems. Because incentive problems make it more costly for companies to raise external capital than to use internal capital, they affect corporate investment, financing, and risk management policies. By materially reducing the costs of solving incentive problems, financial innovation can thus have fundamental effects on these policies.

## **Infrastructure and Regulation**

The financial infrastructure consists of the legal and accounting procedures, the organization of trading and clearing facilities, and the regulatory structures that govern the relations among the users of the financial system. From a long historical perspective of several centuries, the evolution of the infrastructure of the financial system has been identified as perhaps the key to understanding economic development.<sup>1</sup> In particular, the emergence of England as the first industrialized nation in the world during the eighteenth and nineteenth centuries has been attributed to the creation of the necessary financial infrastructure during the latter part of the seventeenth and early eighteenth centuries.<sup>2</sup>

An important challenge for public policy is explicit recognition of the interdependence between product and infrastructure innovations and acknowledgment of the inevitable conflicts that arise between the two. To call up a simple analogy, consider the creation of a high-speed passenger train, surely a beneficial product innovation.<sup>3</sup> Suppose, however, that the tracks of the rail system are inadequate to handle such high speeds. Without any rules, the innovator, whether through ignorance or a willingness to take risk, might choose to run the train at high speed anyway.

If the train crashes, it is, of course, true that the innovator and the passengers will pay dearly. But if in the process the track is also destroyed, those who use the system for a different purpose, such as freight opera-

tors, will also be harmed. Hence the need for policy to safeguard the system.

A simple policy that meets that objective is to mandate a safe, but low speed limit. Of course, this narrowly focused policy has the unfortunate consequence that the benefits of innovation will never be realized. A better, if more complex, policy solution is to upgrade the track, and in the meantime set temporary limits on speed, while there is a technological imbalance between the product and its infrastructure.

As in this hypothetical rail system, the financial system is used by many for a variety of purposes. Separate and discrete financial innovations in products and services can be implemented in an entrepreneurial way and rather quickly. Innovations in financial infrastructure, however, must be more coordinated; they therefore take longer to implement and will occur more gradually.

Successful public policy depends importantly on recognizing the limits of what government can do to improve efficiency and on recognizing when government *inaction* is the best choice. Government regulatory actions can do much to either mitigate or aggravate the dysfunctional aspects of financial innovations. By analogy again, hurricanes are inevitable, but government policy can either reduce their devastation by encouraging early warning systems or it can aggravate the damage by encouraging the building of housing in locations that are especially vulnerable to such storms. Similarly, well-intentioned government policies aimed at reducing the systemic risks of a crisis in the global financial system may have the unintended and perverse consequence of actually increasing the risk of such a crisis.

## Risk Accounting

A fundamental part of the infrastructure that will require significant changes to accommodate future financial innovation is the financial accounting system. Traditionally, accounting focuses on value allocations. For this purpose it is generally effective. We need not distinguish here between book or market valuation, because the point is that the accounting system basically looks only at value allocations. It is therefore an ineffective structure for identifying risk allocations.

To illustrate this point, suppose a hypothetical savings bank has fixed-rate mortgages as assets, floating-rate deposit liabilities, and equity. The accounting system indicates the value of assets (the fixed-rate mortgages) on the left-hand side, and on the right-hand side it tells us the value of deposits as well as the value of the bank's equity.

Suppose that this bank now enters into a swap in which it agrees to



receive the floating interest rate and pay the fixed rate. What is the impact of this transaction? The objective, of course, is to match the risk of interest rate exposure of its assets and liabilities by transforming floating-rate financing into fixed-rate financing, or equivalently in this case by transforming fixed-rate returns into floating-rate returns.

But where does that drastic change in the risk exposure of the equity appear in the balance sheet? The current financial accounting structure with its focus on valuation has no place for it. The reason is that the value of a swap is typically zero when the institution enters into it. It thus can be listed neither as a liability nor as an asset.

Much is written and said today about the large and varied exposures that are "off-the-balance-sheet" of banks and other financial institutions. It is even suggested that firms that use those swaps or other off-balance sheet contractual arrangements do so to hide information from outsiders. At times and for some firms, disguise may be a primary motive, but the more frequent and widespread reason that these "zero-value" contractu-als are off-balance-sheet is simply that the accounting system does not have a place to put them.

Although contracts like interest rate swaps and futures contracts have no initial value, they can have an immediate and significant impact on the risk exposure of the various assets and liabilities that are on the balance sheet. It is precisely in this sense that accounting can be said to do a good job at valuation but that it is totally inadequate to deal with risk allocation.

