CHAPTER ONE

A Conceptual Framework for Analyzing the Financial Environment

ROBERT C. MERTON AND ZVI BODIE

Financial markets and intermediaries today are globally linked through a vast international telecommunications network, so that the trading of securities and the transfer of payments go on virtually around the clock. The financial markets include the foreign exchange, fixed-income, and equity markets, as well as the new and growing markets for "derivative" securities such as futures, options, and swaps. Capital market functions are also performed by financial intermediaries such as banks and insurance companies, which provide customized products and services—the kind that do not lend themselves to the standardization necessary to support a liquid market.

For a variety of reasons—including differences in size, complexity, and available technology, as well as differences in political, cultural, and historical backgrounds—financial institutions generally differ across borders. They also change over time. Even when the names of institutions are the same, the functions they perform often differ dramatically. For example, banks in the United States today are very different from what

The conceptual framework set forth in this chapter is a synthesis and extension of work presented by the authors in Merton (1989; 1990; 1992a; 1992b, Ch.14; 1994; 1995), Bodie and Merton (1992; 1993), and Merton and Bodie (1992a; 1992b; 1993).
they were in 1925 or in 1955, and they are very different from the institutions called banks in Germany or the United Kingdom today.

This monograph is an attempt to improve the understanding of how and why the institutional structure of the financial system changes and how it is likely to evolve in the future. In this opening chapter, we try our hand at setting forth a unifying conceptual framework.¹

The key element in the framework is its focus on functions rather than on institutions as the conceptual "anchor." Hence, we call it the functional perspective. It rests on two basic premises:

- Financial functions are more stable than financial institutions—that is, functions change less over time and vary less across borders.
- Institutional form follows function—that is, innovation and competition among institutions ultimately result in greater efficiency in the performance of financial system functions.²

The chapter develops the functional perspective and gives an overview of its range of application. Applicability of this perspective ranges widely, from analysis of the entire financial system to individual business strategy decisions and specific public policy choices. We distinguish four levels of analysis: system-level, institution-level, activity-level, and product-level.

The evolution of the financial system is described as an innovation spiral, in which organized markets and intermediaries compete with each other in a static sense and complement each other in a dynamic sense. The functional perspective views financial innovation as driving the financial system toward the goal of greater economic efficiency.³ Technological advances that have already resulted in dramatically reduced transactions costs, and

---

1. In the economics literature, the closest analogue is the work of Schumpeter (1911), Williamson (1985), and North (1994). These authors, however, focus on the economic system as a whole; we focus on the financial system only.

2. The functional perspective adopted here is similar in spirit to the functional approach in sociology pioneered by Robert K. Merton (1957). There are a number of others whose work fits comfortably within this framework. In the area of financial innovation, see Black and Scholes (1974), Benston and Smith (1976), Ross (1989), and Scholes (1994). In the intermediation literature, the analytical approaches of Black, Miller, and Posner (1978), Black (1985), Pierce (1991, 1993), Gorton and Pennacchi (1992), and Brennan (1993), are aligned with the functional perspective. In the case of finance practitioners, the perspective is perhaps best exemplified in Sanford (1993).

advances in the theory and practice of finance that rely on low transactions costs, are likely to produce wide-ranging institutional changes in the future. We sketch the broad outlines of some of those changes.

From the most aggregated level of the single primary function of resource allocation, we distinguish six basic or core functions performed by the financial system:

- 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.

The six chapters to follow offer in-depth descriptions, analyses, and illustrations of each of the core functions of the financial system. A final chapter discusses the evolving infrastructure and regulation of the global financial system in the future.

Change and Diversity in the Global Financial System

We know that people have engaged in financial transactions since the dawn of recorded history. Sumerian documents reveal the systematic use of credit for agricultural and other purposes in Mesopotamia around 3000 BC. Barley and silver served as a medium of exchange—i.e., money. Even regulation of financial contracts existed in ancient times. Hammurabi’s Code contains many sections relating to the regulation of credit in Babylon around 1800 BC.4

Banking institutions arose in the city-state of Genoa in the twelfth century AD, and flourished there and in Florence and Venice for several centuries. These banks took demand deposits and made loans to merchants, princes, and towns. Security issues similar to the modern form also originated in the Italian city-states in the late Middle Ages. Long-term loans floated by the Republic of Venice, called the prestiti, were a popular

---


*A Conceptual Framework for Analyzing the Financial Environment* 5
form of investment in the thirteenth and fourteenth centuries, and their market price was a matter of public record. Even organized exchanges for trading financial futures contracts and other financial derivatives, which some see as an innovation of the 1980s, are not entirely new. Similar contracts were widely traded on the Amsterdam securities exchange in the 1600s.\(^5\)

As this little bit of history makes clear, some things have not changed. Financial activities, such as borrowing, investing in securities, and other forms of financial contracting, are very old indeed. The ways in which these activities are carried out, however, have changed through the ages.

In the past few decades, in particular, the pace of financial innovation has greatly accelerated.\(^6\) Think of round-the-clock trading in Tokyo-London-New York, financial futures, swaps, mortgage-backed securities, exchange-traded options, “junk” bonds, shelf registration, electronic funds transfer and security trading, automated teller machines, asset-based financing, and LBO, MBO, and all the other acronymic approaches to corporate restructuring. And this is but a small sampling.

While it may be hard to believe that the pace of general financial innovation during the past few decades can sustain itself into the future, there are reasons to believe it can, because it is rooted in fundamental economic factors.\(^7\) Technological advances in telecommunications, data processing, and computation, which began in the 1960s, have resulted in dramatically reduced transactions costs for the financial services industry. In addition to lower transactions costs due to technological advances, there is also the learning curve: When one has created nine new markets, the tenth one becomes a lot easier.

The decision to implement an innovation involves a trade-off between its benefit and its cost. With lower transactions costs, the threshold benefit to warrant implementing financial innovations drops. If we continue to see the same pace of change in the underlying fundamentals as in the past, the implementation of financial innovation is likely to remain rapid, as the threshold for change is lower.

With much lower costs of change, it becomes profitable not only to introduce new products and create new markets, but also to change entire institutional arrangements (including geographical and political locations) in response to much smaller shifts in customer tastes or operating costs than in the past. Thus, technological advances, lower costs, and the prospect of greater global competition in financial services all form the basis for

---

5. See de la Vega (1668).

---

6 THE GLOBAL FINANCIAL SYSTEM
predicting substantial increases in both the frequency and the magnitude of institutional changes for private sector and government financial intermediaries and for regulatory bodies alike.8

As an illustration of both the change and the diversity in institutional structures around the world, consider the financing of retirement income for older people. For much of the world’s population, the extended family is the main institution to perform this function. Elderly family members live and work with younger members of the agrarian family, and all draw a common livelihood from it. But in much of the industrialized world, urbanization and other fundamental economic and social changes have led to new institutional structures for the care and support of the elderly.

An often-used metaphor for describing a country’s retirement income system is the “three-legged stool.” The first leg is government-provided pension and welfare programs (such as Social Security in the United States); the second is employer- or labor union-provided pensions; and the third is direct individual savings. There is substantial variation across countries in the mix of the three sources of retirement income.

Table 1-1 illustrates these national differences. The first column shows Social Security replacement rates of final salary for 12 different countries in 1992. The replacement rate is given for two levels of final salary—$20,000 (low income) and $50,000 (middle income).

Table 1-1 also shows the proportion of the labor force that is covered by a private pension plan. At one extreme is Italy, where the government-run social security system provides a replacement rate greater than 70% for both low- and middle-income workers. It is therefore not surprising to see that in Italy only 5% of the labor force is covered by an employer pension plan. At the other extreme is Australia, where the social security replacement rate is quite low, but 92% of workers are covered by a compulsory employer-based pension plan.

Table 1-1 is a snapshot at a point in time. It therefore fails to convey the dramatic changes that have occurred in national retirement income systems and the changes that are bound to come in the decades ahead.9

For example, the high proportion of Australian workers covered by a private pension plan shown in the last column of Table 1-1 is a very recent phenomenon. Only in July 1992 did the Australian government implement a major pension reform that introduced a system of mandatory employer-based pensions similar to those in Chile and Switzerland.10

Pension reform is currently a high-priority issue in several European

---

8. This is also the conclusion drawn by Hayes (1993).
9. See, for example, the study sponsored by the World Bank (1994).
<table>
<thead>
<tr>
<th>Country</th>
<th>Social Security Retirement Benefit as a Percentage of Final Earnings (based on final salary of $20,000 and $50,000)</th>
<th>Percentage of Labor Force Covered by a Private Pension Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>65%-40%</td>
<td>46%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>50-26</td>
<td>50</td>
</tr>
<tr>
<td>Germany</td>
<td>70-59</td>
<td>42</td>
</tr>
<tr>
<td>Japan</td>
<td>54</td>
<td>50</td>
</tr>
<tr>
<td>Canada</td>
<td>34</td>
<td>41</td>
</tr>
<tr>
<td>Netherlands</td>
<td>66-26</td>
<td>83</td>
</tr>
<tr>
<td>Sweden</td>
<td>69-49</td>
<td>90</td>
</tr>
<tr>
<td>Denmark</td>
<td>83-33</td>
<td>50</td>
</tr>
<tr>
<td>Switzerland</td>
<td>82-47</td>
<td>90 (compulsory)</td>
</tr>
<tr>
<td>Australia</td>
<td>28-11</td>
<td>92 (compulsory)</td>
</tr>
<tr>
<td>France</td>
<td>67-45</td>
<td>100 (compulsory)</td>
</tr>
<tr>
<td>Italy</td>
<td>77-73</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Davis (1995).
Notes: 1. The social security replacement rates in column 2 are given for two different levels of final salary—$20,000 and $50,000. For example, in the United States the replacement rate is 65% for someone with a final salary of $20,000 and 40% for someone with a final salary of $50,000. Where only a single replacement rate is given (e.g., Japan), the rate is the same for both salary levels.
2. The pension plan coverage rates in column 3 only include pensions provided by employers or labor unions. They do not include voluntary retirement savings accounts for individuals such as IRAs in the United States.

countries (e.g., Italy, Germany, France) that have relied heavily on pay-as-you-go systems of retirement income provision in the past. As the proportion of the elderly in these populations increases in the next few decades, these systems will come under tremendous strains that are likely to lead to institutional change. And in the developing nations of Asia and Africa, some of which have had no formal pension system at all, institutional reforms are being considered to supplement the informal systems of family provision of old-age income.
The example of retirement finance clearly demonstrates that the financial system encompasses a broader set of institutions than just financial markets and intermediaries. The family and government play an important role everywhere. In many countries—even those with fully developed financial markets and intermediaries—the family is still an important institutional mechanism for financing education, housing, care of the elderly, and even start-ups of new businesses.11

Government’s role in supporting the infrastructure of the financial system is fundamental. It includes establishing and enforcing property rights and other laws affecting contracts as well as regulating financial markets and intermediaries. Governmental bodies often substitute for or supplement private sector intermediaries, providing cash loans, subsidized interest rates, and loan guarantees.

The roles of family, government, and private sector markets and intermediaries, and the regulatory structures governing them, vary considerably from country to country and from financing activity to activity. The relations among all of these institutions are typically both competitive and complementary. This applies to both the relations between financial intermediaries and markets and the relations between those private sector institutions and the family and government.