Major changes in accounting structure and methodology are required to address this inadequacy. In particular, financial accounting needs fundamental revisions to develop a specialized new branch called "risk accounting." The prospect for such development is not just prospective and theoretical. Pressed by the reality of need, financial firms that deal extensively in complex securities have already developed risk accounting protocols as part of their internal management systems. With the benefits of real-world experience, these protocols could serve as prototypes for standardized risk accounting.<sup>4</sup>

### **An Example: Regulation of OTC Derivatives**

Chapters 1, 2, and 5 call attention to the extraordinary growth in the trading of derivatives since the mid-1980s. Driving this growth is the vast savings in transactions costs from their use. The most recent growth has

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4. For generic examples, see Hindy (1995) and Merton (1989, pp. 242-247; 1992b, pp. 450-457).

been focused in over-the-counter (OTC) derivatives. These contracts are transacted away from a central market, putting greater pressure on the intermediary issuing them to price them correctly and to manage their risk.

Much has been written on whether it is time for governments to take strong steps to protect against increases in systemic risk arising from the use of OTC derivatives.<sup>5</sup> Yet, as discussed in Chapters 1, 2, and 5, the use of OTC derivatives can just as well be framed as reducing systemic risks.<sup>6</sup> Resolving this issue therefore rests on the empirical evidence. Thus a key question in the debate becomes how to measure the risk exposure created by derivatives.

The contribution to systemic risk exposure from OTC derivatives must be measured relative to the risk exposure contribution of the financial structure that they replace, and not in some abstract, absolute terms as if there were no systemic risk exposure prior to their introduction. For example, the over-the-counter options market for foreign exchange (forex) is in part a substitute for interbank forex market trades. The exposure to contract default on OTC options is related to the *difference* between the principal amount and the strike price. In the forex market, principal amounts are exchanged, so the default exposure is the *total* principal amount. Therefore, although the options surely have exposure to contract default, their use as a substitute for the standard forex transaction actually reduces the magnitude of systemic exposure.<sup>7</sup>

Prior to the widespread development of swaps, parallel loans were used to achieve similar results. The systemic exposure of these loans includes the principal and gross interest payments on *each* loan. The swap, by contrast, involves no principal amount exposure; it has exposure only to net interest payments. Yet public debate on the systemic risk of swaps and other derivatives is often clouded by the nearly universal practice of citing the notional principal amount of swaps outstanding, and treating that number as if it were the amount at risk.

To facilitate measurement, financial accounting must undergo fundamental revisions in the long run. In our opinion, central to those revisions

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5. Most recently in the United States, the General Accounting Office 1994 report and the Global Derivatives Study Group (1993). See also Darby (1994), Freeman (1993), Miller (1994b), and Paré (1994).

6. The focus on increasing systemic risk is all the more perplexing because derivative securities have long been integral parts of the financial system. As discussed in Merton (1992a), options, forward contracts, and futures have been around since the seventeenth and eighteenth centuries in Europe, the United States, and Japan. Among the earliest derivative securities were bank currencies (money), which "derived" their value from their convertibility into the underlying gold held in depositories.

7. Chapter 2 makes the same point for the Rolling Spot forex futures contract traded on the Chicago Mercantile Exchange with respect to the length of the settlement period.



is the creation of a specialized new branch dealing with risk accounting. Until a system of risk accounting is in place, truly effective regulation will be difficult to implement.

## Functional Regulation

As discussed in Chapter 1, increasingly more sophisticated trading technologies, together with low transactions cost markets to implement them, tend to blur the lines among financial products and services. The existence of these technologies and markets also implies easier entry into the financial services. As a result, distinctions between financial institutions are likely to become even less clear in the future.

For example, insurance companies now offer U.S. Treasury money market funds with check writing, while banks use options and futures markets transactions to provide stock-and-bond-value insurance that guarantees a minimum return on customer portfolios. Credit subsidiaries of major manufacturing firms no longer serve only the single, specialized function of providing financing for customers of their parents; they now offer services ranging from merchant banking for takeovers and restructurings to equity-indexed mutual funds sold to retail investors. Electronics also makes the meaning of "the location of the vendor" of these products ambiguous. Therefore, whatever the change in the degree of regulation in the future, a major change in the format of regulation from *institutional* to *functional* seems inevitable.

The approach generally adopted by regulators is to treat the existing institutional structure as given, and to view the objective of public policy as helping the institutions currently in place to survive and flourish.<sup>8</sup> In contrast, the functional perspective takes as given the functions to be performed, and asks instead what the best institutional structure is to perform those functions.

Functional regulation promises more consistent treatment for all providers of functionally equivalent products or services and thereby reduces the opportunities for rent-seeking and regulatory capture. Furthermore, functional regulation can facilitate necessary changes in institutional structures by not requiring a simultaneous revision of the regulations or the regulatory bodies surrounding them as is often required with an institutionally based regulatory structure.<sup>9</sup>

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8. The thrust of policymaker thinking is perhaps reflected in the titles given to government reports. For instance, the U.S. Treasury entitled its February 1991 detailed proposals for financial system reform, *Modernizing the Financial System: Recommendations for Safer, More Competitive Banks*.

9. See Chicago Mercantile Exchange (1993) for an example of a model for a more function-

The case of regulating OTC derivatives provides an illustration of a major advantage of functional regulation. To be effective and avoid unintended consequences, policy implementation must be comprehensive and include similar treatment of economically equivalent transactions. For example, a proposed regulation to force marked-to-market collateral requirements on OTC derivatives, but not on loans and other “traditional” investments, could actually cause a shift back toward structures (like parallel loans) that actually increase the systemic exposure of the system.

Implementation of comprehensive regulations, however, will be quite difficult. To underscore the point, we repeat the example from Chapter 1 of the varied ways to take a levered position in the Standard & Poor’s 500 stocks:

1. You can buy each stock individually on margin in the cash stock market.
2. You can invest in an S&P 500 Index fund and borrow from a bank to finance it.
3. You can go long a futures contract on the S&P 500.
4. You can go long an OTC forward contract on the S&P 500.
5. You can enter into a swap contract to receive the total return on the S&P 500 and pay LIBOR or some other standard interest rate.
6. You can go long exchange-traded calls and short puts on the S&P 500.
7. You can go long OTC calls and short puts.
8. You can purchase an equity-linked note that pays on the basis of the S&P 500 and finance it by a repurchase agreement.
9. You can purchase from a bank a certificate of deposit with its payments linked to the return on the S&P 500.
10. You can either buy on margin or purchase the capital appreciation component of a unit investment trust (examples are Super Shares or SPDRs) that holds the S&P 500.
11. You can borrow to buy a variable-rate annuity contract with its return linked to the S&P 500.

In the United States alone, the types of institutions involved in these equivalent trades include brokers, mutual funds, investment banks, commercial banks, insurance companies, and exchanges. The regulatory authorities involved include the Securities and Exchange Commission, the Com-



modity Futures Trading Commission, the Board of Governors of the Federal Reserve System, the Comptroller of the Currency, and state insurance commissions. One need hardly mention that, in the real world, attempts to regulate just two or three of the eleven ways of doing an equivalent thing are not going to be effective.

## Looking Ahead

As we look into the future, there are a number of areas where a functional perspective on regulation seems to offer the potential for improved policy options. Let us consider some of them.

### *Regulation of Banks*

First, consider commercial banks in the United States.<sup>10</sup> Since the 1930s they have performed traditionally two main economic activities: They make loans (including guarantees of loans) to businesses, households, and governments, and they take deposits from customers. The loans and guarantees made by banks are risky and tend to require careful monitoring. Thus, bank loans are relatively "opaque" assets.<sup>11</sup> On the other hand, bank deposits are expected by customers to be safe and liquid.

Government insurance through the Federal Deposit Insurance Corporation (FDIC) is the principal means to assure safety of customer deposits. It is the fundamental mismatch between bank demand-deposit liabilities insured by the government and the illiquid, risky, and opaque loans collateralizing those insured deposits that gives rise to the deposit insurance problem.<sup>12</sup>

Even if historically there were efficiency gains from using insured deposits as the primary source to finance the commercial lending activities of banks, there is no evidence that such benefits exist today.<sup>13</sup> We argue

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10. Merton and Bodie (1993) and Pierce (1993) present an explicitly functional approach to the subject of bank regulation in the United States. While their analysis focuses specifically on the U.S. experience, it also applies to many other countries with a similar structure.

11. We use the term "opaque" here in the sense developed by Ross (1989).

12. In discussions of deposit insurance, it is common practice to use the cost to the U.S. taxpayer of bailing out the depositors of failed depository institutions as the measure of the problem. The true cost to society, however, is the misallocation of investment and the unintended redistribution of income and wealth caused by the current system. The current deposit insurance system, accounting rules, and regulatory procedures can encourage excessive risk-taking.