Why a Functional Perspective?
As illustrated by the example of systems for providing retirement income, institutional change in the financing of economic activity is today a dominant theme around the world in both the private and the public sector. Among other policy issues of current concern are the following:

- What regulatory or other institutional arrangements are most efficient for dealing with over-the-counter markets for derivatives such as forward contracts, options, and swaps?12
- Is there a way to improve the institutional mechanisms that support investment in business innovation?13

11. We use the term “family” in a technical sense to mean any group of people with strongly interdependent utility functions. It is thus not necessarily the same as a “household.” If within a household such interdependent utility is not present, then the legal or biological family does not function as “family.”
12. For example, Financial Derivatives . . . (1994), a report by the United States General Accounting Office, recommends that “Congress require federal regulation of the safety and soundness of all major U.S. OTC derivatives dealers.”
13. Porter (1994), for example, believes that the institutional structure of the United States financial system tends to create a problem of insufficient investment in business innovation.
To tackle such questions, one requires a tool of analysis that explicitly deals with the dynamics of institutional change. The neoclassical economics perspective addresses the dynamics of prices and quantities, but is largely an "institution-free" perspective in which only functions "matter." It thus has nothing to say directly about the institutions that perform these functions and how they change over time.\textsuperscript{14}

At the other extreme, there is a static institutional perspective, which assumes not only that institutions matter but also takes them as the conceptual "anchor." It views the objective of public policy to be to help the institutions currently in place to survive and flourish. Framed in terms of the banks or the insurance companies, managerial objectives are similarly defined in terms of what can be done to make those institutions perform their particular financial services more efficiently and profitably.

Because this institutional perspective is static in focus, it cannot explain the dynamics of institutional change. Moreover, from this perspective, financial innovation sometimes appears to threaten the stability of the system, by providing the means to circumvent institutionally based regulations at low cost.

Drawing on both the neoclassical and institutional perspectives, the functional perspective adopted here takes as a given the economic functions performed by financial institutions and then seeks to discover the best institutional structure for performing those functions at a given time and a given place. It does not assume that existing institutions, whether private sector or governmental, operating, or regulatory, will be preserved. Thus functions rather than institutions serve as the conceptual anchor. Because institutions "matter" but are not the anchors, institutional changes can be explained within this perspective.\textsuperscript{15}

To illustrate the differences among the neoclassical economics perspective, the static institutional perspective, and the functional perspective, consider how many ways there are today to take a levered position in the Standard & Poor's 500 stocks:\textsuperscript{16}

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.


\textsuperscript{14} This feature of the neoclassical perspective has been stressed by North (1994).
\textsuperscript{15} The functional perspective on the financial system falls within the research tradition of what Williamson (1985, p. 16) calls the New Institutional Economics.
\textsuperscript{16} This example is taken from Merton (1995).
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 based on 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 apprecia-
    tion 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 that has
    its return linked to the S&P 500.

From a neoclassical economics perspective, all 11 of these are equivalent
ways of achieving a desired exposure to the S&P 500. Indeed, the modern
theory of asset pricing (based on the law of one price) relies on this
equivalence to infer information from the market prices of these products.
But these 11 different forms for investing in the S&P 500 are not simply
cosmetic product differentiations among competing issuer institutions.
They make it possible for investors facing different tax and regulatory
structures and other institutional rigidities to take positions more effi-
ciently. The neoclassical perspective offers little guidance in understand-
ing the managerial or regulatory implications of the differences.

The static institutional perspective, on the other hand, tends to lead one
to view the 11 different ways of taking a levered position in the S&P 500
with alarm. If regulators want to maintain the safety and soundness of
financial institutions currently in place, the development of alternative
ways of achieving an economically equivalent result poses a danger. A
natural regulatory response is to try to slow down financial innovation
or ban it altogether. The important question from a public policy perspec-
tive, however, is whether the institutions in place ought to be preserved.

The functional perspective offers an alternative view with very different
policy implications. It is precisely the development of a multiplicity of
institutional forms illustrated in our example that has facilitated the
globalization of the financial system in the 1980s and 1990s. Given the
diversity of the national currency, financial-cultural, and regulatory re-
gimes that have become linked together, it seems remarkable in retrospect
that the process of globalization has been so smooth. Financial innovation has made it possible to hook up these diverse national financial systems to a single global network.

Indeed, one can think of today's financial system as a global network (similar to the Internet) that can be freely accessed by any government or firm that has the standardized hardware, software, and trained personnel necessary to "hook up" to it. An important implication is that governments in countries with less well-developed domestic financial systems may not have to follow the same historical path as the United States or Germany and develop a complete set of organized financial markets and intermediaries. Instead of establishing local securities exchanges and the regulatory apparatus to oversee them, they can concentrate their limited resources on developing the financial and technological expertise needed to access the global financial network.\[^{17}\]

**Functions of the Financial System**

As stated at the outset, the *primary* function of any financial system is to facilitate the allocation and deployment of economic resources, both across borders and across time, in an uncertain environment. From the most aggregated level of the single primary function of resource allocation, we can further distinguish six basic functions performed by the financial system:\[^{18}\]

*Function 1: Clearing and Settling Payments*

- A financial system provides ways of clearing and settling payments to facilitate the exchange of goods, services, and assets.

There are alternative ways of clearing and settling payments. Collectively, the set of institutional arrangements for accomplishing this task is called the payments system. Depository financial intermediaries such as banks serve this function with wire transfers, checking accounts, and credit/cash cards. Other intermediaries such as money market mutual funds offer transaction-draft accounts, and firms whose principal business is not financial, such as AT&T, General Electric, and General Motors, offer general credit cards.

\[^{17}\] The World Bank (1990) reports that in 1989 it launched the Financial Technical Assistance on Asset and Liability Management Project to help selected groups in the public and private sectors gain expertise in the use of modern techniques of financial risk management.

\[^{18}\] Other functional classification schemes have been suggested in the finance literature. An appendix to this chapter briefly discusses several of them.
Mechanisms for clearing and settling securities transactions are designed to deal with the costs and the risks associated with the process. Costs arise in the form of processing fees, transfer taxes, and the maintenance of collateral. Risk arises because one of the parties to a transaction may not fulfill its terms. For example, the buyer may not be able to arrange financing, or the seller fails to deliver. The key elements for managing these costs and risks include netting arrangements, efficient use of collateral, delivery-versus-payment, immobilization of securities, and extension of credit.