13. Gorton and Pennacchi (1991) present several "agency cost" arguments for using very short-term debt to finance in large part those specialized institutions that make opaque and illiquid loans. They show, however, that there is no need for this short-term debt to take the form of insured demand deposits that are part of the payments system.

elsewhere (1993) that by changing the institutional structure of commercial banking—through separating banks' lending and loan guarantee activities from their deposit-taking activities—it is possible to achieve potentially large social benefits with no apparent offsetting costs. We are therefore led to agree with Black (1985), Kareken (1986), Litan (1987), Pierce (1991, 1993), and Tobin (1985, 1987) that deposit insurance can be effectively reformed by this separated structure. As discussed in Merton and Bodie (1993), this separation can be achieved by simply requiring that federally insured deposits be fully collateralized with the equivalent of U.S. Treasury bills.<sup>14</sup>

This proposed solution to the structural problem of deposit insurance, however, does not require a so-called narrow-bank structure that prohibits institutions that take transactions deposits from engaging in other financial activities, including risky lending. Indeed, under these collateral conditions, there is no danger to the safety of deposits from depository firms offering other financial services. Thus, this proposal does not eliminate any opportunities for economies of scope or scale from "one-stop shopping" for consumers of financial services.

Once the lending and loan-guarantee activities of banks are separated from insured deposits as the funding source, lending could be carried on with many fewer government restrictions and strict capital requirements designed to protect the FDIC. The financing of these lending activities would probably evolve to some combination of common and preferred stock, long-term and short-term debt, and convertible securities, as determined by competitive market forces. If, as some have suggested, government intervention is required in the area of commercial lending to over-

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Indeed, Merton and Bodie (1993) argue that financing with *insured* deposits would defeat the agency purpose of short-term debt because the holders of that debt would no longer have an incentive to monitor the firm in making their decision whether to "roll over" the debt and continue to finance the firm.

Benston and Kaufman (1988) argue that if the same institution that holds a customer's deposits also grants loans to that customer, economies of scale and scope can be achieved. Black (1975) and Fama (1985) appear to make similar claims, although Black (1985) later seems to reject such synergies. In these times, it is rare that either a business or an individual carries all its financial accounts including credit cards with a single bank. Moreover, we are unaware of any widespread practice to induce this behavior by offering significantly better loan terms to those who would do so. If, however, such potential efficiency gains are really there, the Merton and Bodie (1993) proposal for reform does not rule out lending and deposit-taking activities within the same company, provided that the loans do not serve as collateral for deposits.

In summary, we know of no study showing direct synergistic benefits from having risky loans serve as the collateral for insured demand deposits.

14. The idea of requiring interest-earning obligations of the U.S. government as 100 percent reserves against bank demand deposits was proposed by Friedman (1960). His proposal, however, is motivated by the objective of achieving more effective control of the money supply.



come private market failures, that intervention can surely be made more efficient if it is not complicated by the existence of government-insured demand deposits.

The proposed reform also readily permits other institutions, such as mutual funds, to compete with depository banks in offering insured deposits to their customers. As long as these other institutions maintain the required collateral and follow the same reporting procedures, a level playing field is created for all providers of safe and liquid transactions deposits.

In this new environment, is there still a role for deposit insurance? Reasons given for deposit insurance tend to fall into five categories:

- To encourage and enhance a safe and convenient form of investment for small savers.
- To ensure an adequate and stable supply of credit to worthy borrowers who would not otherwise have access to the nation's supply of capital.
- To facilitate the creation of liquidity.
- To prevent a run on the banking system that might destabilize the macroeconomy.
- To enhance the efficiency of the payments system.

In our opinion, only the last of the five actually requires deposit insurance for efficiency. The other four are better served by alternative means.

Deposit insurance enhances the efficiency of the payments system by eliminating unnecessary monitoring costs. If demand deposits are subject to default risk on the part of the bank, then sellers of goods seeking to verify the ability of buyers to make good on their promises to pay would have to verify not only that the buyer has enough money in an account, but also that the bank in which the account is held is solvent. Similarly, buyers who want the convenience of writing default-free checks would have to monitor the solvency of the bank in which they have their account. Uncertainty about the ability of the bank to make good on its deposit liabilities thus creates deadweight losses. The system of collateralized demand deposits we advocate eliminates this deadweight loss for all parties at minimal cost. The role of the FDIC in this system is simply to confirm to the public that sufficient collateral is there and that, if it is not, the FDIC will make good on the payment.

### *Regulatory Cooperation and Competition*

The blurring of distinctions among financial intermediaries and markets might seem to support a broader case for widespread coordination, and

even standardization, of financial regulations, both domestically and across national borders. However, such extrapolation is valid *only if* the coordinated regulatory policies chosen are socially optimal. The reduction in regulatory diversification that by necessity occurs with more effective coordination will accentuate the social losses if the common policies chosen are suboptimal.<sup>15</sup>

A related question is whether imposition of a single regulator for all providers of a particular financial function has the unintended consequence of actually inducing a new systemic risk component that did not exist before. Put differently: Do multiple types of institutions and regulators serving a particular financial function create multiple channels of service, which thereby serve to reduce systemic exposure?

As an analogy, consider an instance from transportation.<sup>16</sup> The objective is to assure travel from England across the Channel to France. Suppose that only one institutional form of transportation across the Channel is available, flight by airplane. Assume further a single regulator for air transportation. In this structure, foggy weather, which is known to happen in England, becomes a systemic event that can shut down transportation.

Because nothing is going to fly, it does not matter how many different airlines there are. Moreover, if the single regulator decides that planes should not fly because it thinks there is bad weather coming, and the forecast happens to be wrong, then the single regulator actually induces the systemic event. Why not allow the Channel tunnel as another way of getting across? With a different regulator, it is in every dimension a different way to cross. Systemic risk is reduced by this diversification. But the tunnel too could block up. So why not a third way such as a hovercraft that can go across the surface? The likelihood that all three ways would fail simultaneously is probably quite small. Hence, the presence of multiple modes of transportation with different structures reduces the systemic risk of complete breakdown in ability to cross the Channel.

As with transportation, so with financial services. We acknowledge that regulating a particular financial function is more complicated when there are multiple channels of providers, because a regulator has to deal with many different kinds of institutions. But the end objective should not be what is easiest for regulators, but what is best for the end users of the financial system.

### *Pension Reform and Privatization*

Financial innovation can facilitate the achievement of some nonfinancial goals of public policy. Pension reform and privatization of state-owned

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15. White (1993) makes a similar point.

16. This analogy is taken from Merton (1995).



enterprises are examples. These two objectives are high on the list of many countries, including Argentina, Brazil, Chile, the Czech Republic, Hungary, Israel, and Italy.<sup>17</sup> The idea of linking the implementation of policies to achieve both of these objectives simultaneously provides an occasion to illustrate application of the functional perspective to public policy regarding the financial system.

Privatization in its most general sense means transferring responsibility for performing some economic function from the government to the private sector. In the context of pension reform, privatization has come to mean less reliance on the government-run part of the pension system, which is typically a pay-as-you-go system, and greater reliance on employer-provided pensions and specially designated private retirement accounts.

But, privatization also means the transfer of the ownership and control of state-owned enterprises to the private sector. In many countries, privatization in this sense is under consideration as a mechanism for improving the way business firms are managed and scarce capital resources are allocated among those firms. It is believed that by encouraging the creation of competitive securities markets and by finding structures that make managers more accountable to the owners of these securities, the most competent managers will rise to the top, and resources will be allocated more efficiently.

Reform of a country's pension system and privatization of state-owned enterprises are quite separate financial matters. Nonetheless, under certain circumstances, combining the two may make it easier to resolve problems that arise in trying to implement each separately. For example, a major element in switching from a government-run pay-as-you-go retirement income system to a funded private pension system is providing both financial instruments for pension funds to invest in and liquid markets in which to trade them. Similarly, privatization of industry is greatly facilitated by having an array of securities markets to absorb the stocks and bonds issued by newly privatized firms. Undertaking pension reform and privatization of industry at the same time permits a more balanced growth in securities markets by simultaneously developing the demand (by pension funds) and the supply (by privatized firms).

In implementing pension reform, financial managers in both the private and public sectors can exploit the global financial network discussed in Chapter 1 to avoid conflict with other policies. For example, swaps can

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17. A recent World Bank study (1994) documents many of these efforts. In particular, Chile's experience since 1981 has been closely studied as a possible model for other countries. See Myers (1991, 1992) for details about the Chilean experience. See Bodie and Merton (1992) on Israel; Diamond (1992) on Poland, and Hanke (1991) on the former Communist countries of Eastern Europe.

be used to allow local firms and individuals to diversify internationally without exposing the country to the problem of "capital flight."<sup>18</sup> As an illustration, consider an international equity swap contract between a small-country pension fund and a foreign institution on a notional or principal amount of \$1 billion. In the proposed swap, the total return per dollar on the small-country's domestic stock market is exchanged annually for the total return per dollar on a market-value weighted average of the major world stock markets. Trading and ownership of actual shares remain with small-country investors.

The swap agreement effectively transfers the risk of the small-country stock market to foreign investors and provides the domestic investors with the risk return pattern of a well-diversified world portfolio. Since there are no initial payments between parties, there are no initial capital flows in or out of the country. Subsequent payments, which may be either inflows or outflows, involve only the difference between the returns on the two stock market indexes, and no "principal" amounts flow.