Chapter 2 examines these basic mechanisms. It takes a broad view of the payment system, to include not just systems for clearing and settlement, but also derivative instruments, traditionally not viewed as integral to the payment system, except with respect to their own clearing and settlement. The chapter establishes that derivative instruments serve as an important extension of the payment system because they substitute in a variety of ways for trading in cash market instruments.

The chapter compares the payment system demands of cash market security trading strategies with those of derivatives-based strategies. It shows how the derivatives-based strategies typically transform a small number of large payments into a large number of small payments spread over time. By reducing the occurrence of relatively large funds transfers, the use of the derivatives alternative can significantly reduce the risk of a major disruption caused by a single default.

Chapter 2 concludes by focusing on the foreign exchange market and examining alternatives for dealing with credit risk induced by different time zones ("Herstatt risk"). It illustrates how these alternative approaches to the reduction of this risk, including netting and the use of derivatives, can serve as functional substitutes with very different implications for institutional change.

Function 2: Pooling Resources and Subdividing Shares

- A financial system provides a mechanism for the pooling of funds to undertake large-scale indivisible enterprise or for the subdividing of shares in enterprises to facilitate diversification.

In modern economies, the minimum investment required to run a business is often beyond the means of an individual or even several individuals. From the perspective of firms raising capital, the financial system provides a variety of mechanisms (such as security markets and financial intermediaries) through which individual households can pool (or aggregate) their wealth into larger amounts of capital for use by business firms. From the perspective of individual savers, the financial system provides
opportunities for households to participate in large indivisible investments.

Mutual funds that hold stocks and bonds are examples of financial intermediaries that provide virtually full divisibility in subdividing the individual unit size of the traded securities they hold. Chapter 3 explores the role of mutual funds in detail. It also identifies the process of securitization as one key to future gains in the efficiency of pooling. Securitization is essentially the removal of (nontraded) assets from a financial intermediary's balance sheet by packaging them in a convenient form for outside investors and selling the packaged securities in a financial market.

Function 3: Transferring Resources Across Time and Space

- A financial system provides ways to transfer economic resources through time, across geographic regions, and among industries.

A well-developed, smooth-functioning financial system facilitates the efficient life-cycle allocations of household consumption and the efficient allocation of physical capital to its most productive use in the business sector. A well-developed, smooth-functioning capital market also makes possible the efficient separation of ownership from management of the firm. This in turn makes feasible efficient specialization in production according to the principle of comparative advantage.

Intermediaries that serve this function include banks and thrifts in financing corporate investments and housing, insurance companies and pension funds in financing corporate investments and paying retirement annuities, and mutual funds that invest in virtually all sectors.

Chapter 4 explores this function in depth. In particular, it identifies the incentive problems of adverse selection and moral hazard as the main barriers to greater efficiency in the transfer of capital resources around the world. As in the chapter on the pooling function, collateralization, credit enhancement, and securitization are seen as the key to future improvements in the performance of the resource transfer function.

Function 4: Managing Risk

- A financial system provides ways to manage uncertainty and control risk.

A well-functioning financial system facilitates the efficient allocation of risk-bearing. Through often elaborate financial securities and through private sector and government intermediaries (including the system of social insurance), the financial system provides risk-pooling and risk-sharing opportunities for both households and business firms. It facilitates efficient life-cycle risk-bearing by households, and it allows for the separation of the providers of working capital for real investments (i.e., in
personnel, plant, and equipment) from the providers of risk capital who bear the financial risk of those investments.

In both an international and a domestic context, this separation of real investment and risk-bearing permits specialization in production activities according to the principle of comparative advantage. Insurance companies are the classic example of a financial intermediary offering risk protection. They sell protection against loss in value of human capital (e.g., death and disability), physical property (e.g., fire and theft), and financial assets (e.g., contract guarantees including bond-default insurance). Mutual funds help control risk by providing diversification.

Chapter 5 explores the risk management function in detail, including the three basic ways to manage risk: hedging, diversifying, and insuring. Chapter 5 identifies the emergence of derivative securities as an important innovation, because like the purchase of insurance contracts, derivatives allow for the separation of risk management from the transfer of resources. The chapter also discusses the impact of these developments on the stability of the financial system and the possible need for regulation of derivatives trading.

Function 5: Providing Information

- A financial system provides price information that helps coordinate decentralized decision-making in various sectors of the economy.

The manifest function of financial markets is to allow individuals and businesses to trade financial assets. An additional latent function of the capital market is to provide information useful for decision-making. Interest rates and security prices, for example, are information that households or their agents use in making their consumption-saving decisions and in choosing the portfolio allocations of their wealth. These same prices provide important signals to managers of firms in their selection of investment projects and financings.

As the diversity of financial markets has increased during the past two decades, so too have the opportunities to extract useful information from the prices of financial instruments. Chapter 6 illustrates how information about the future volatility of changes in security, currency, and commodity prices can be extracted from options and option-like securities. Volatility is a critical input for virtually all decisions relating to risk management and strategic financial planning.

The introduction of exchange-traded options in 1973 and the concurrent development of the theory of contingent claims pricing have made it possible to infer beliefs about future volatility of an asset directly from the prices of options and other derivatives whose payoffs depend in a nonlinear way on the asset’s price. The estimate extracted in this way is

A Conceptual Framework for Analyzing the Financial Environment  15
called implied volatility. An important, if unintended, consequence of the proliferation of derivatives will be a richer information set that can facilitate more efficient resource allocation decisions.

Function 6: Dealing with Incentive Problems

- A financial system provides ways to deal with the incentive problems when one party to a financial transaction has information that the other party does not, or when one party is an agent for another.