Foreign investors benefit from the swap by avoiding the costs of trading in individual securities in the small-country market and by avoiding some potential tax complications that often arise with cross-border investments. Furthermore, they avoid the problems of corporate governance issues that arise when foreigners acquire large ownership positions in domestic companies. Unlike standard cash investments in equities, debt, or real property, the custodial-default risk or expropriation exposure of foreign investors is limited to the difference in returns instead of the total gross return plus principal.

The risks of default are further reduced when the small country party to the swap is a pension fund with its assets invested in the small-country stock market as a hedge. The foreign counterparty to the swap could, of course, also be a pension fund with its assets invested in the world stock market portfolio.

Equity-return swaps based on the returns of major stock markets are common today. Although we are unaware of their explicit application to stock markets in countries with capital controls, given the current rate of innovation, we would not be surprised to see such a development soon. More generally, customized private financial contracting is now available in world capital markets on a large enough scale to accommodate the needs of national governments. As illustrated by our hypothetical swap example, such contracting often makes possible low-cost elimination (or at least reduction) of unintended and undesirable side effects of public financial policies without interfering with the intended objectives of these policies.

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18. Merton (1992a) develops this idea in detail.



## Stabilization Policy

Chapter 1 briefly discusses the ways that financial innovation can affect central bank activities designed to stabilize the macroeconomy. Without taking a position on whether governments should pursue stabilization, we believe that if stabilization remains an objective of government policy in the future, central banks will almost surely use derivative instruments to help implement it.

For an example of how derivatives could be used in the future, consider the German government's issue in 1990 of a sizable private placement of ten-year *Schuldscheine* bonds with put option provisions.<sup>19</sup> The securities are just like standard ten-year government bonds, except they have the feature that the holders can put them back to the government for a fixed price.

By issuing these bonds, the German government in effect introduced a preprogrammed stabilization policy. How is that? Suppose it had issued a standard ten-year bond instead. Suppose further that afterward interest rates start to rise, and therefore, that bond prices fall. Normal ten-year bonds would fall in price in line with interest rate rises.

But what happens to the bonds with the put option? The put bonds will not decline as much as the normal ten-year. Furthermore, the rate of decline in the put bonds becomes less and less until they cease to decline at all. At that point, the bonds will actually begin to behave just like a short-term money instrument. If interest rates were to fall and bond prices to rise, the puts would become more out-of-the-money, and the effective outstanding bond exposure held by investors would increase, which is effectively the same as the government's issuing more bonds.

Note that the decrease or increase in the equivalent bond exposure takes place immediately as interest rates change, without requiring that the bonds actually be put back to the government. It is unlikely that stabilization was the original intent of the German government. Nevertheless, by issuing the put bonds, the government in effect put into place an automatic stabilizer to the extent that "stabilization" means to "lean" against market movements; that is, to buy bonds when bond prices go down, and sell bonds when they go up. The put bonds thus function as the equivalent of a dynamic, open-market trading operation without any need for actual transactions.<sup>20</sup>

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19. We are indebted to Peter Hancock and the J.P. Morgan Global Research Group for alerting us to the existence of the *Schuldscheine* bonds with put options.

20. In the usual applications, the contingent-claim instrument is given, and a dynamic trading strategy is derived that replicates the payoffs to the claim. Here, we start with

The put bonds achieve more than that because their issue also in effect announces a prescribed open-market policy. If the market believes that issuance is a systematic part of policy, then by looking at the size and terms of government put issues, the market can figure out the implied stabilization policy. In comparison to traditional open-market activity, the put option bond automatically kicks in as soon as events occur because that feature is built into the structure of the securities. Therefore the securities add value because on weekends, non-trading days, and during crashes, the central bank need not be on the scene to implement the open-market operations.

The stated interest rate to be paid by the government on these put bonds is lower than on a standard ten-year bond because the price of the bond includes the value of the put. This provides another difference between selling put bonds to the market and undertaking a traditional open-market stabilization policy. The government in effect charges for the stabilization insurance because the private sector pays for the put option rather than receiving it for free.<sup>21</sup>

To charge explicitly for stabilization may or may not be an objective that policymakers want to achieve. It is, however, now feasible to charge the private sector for interest rate insurance in an efficient way. By issuing the bonds, the government effectly gives the private sector a positive supply of interest rate insurance, which can then be distributed by the private sector.

As noted, none of this is likely to have been the conscious intent of the German government in the case of the *Schuldscheine* bonds. The action nonetheless provides an alternative to traditional stabilization policies, and thus it is an early instance of a class of new techniques for dealing with a low-friction, global financial system. It should be evident that this same approach to automatic stabilizers could also be applied to automatic intervention programs for currencies.