A well-functioning financial system reduces the incentive problems that make financial contracting difficult and costly. These problems arise because parties to contracts cannot easily observe or control one another, and because contractual enforcement mechanisms are not costless to invoke. These contractual “frictions” take a variety of forms: moral hazard, adverse selection, and information asymmetries.¹⁹

Chapter 7 focuses on the impact of incentive problems on the contractual relationships between a firm’s managers and its capital providers. In short, incentive problems make it more costly for companies to raise external capital than to use internal capital. The nature and size of these additional costs affect, and are affected by, three major aspects of corporate behavior: financing policies; investment and capital budgeting policies; and risk management policies.

Chapter 7 shows how the financial system can respond to overcome those incentive problems. It discusses recent security innovation and the use of derivatives within corporate risk management programs as examples of how innovation can reduce the scope and the costs of incentive problems.

The Functional Perspective at Four Levels of Analysis

The functional perspective is applicable at several levels of analysis: system-level, institution-level, activity-level, and product-level.

Level of the System

The functional perspective offers a useful frame of reference for analyzing a country’s entire financial system. In the former Communist countries of

Eastern Europe, changing the financial system is a major part of a general restructuring of the entire economic system, from one based on central planning and government ownership of business to one based on free markets and private ownership. A number of other countries with well-developed free markets for nonfinancial goods and services still have centralized government control of their financial systems.

With total control over both the banking and pension systems and restrictions on cross-border capital flows, these governments collect almost all the savings of the household sector and allocate most of the capital to the business sector. In at least some of these countries, reforms to privatize large parts of the financial system are under consideration. And even in countries like the United States, with highly developed private financial markets and institutions, important changes in the way government regulates the system are actively being debated. An example is the system of financing retirement income.20

In general, such analyses begin with a description of the functions served by the pension system and a determination of how they are currently accomplished. From this base, the analysis then continues by examining alternative institutional arrangements used at other times and in other countries.

It is unlikely that solutions developed in one country or group of countries cannot be improved upon. Functional analysis seeks new institutional arrangements or new combinations of existing ones that might improve the performance of the functions, given the specific local economic, political, and cultural circumstances.

Level of an Institution

Application of the functional perspective is not limited to analyses at the level of the financial system. A functional perspective is also useful in the study of a particular institutional form. Examples are the savings and loans (S&Ls) in the United States during the 1970s and 1980s, or U.S. commercial banks during the 1990s.21

Evolving as specialized institutions in the United States during the first half of this century, S&Ls or “thrifts” came to have two core economic functions: to provide long-term financing for residential homeowners at fixed interest rates and to provide a riskless, liquid, short-term savings vehicle for large numbers of small savers. These are separable functions that need not be performed by the same intermediary.

20. See, for example, Bodie and Merton (1992, 1993).
Nevertheless, the U.S. public policy response to the difficulties faced by thrifts during the 1970s and 1980s was to try to find ways of making them healthy again. The S&L problem was thus framed in terms of taking the existing institutions as a given (i.e., maintaining the institutional structure) and asking what changes could be made to improve the thrifts' competitive position. It is difficult to rationalize this public policy toward the thrifts during the 1980s unless preservation of existing financial institutions was a primary objective of that policy.

Ironically, while the government was struggling at great cost to save the thrifts during the 1980s, both of the thrifts' principal economic functions were being taken over by other institutional mechanisms. The creation of securitized mortgage instruments, ostensibly to help the thrifts, led to the creation of a national mortgage market that then allowed mutual funds and pension funds to become major funding alternatives to the thrifts. These funding markets also allowed entry by agent-like institutions such as investment banks and mortgage brokers to compete with the traditional principal-like thrifts for the origination and servicing fees on loans and mortgages.

**Level of an Activity**

To illustrate application of the functional perspective to a financial activity, consider *lending*. Lending is often treated as a homogeneous activity in both private sector and public sector decision-making. But from a functional perspective, lending in general is multi-functional, involving two of the six basic functions of the financial system.

Lending in its "purest" form is free of default risk, so it falls under a single basic functional category: *the intertemporal transfer of resources*. But, of course, with few exceptions, payments promised in loan agreements are subject to some degree of default risk. Lending therefore also involves a second basic functional category: *risk management*. When a loan is made, an implicit guarantee of that loan (a form of insurance) is involved.

To see this, consider the fundamental identity, which holds in both a functional and a valuation sense:

\[
\text{Risky Loan} + \text{Loan Guarantee} = \text{Default-Free Loan}
\]

\[
\text{Risky Loan} = \text{Default-Free Loan} - \text{Loan Guarantee}
\]

Thus, whenever lenders make dollar-denominated loans to anyone other than the U.S. government, they are implicitly also selling loan guarantees. The lending activity therefore consists of two functionally distinct activities: pure default-free lending (the intertemporal transfer function), and
the sale of default risk insurance by the lender to the borrower (an example of the risk management function).\textsuperscript{22}

The relative weighting of these two functions varies considerably across the various debt instruments. A high-grade bond (rated AAA) is almost all default-free loan with a very small guarantee component. A below-investment-grade or "junk" bond, on the other hand, typically has a large guarantee component.

Level of a Product

To see an application of the functional perspective at the level of an individual financial product, consider municipal-bond insurance.\textsuperscript{23} In the United States, there are specialized insurance companies that sell insurance contracts that guarantee interest and principal payments on municipal bonds against default by the issuer. The policies are typically sold to the issuer, which "attaches" them to the bonds to give them an AAA credit rating. To succeed as a guarantor, the insurance company itself must be seen as a very strong credit.

In evaluating the firm’s competitive standing, a manager with an institutional perspective would focus on other insurance companies as competitors. A manager with a functional perspective would instead focus on the best institutional structure to perform the function, which may not be an insurance company.

Consider as one alternative an option exchange that creates a market for put options on municipal bonds. In such a market investors could achieve the same protection against loss by buying an uninsured municipal bond and a put option on that bond.\textsuperscript{24} Note that both structures serve the same function for investors—protection against loss from default—but the institutions are entirely different: An options exchange is not an insurance company. Furthermore, the put option traded on the exchange is a different product from the insurance guarantee. Although the products and institutions that provide them are both quite different, the economic function they serve is the same.

In certain environments, it is surely possible that an options exchange with mark-to-market collateral and a clearing corporation could be a

\textsuperscript{22} For analysis of the default-insurance guarantee business, see Merton and Bodie (1992b).
\textsuperscript{23} This example is taken from Merton (1993, pp. 28–29).
\textsuperscript{24} With a standard fixed exercise price, the put would actually provide more protection because it covers losses in the value of the bond for any reason, not just issuer default. The coverage could effectively be "narrowed" to only default risk by making the exercise price "float" to equal the current price of an AAA bond with comparable terms to those of the covered bond.
better credit than an insurance company and also thereby be a superior institutional structure to serve the guarantee function. In such environments, the institutionally oriented manager may miss recognizing the firm’s prime competitor. Regulatory bodies for financial services are almost exclusively organized along institutional lines, so they face similar problems. Because options are not insurance products, and exchanges are not insurance companies, insurance regulators would have no control over the option exchange even though its product is a perfect substitute for an insurance product.

The Financial Innovation Spiral

The evolution of the financial system can be viewed as an innovation spiral, in which organized markets and intermediaries compete with each other in a static sense and complement each other in a dynamic sense. That intermediaries and markets compete to be the providers of financial products is widely recognized. Improving technology and a decline in transactions costs have added to the intensity of that competition. Inspection of Finnerty’s (1988, 1992) extensive histories of innovative financial products suggests a pattern in which products offered initially by intermediaries ultimately move to markets. For example:

- The development of liquid markets for money instruments such as commercial paper allowed money market mutual funds to compete with banks and thrifts for household savings.
- The creation of “junk”-bond and medium-term note markets made it possible for mutual funds, pension funds, and individual investors to service those corporate issuers that had historically depended on banks as their source of debt financing.
- The creation of a national mortgage market allowed mutual funds and pension funds to become major funding alternatives to thrift institutions for residential mortgages. Creation of these funding markets also made it possible for investment banks and mortgage brokers to compete with the thrift institutions for the origination and servicing fees on loans and mortgages.
- Securitization of auto loans, credit card receivables, and leases on consumer and producer durables has intensified the competition between banks and finance companies as sources of funds for these purposes.25

25. For a comprehensive discussion of the implementation of asset securitization, see Zweig (1989), Norton and Spellman (1991), and the entire Fall 1988 issue of the Journal of Applied Corporate Finance.
This pattern may seem to imply that successful new products will migrate from intermediaries to markets. That is, once they become familiar, and perhaps after some incentive problems are resolved, those products will trade in a market. Exclusive focus on the time path of individual products can be misleading, however, not only with respect to the apparent secular decline in the importance of intermediation, but also with respect to the general relations between financial markets and intermediaries. Just as venture capital firms that provide financing for start-up businesses expect to lose their successful customers to capital market sources of funding, so do the intermediaries that create new financial products.

Financial markets tend to be efficient institutional alternatives to intermediaries when the products have standardized terms, can serve a large number of customers, and are well-enough understood for transactors to be comfortable in assessing their prices. Intermediaries are better suited for low-volume customized products. As products such as futures, options, swaps, and securitized loans become standardized, and move from intermediaries to markets, the proliferation of new trading markets in those instruments makes feasible the creation of new custom-designed financial products that improve “market completeness”; to hedge their exposures on those products, the producers (typically, financial intermediaries) trade in these new markets and volume expands; increased volume reduces marginal transactions costs and thereby makes possible further implementation of more new products and trading strategies by intermediaries, which in turn leads to still more volume. Success of these trading markets and custom products encourages investment in creating additional markets and products, and so on it goes, spiraling toward the theoretically limiting case of zero marginal transactions costs and dynamically complete markets.

Consider, for example, the Eurodollar futures market that provides organized trading in standardized LIBOR (London Interbank Offered Rate) deposits at various dates in the future. The opportunity to trade in this futures market provides financial intermediaries with a way to hedge more efficiently custom-constructed interest rate swaps based on a floating rate linked to LIBOR. A LIBOR rather than a U.S. Treasury rate-based swap is better suited to the needs of many intermediaries’ customers because their cash market borrowing rate is typically linked to LIBOR and not to Treasury rates.

At the same time, the huge volume generated by intermediaries hedging their swaps has helped make the Eurodollar futures market a great

---

26. This example is taken from Merton (1993).

* A Conceptual Framework for Analyzing the Financial Environment 21
financial success for its organizers. Furthermore, swaps with relatively standardized terms have recently begun to move from being custom contracts to ones traded in markets. The trading of these so-called plain vanilla swaps in a market further expands the opportunity structure for intermediaries to hedge and thereby enables them to create more-customized swaps and related financial products more efficiently.

Eurodollar futures appear to be a nearly perfect substitute for LIBOR-based fixed- to floating-rate swaps. One might therefore think that nonfinancial firms would simply transact directly in the LIBOR futures market and bypass the financial intermediary altogether. Yet the futures require a mark-to-market collateralization of positions, and OTC swaps need not. Thus, intermediaries that issue such swaps to corporations and hedge them in the futures market in effect perform the service of managing the collateralization process for these nonfinancial business customers.

As this example shows, intermediaries help markets grow by creating the products that form the basis for new markets and by adding to trading volume in existing ones. In turn, markets help intermediaries to innovate new more-customized products by lowering the cost of producing them. Thus, although markets and intermediaries are competitors, they also are complementary to one another.