## Summary and Conclusion

This book assumes that the functions of the financial system are stable, but that the ways in which functions are performed are not. Accordingly, it introduces an analytical framework that relies on functions rather than on institutions as its conceptual anchor. From our perspective on the financial system, institutional form follows its function.

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a trading strategy and derive the contingent claim that replicates the payoffs from the strategy. This reverse approach is used by Cox and Huang (1989) to solve the lifetime consumption problem. See also Merton (1992b, pp. 457–467).

21. Of course, it is not really “free,” since taxpayers pay for it.



From the most aggregated level of the single primary function of resource allocation, six core functions performed by the financial system are identified:

- To provide ways of *clearing and settling payments* to facilitate trade.
- To provide a mechanism for the *pooling of resources* and for the *subdividing* of shares in various enterprises.
- To provide ways to *transfer economic resources* through time, across borders, and among industries.
- To provide ways of *managing risk*.
- To provide *price information* to help coordinate decentralized decision-making in various sectors of the economy.
- To provide ways of *dealing with the incentive problems* created when one party to a transaction has information that the other party does not or when one party acts as agent for another.

Chapters 2 through 7 describe these six functions. Each chapter connects financial innovation with major improvements in the performance of financial functions. Specific instances include:

- Trading in derivative instruments has substituted in a variety of ways for trading in underlying securities, thereby providing an alternative mechanism for the clearing and settling of transactions.
- Securitization has made it possible for institutions such as mutual funds to flourish, thereby facilitating the pooling of resources and the subdividing of shares.
- Improved techniques for collateralization, credit enhancement, and financial contracting using derivatives have made it possible to overcome some traditional incentive problems, thereby enhancing the transfer of capital resources around the world and the global allocation of risks.
- Expansion of the number and diversity of financial markets creates more opportunities to extract useful information from the prices of financial instruments.

Chapter 8 has considered the changes in financial infrastructure and regulation necessary to support further improvements. Among these is the need to develop a new branch of accounting to measure the exposure of firms to the risk of unanticipated changes in the economic environment. Effective regulation is impossible without such an accounting system.

In the future, public sector managers are likely to become increasingly familiar with financial engineering, derivatives, and the advanced financial technology and concepts currently used in the private sector. They

must do so not only so they can understand the parts of the financial system they regulate, but also to execute their own functions more effectively. We harbor the hope that the functional perspective we have set forth can help with the efficient evolution of the system by providing a single framework of analysis shared by both public sector and private sector managers.

## References

- Benston, G., and G. Kaufman (1988), "Risk and Solvency Regulation of Depository Institutions: Past Policies and Current Options," New York: Salomon Brothers Center Monograph Series in Finance and Economics, Monograph 1.
- Black, F. (1975), "Bank Funds Management in an Efficient Market," *Journal of Financial Economics*, 2 (December): 323-339.
- (1985), "The Future for Financial Services," Chapter 8 in *Managing the Service Economy*, R.P. Inman, ed., Cambridge: Cambridge University Press.
- Bodie, Z., and R.C. Merton (1992), "Pension Reform and Privatization in International Perspective: The Case of Israel," Harvard Business School Working Paper No. 92-082, Boston (May). Also published in Hebrew, *The Economics Quarterly*, August 1992, 152.
- (1993), "Pension Benefit Guarantees in the United States: A Functional Analysis," in *The Future of Pensions in the United States*, R. Shmitt, ed., Philadelphia: University of Pennsylvania Press.
- Chicago Mercantile Exchange (1993), "A Blueprint for Reform of the Financial Regulatory Structure."
- Commodity Futures Trading Commission (1993), *The Report of the Commodity Futures Trading Commission: OTC Derivative Markets and Their Regulation*, Washington, D.C. (October).
- Cox, J.C., and C. Huang (1989), "Optimum Consumption and Portfolio Policies When Asset Prices Follow a Diffusion Process," *Journal of Economic Theory*, 49 (October): 33-83.
- Darby, M. (1994), "OTC Derivatives and Systemic Risk," National Bureau of Economic Research Working Paper 4801, Cambridge, MA.
- Diamond, P. (1992), "Pension Reform in a Transition Economy: Notes on Poland and Chile," Paper prepared for NBER Conference on Industrial Restructuring in Eastern Europe (February).
- Dickson, P.G.M. (1967), *The Financial Revolution in England*, New York: St. Martin's Press.
- Fama, E. (1985), "What's Different About Banks?" *Journal of Monetary Economics*, 15 (January): 29-39.
- Freeman, A. (1993), "A Survey of International Banking: New Tricks to Learn," *The Economist*, April 10: 1-37.
- Friedman, M. (1960), *A Program for Monetary Stability*, New York: Fordham University Press.



- General Accounting Office (1994), *Financial Derivatives: Actions Needed to Protect the Financial System*, Report GAO/GGD-94-133, Washington, D.C. (May).
- Global Derivatives Study Group (1993), *Derivatives: Practices and Principles*, Washington, D.C.: The Group of Thirty (July).
- Gorton, G., and G. Pennacchi (1991), "Financial Innovation and the Provision of Liquidity Services," in *Reform of Deposit Insurance and the Regulation of Depository Institutions in the 1990s*, D. Brumbaugh, ed., Grand Rapids, MI: Harper Business.
- Hanke, S.H. (1991), "Private Social Security: The Key to Reform in Eastern Europe," *Contingencies* (July/August): 18-21.
- Hindy, A. (1995), "Elements of Quantitative Risk Management," in *Risk Management: Problems & Solutions*, W.H. Beaver and G. Parker, eds., New York: McGraw-Hill.
- Kareken, J.H. (1986), "Federal Bank Regulatory Policy: A Description and Some Observations," *Journal of Business*, 59 (January): 3-48.
- Litan, R.E. (1987), *What Should Banks Do?* Washington: The Brookings Institution.
- Merton, R.C. (1989), "On the Application of the Continuous-Time Theory of Finance to Financial Intermediation and Insurance," *Geneva Papers on Risk and Insurance*, 14 (July): 225-262.
- (1992a), "Financial Innovation and Economic Performance," *Journal of Applied Corporate Finance*, 4 (Winter): 12-22.
- (1992b), *Continuous-Time Finance*, revised edition, Oxford: Basil Blackwell.
- (1993), "Operation and Regulation in Financial Intermediation: A Functional Perspective," in *Operation and Regulation of Financial Markets*, P. Englund, ed., Stockholm: The Economic Council.
- (1995), "Financial Innovation and the Management and Regulation of Financial Institutions," *Journal of Banking and Finance*, 19 (July): 461-482.
- Merton, R.C., and Z. Bodie (1992), "On the Management of Financial Guarantees," *Financial Management*, 22 (Winter): 87-109.
- (1993), "Deposit Insurance Reform: A Functional Approach" in *Carnegie-Rochester Conference Series on Public Policy*, A. Meltzer and C. Plosser, eds., 38 (June).
- Miller, M.H. (1994a), "Functional Regulation," *Pacific-Basin Finance Journal*, 2 (May): 91-106.
- (1994b), "Do We Really Need More Regulation of Financial Derivatives?" Banco de Investimentos Garantia, Sao Paulo, Brazil (August).
- Myers, R.J. (1991), "Privatizing Social Security: It's Not Exactly One Size Fits All," *Contingencies* (November/December): 9-11.
- (1992), "Chile's Social Security Reform After Ten Years," *Benefits Quarterly*, 1 (Third Quarter): 6-20.
- National Commission on Financial Institution Reform, Recovery, and Enforcement (1993), *Origins and Causes of the S&L Debacle: A Blueprint for Reform*, Washington, D.C.: Government Printing Office, (July).
- North, D.C. (1994), "The Evolution of Efficient Markets in History," Chapter 11 in *Capitalism in Context*, J.A. James and M. Thomas, eds., Chicago: University of Chicago Press.
- Paré, T.P. (1994), "Learning to Live with Derivatives," *Fortune*, July 25: 106-116.

- Pierce, J.L. (1991), *The Future of Banking*, New Haven, CT: Yale University Press.
- (1993), "The Functional Approach to Deposit Insurance and Regulation," in *Safeguarding the Banking System in an Environment of Financial Cycles*, R.E. Randall, ed., Proceedings of a Symposium of the Federal Reserve Bank of Boston (November): 111-130.
- Ross, S.A. (1989), "Institutional Markets, Financial Marketing, and Financial Innovation," *Journal of Finance*, 44 (July): 541-556.
- Tobin, J. (1985), "Financial Innovation and Deregulation in Perspective," *Bank of Japan Monetary and Economic Studies*, v. 3, no. 2, (September): 19-29. Reprinted in Y. Suzuki and H. Yomo, eds., (1986), *Financial Innovation and Monetary Policy: Asia and the West*, Tokyo: University of Tokyo Press, 31-42.
- (1987), "The Case for Preserving Regulatory Distinctions," in *Restructuring the Financial System*, Federal Reserve Bank of Kansas City.
- White, L.J. (1993), "Competition versus Harmonization: An Overview of International Regulation of Financial Services," New York University Salomon Center Working Paper S-93-58.
- World Bank (1994), "Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth," Policy Research Report (June).