The Future of the Global Financial System

Consider now a small sampling of the implications of the functional perspective for the future evolution of the global financial system. In our most likely scenario, aggregate trading volume expands secularly, and trading is increasingly dominated by institutions such as mutual funds and pension funds. As more financial institutions employ dynamic strategies to hedge their product liabilities, incentives rise for further expansion in round-the-clock trading to allow for more effective implementation of these strategies. Supported by powerful trading technologies for creating financial products, financial services firms will increasingly focus on providing individually tailored solutions to their clients' investment and financing problems. Sophisticated hedging and risk management will become an integrated part of the corporate capital budgeting and financial management process.

The Household Sector

Retail customers ("households") will continue to move away from direct, individual financial market participation such as trading in individual

27. See, for example, Antilla (1992) on the Chicago Mercantile Exchange.
28. A general development of this observation is presented in Merton (1993).
stocks or bonds where they have the greatest (and growing) comparative
disadvantage. Better diversification, lower trading costs, and less informa-
tional disadvantage will continue to move their trading and investing
activities toward aggregate bundles of securities, such as mutual funds,
basket-type and index securities, and custom-designed products issued
by intermediaries.

This secular shift, together with informational effects as described in
Gammill and Perold (1989), will enhance liquidity in the basket/index
securities, while individual stocks become relatively less liquid. With ever
greater institutional ownership of individual securities, there is less need
for the traditional regulatory protections and other subsidies of the costs
of retail investors trading in stocks and bonds. The emphasis on disclosure
and regulations to protect those investors will tend to shift up the “secu-
ritv aggregation chain” to the interface between investors and investment
companies, asset allocators, and insurance and pension products.

The Nonfinancial Business Sector

Just as there will be changes in the financial products and services offered
to households, so too nonfinancial firms will face a very different set of
opportunities.29 As shown in Chapter 7, the development of low-cost
financial tools that enable firms to hedge particular risks has profound
implications for their investment, financing, and risk management strategies.

The management of risk has traditionally focused on capital. Equity
capital is the “cushion” for absorbing risks of the firm. Management does
not have to predict the source of loss, because equity protects the firm
against all forms of risk. But the very characteristic of the equity cushion
that makes it attractive to managers is the characteristic that creates a
moral hazard for the shareholders who provide that equity cushion. The
resulting agency and tax costs are the main reasons equity financing can
be expensive.30

The other fundamental means for controlling risk is through hedging.
In contrast to equity capital, which is all-purpose, hedging is a form of
risk control that is targeted. Hedging can be very efficient, but it carries
with it the requirement that its users have a deep quantitative under-
standing of their business. They must understand much more about their
structures than in the case of all-purpose equity capital. Developing this
deeper understanding of their business is going to require some retraining
of the ways managers think about their businesses if they are to use
hedging effectively.

29. This section is based on Merton (1995).
30. See, for example, Grossman and Hart (1982), Jensen (1986), Scholes and Wolfson (1992),
and Merton (1993).
Consider, for instance, the example of a "synthetic refinery." Imagine a firm with extensive crude oil reserves and a chain of gasoline stations. Suppose that strategic analysis concludes that there are serious risk concerns about ensuring the firm's access to the production process that links those two activities together. The need to eliminate that risk in the past would have been satisfied perhaps by acquiring a refinery.

The alternative today, especially if the firm has no expertise in refining or managing a refinery, would be to enter into contracts in which the firm agrees to deliver so many barrels of crude oil and, perhaps with some time delay, receives in return a certain amount of high-grade gasoline. That contract functionally creates a synthetic refinery. It may not be appropriate for every such firm, but entering into a simple contract may be a lot safer and a lot more efficient than acquiring the refinery itself. Thus, while creating a synthetic refinery may require the firm's management to increase its knowledge in one area (use of financial tools), not having to build and manage an actual refinery also reduces the managers' need for expertise in another area (building and managing a refinery).

As the skills needed to apply these kinds of risk management are acquired by institutions and their customers, one of the outcomes may be changes in the industrial organization and governance systems in parts of the nonfinancial sector of the economy. In particular, there is the choice between being a private firm (by that we mean a firm with a relatively small number of owners) or being a public firm with ownership held by public shareholders.31

Consider some of the trade-offs that owner-managers weigh when making the choice between the firm being private and public. The advantages of being private are headed by reduced agency costs, lower costs of transferring information including external reporting, protection of key information from competitors, and greater flexibility to optimize with respect to taxes and regulation.

What are the benefits of going public? Most important are the risk-sharing benefits. If a small group of owners is bearing the full risks of the firm, then at some point if this risk becomes large enough, the shadow price placed by them on the firm is lower than the public market price would be because they cannot achieve the diversification that public shareholders have. Hence, private owners internalize parts of the firm's risks that are diversifiable with widespread ownership. The other key

---

benefit has to do with capital expansion. The private firm runs into limits on debt as a function of the absolute variability of the business.

Consider such a firm with needs for funding and risk-sharing that believes it must move to the public ownership domain with all its costs (that reflect what the firm gives up by going public). If the firm were instead able to use efficient hedging to strip away the risks of the business that are not adding to value (e.g., commodity price risks, interest rate risks, or currency risks), it could reduce the total volatility or riskiness of the business, without lowering its profitability. In so doing, it reduces the risk exposure to its private owners. The reduced risk will also allow the firm to expand its capacity to raise capital in the debt market without going public.

To the extent that hedging becomes widespread, a macro shift back toward greater private ownership of firms could appear as these hedging tools are developed. This shift in institutional structure for firms marks one type of influence that financial innovation can have beyond the financial sector.

The Financial Sector

Whether the financial services industry becomes more concentrated or more diffuse in this scenario is ambiguous. The central functions of information and transactions processing would seem to favor economies of scale. Similarly, the greater opportunities for netting and diversifying risk exposures by an intermediary with a diverse set of products suggest both fewer required hedging transactions and less risk capital per dollar of product liability as size increases.32

Increased demand for custom products and private contracting services would seem to forecast that more of the financial service business will be conducted as principal instead of agent, which again favors size. On the other hand, expansion in the types of organized trading markets, reductions in transactions costs, and continued improvements in information processing and telecommunications technologies will all make it easier for a greater variety of firms to serve the financial service functions.

These same factors also improve the prospects for expanding asset-based financing, and such expanded opportunities for securitization permit smaller, agent-type firms to compete with larger firms in traditionally principal-type activities. Continuing the scenario, locational and regulatory advantages currently available to some financial institutions will be

32. For a detailed discussion of the allocation of risk capital in financial firms, see Merton and Perold (1993).

A Conceptual Framework for Analyzing the Financial Environment  25
reduced, because more firms will be capable of offering a broader range of financial products and servicing a wider geographic area. Traditional institutional identifications with specific types of products will continue to become increasingly blurred.

As in other innovating industries, competition to create new products and services, and to find new ways to produce established ones at lower costs could make the research and development activity the lifeblood of the financial services firm. Along this hypothetical path, the need to distribute a higher volume and more diverse set of products promises continued relative growth of the firm’s sales activity.

Controlling actual and perceived default risk for its customer-held liabilities has always been a key requirement for success of any financial intermediary. Higher customer expectations for service and greater complexity of products will intensify the attention given to this issue in the future. The finance function of financial services firms will be significantly expanded to cover not only increased working capital needs of the firm, but also the management of its credit risk exposure to counterparties.

As technological advances continue to drive down trading and custodial costs, the posting and careful monitoring of collateral is likely to be more widely adopted as the primary means for ensuring counterparty performance, especially among financial institutions. Implementation of this practice will in turn require enhanced trading skills for the firm. The trading activity is also likely to expand to meet the execution requirements for implementing more complex product technologies.

This framework for analysis underlies the next six chapters, which offer in-depth analyses and illustrations of each of the core functions of the financial system.

Appendix: Other Functional Classification Schemes

The essence of the functional perspective is its reliance on functions instead of institutional forms as the conceptual anchors for analyzing the financial system. Which functional classification scheme to use depends on its effectiveness in analysis. Table A shows how various authors view the functions that we have described.

As is evident from columns 2 through 4 of Table A, providing liquidity and lending are sometimes listed as core functions of the financial system. We note in the body of the chapter that lending can be analyzed as a combination of the resource transfer and risk management functions. Here we analyze liquidity in terms of two of our core functions: clearing and settling (function 1), and dealing with the incentive problems arising from asymmetric information (function 6).
Table A  Functional Classification Schemes

<table>
<thead>
<tr>
<th>Function (1)</th>
<th>Hubbard (2)</th>
<th>Kohn (3)</th>
<th>Rose (4)</th>
<th>Sanford (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing and settling</td>
<td>Providing liquidity</td>
<td>Providing liquidity</td>
<td>Providing liquidity</td>
<td>Transaction processing</td>
</tr>
<tr>
<td>Pooling</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Transferring resources</td>
<td>Lending</td>
<td>Lending</td>
<td>Lending</td>
<td>Financing</td>
</tr>
<tr>
<td>Risk management</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Information</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Advising</td>
</tr>
<tr>
<td>Incentives</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Note: Sanford also has a functional category called "trading and positioning." In the scheme here, it would be included in the category of risk management.

Liquidity is defined as the relative ease and speed with which an asset can be converted into the medium of exchange, money. In our view, the quantitative measure of an asset’s liquidity is its bid-ask spread. A perfectly liquid asset trades with a zero bid-ask spread. Illiquidity can arise because of the costs and risks of trading an asset or because of incomplete and asymmetric information about the value of an asset.

Liquidity is sometimes confused with certainty of payment. But liquidity and price certainty are logically distinct properties of assets. Thus, shares of stock traded on securities exchanges can be highly liquid yet subject to considerable uncertainty about temporal changes in the transaction price. The converse is that an individual’s claim to a government pension may be completely riskless, with no price uncertainty, yet totally illiquid.

It is sometimes claimed that a core function of commercial banks is to create liquidity. In the traditional bank arrangement, there is a mismatch between the liquidity of the deposits issued by the bank and the loans backing those deposits. Indeed, it is this mismatch in liquidity that is often cited as the root cause for banking panics.

The current environment of low and secularly declining transactions

---

33. See Hooker and Kohn (1994) for an alternative measure of liquidity in terms of search cost.
34. In addition, the size of a transaction can affect the bid-ask spread. One should therefore measure an asset’s liquidity by the bid-ask spread for a transaction of a given size.
35. Diamond and Dybvig (1986), for example, identify liquidity creation as one of the core functions performed by banks. Indeed, they oppose policy moves toward 100% reserve banking because it “would prevent banks from fulfilling their primary function of creating liquidity” (p. 57).
costs for securitization supports a *hierarchical* or *incremental* chaining approach as an efficient means for providing liquidity. Liquidity is enhanced whenever a collection of assets is "repackaged," and the resulting liabilities created have a smaller bid–ask spread than the original assets. Thus highly illiquid and opaque assets can be financed with instruments of different degrees of liquidity—stocks, bonds, and short-term debt instruments. Portfolios of the more liquid of those securities, in turn, can be used as assets to back other securities that will have even greater liquidity, and so on.

Thus, at each link in the chain, the differential in liquidity is relatively small. Cumulatively, it is possible to create virtually perfectly liquid securities while minimizing the danger to the system of ever experiencing a "crisis" because of a mismatch between the liquidity of an intermediary's assets and liabilities.

References


---

36. Ultimately, the economic uncertainties associated with illiquid assets are borne collectively by participants in the financial system. But the form in which they are borne can influence the degree of liquidity available.
No. 92-082, Boston (May). (Published in Hebrew, The Economics Quarterly, August 1992, 152.)


A Conceptual Framework for Analyzing the Financial Environment 29